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Proceedings of the 1st D4|Learning International Conference

Innovations in Digital Learning for Inclusion

Edited by

Elsebeth Korsgaard Sorensen,
Andras Szucs & Md. Saifuddin Khalid

D4|Learning

Digital - **D**ialogic - **D**emocratic - **D**evelopment
Research on innovatiove it-integrating learning processes

Proceedings of the 1st D4|Learning International Conference

Innovations in Digital Learning for Inclusion

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D4|Learning

Digital - Dialogic - Democratic - Development
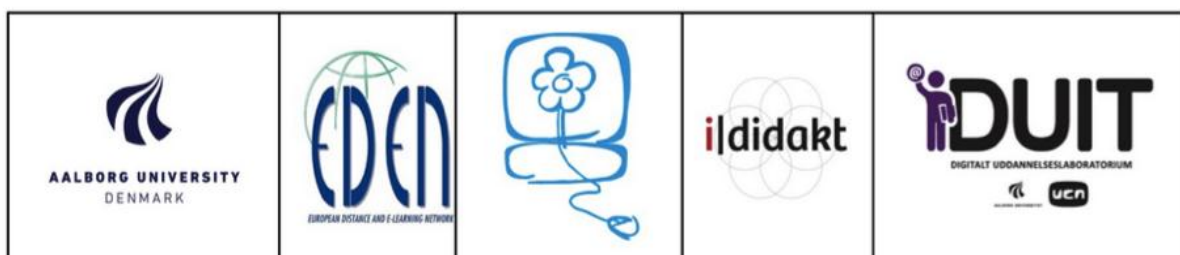Research on innovatiove it-integrating learning processes

ABOUT THIS BOOK

This book is the proceedings of the 1st D4|Learning International Conference on Innovations in Digital Learning for Inclusion, and contains 34 peer-reviewed articles, of which 21 articles are accepted as full papers, 12 articles as short papers and 1 paper in the showcase and demonstration category. These articles present and discuss

- New digital/educational practices
- New digital/educational environments
- New and innovative educational strategies
- Design of teaching/learning for inclusion
- Institutional policies with respect to the challenges of inclusion

The D4|Learning 2015 Conference was arranged in collaboration with Aalborg University (AAU), University College Nordjylland (UCN) and The European Distance and E-Learning Network (EDEN). The conference was held during 17-20 November 2015 at University College Nordjylland (UCN), Aalborg, Denmark.

The conference proceedings is published as a printed edition (ISBN: 978-87-7112-402-6) and as an Open Access e-Book by Aalborg University Press (ISBN: 978-87-7112-405-7). Access e-Book via http://vbn.aau.dk/da/publications/proceedings-of-the-1th-d4learning-international-conference-innovations-in-digital-learning-for-inclusion-d4learning-2015%2834b1305e-9ae3-49ee-be54-cbbadb00f0a8%29.html

EDITORIAL

Human elements in learning are nowadays continuously moving to the forefront. A new organizational culture supporting openness is developing. Present education and training systems are still poorly equipped to face these challenges. Strategies and communication channels need to be created, new businesses built, changing the conventional patterns. In this process, Lifelong learning and ICTs may be key boosters of change.

The aim of this conference has been to invite papers reporting on research that deal with the challenge of using *digital technology for inclusion* in innovative learning designs. We have seen so many examples of non-inclusive educational processes, which do not empower the learner, but, on the contrary, may appear exclusive and work in the name of control over the learner. Meanwhile, to produce and design educational processes with inclusive quality, remains a controversial issue.

The 1st D4Learning International Conference: Innovations in Digital Learning for Inclusion (D4L) is an international conference, organized by the D4Learning Research group (http://d4learning.aau.dk), Aalborg University. It is held in collaboration with the European Distance and e-Learning Network (EDEN), and EDEN's conference series of Open Classroom with a focus on distance education and new technologies in school level education and training. The D4Learning conference serves as a forum for the discussion and exchange of information on the research, development, and applications on all topics related to the use of digital technology for inclusion.

The D4Learning International Conference on Innovations in Digital Learning is a place for presenting and discussing new educational environments, affordances of digital tools for including education through digital technology, and best practices and case studies on innovative technology-based learning strategies or pedagogies to achieve this goal. The D4Learning conference on digital innovation learning through digital technology aims to give an overview of the state of the art as well as upcoming trends and to promote discussion about the pedagogical potential of new learning and educational technologies in the academic, educational and corporate world.

D4Learning spans across disciplines and levels of education. It was seeking papers reporting research work, academic or business case-studies, papers describing advanced prototypes, systems, tools and techniques and general survey papers indicating future directions. Both technological and social-oriented themes were welcome, describing original work, including research, PhD-work, case-studies and commercial presentations of technologies intended to support processes of inclusion.

D4Learning aims at becoming a biannual forum and meeting place for presenting and discussing:

- New digital/educational practices
- New digital/educational environments
- New and innovative educational strategies
- The designs for teaching/learning for inclusion
- Institutional policies on the challenge of inclusion.

All the submitted papers report on research that deal with the challenge of using digital technology for inclusion. Among those of particular interest are papers that report on the innovative use of ICT for the establishment of learning environments/tools, and papers that introduce designs for learning, pedagogical approaches that are conducive to the inclusion of learners or citizens in life and learning.

The D4Learning research group aims at presenting and discussing new educational environments, affordances of digital tools for inclusive education through digital technology, and best practices and case studies on innovative technology-based learning strategies and pedagogies to achieve this goal.

While bearing in mind that teachers and designers are the core architects of "our tomorrow" and given the visions expressed in the Luncheon Declaration 2015, designs for teaching and learning should be more innovative in utilizing the inclusive potential of digital technologies to serve the purpose of inclusive education.

Included in the D4Learning research perspective is also, more concretely, a wish to engage in mixed methods and action research (e.g. Design-Based Research – DRB), research in own practice, and *collaborative cross-disciplinary and trans-disciplinary mode2 research involving multiple stakeholders*. D4Learning looks through the glasses of DRB methodology to study and enhance dialogic and democratic quality in design or cultivation of *NEW knowledge* (as opposed to knowledge reproduction).

In essence, D4Learning research deals with innovative, cross-disciplinary and participatory processes of dialogue and collaboration, facilitated and captured by technology. D4Learning research captures use of digital technology and virtual environments to identify, enable and facilitate flexible teaching/learning opportunities for the future with an *ethical awareness* that is committed to *co-existence, collaboration, inclusion and empowerment* of all types of citizens.

This commitment includes challenges - via technology – to transcend boundaries of contexts (time and space):

- Institutional boundaries
- Organizational boundaries
- Geographical boundaries
- Disciplinary boundaries
- Cultural boundaries

D4Learning research involves modes such as e.g. online teaching/learning (OL), technology supported distance education (DE), problem-based teaching/learning (PBL), digital/blended environments and digital/social networks within the following *fields/areas of research and practice*:

- Computer-Supported Collaborative Learning (CSCL)
- Distance Education (DE)
- Learning to Learn (L2L)
- Meta-Learning (ML)
- Lifelong Learning (LL)
- Problem-Based Learning (PBL/POPP)
- Innovative Learning (IL)
- Technology-integrating inclusion (TI)
- The D4Learning research group operates with concepts, such as:
- Meta-Learning unfolding in digital spaces
- Learning as identification
- Intercultural democratic dialogue in digital spaces
- Empowerment through digital dialogic teaching/learning and general education
- Ownership generated through digital democratic teaching/learning
- Innovation and digital dialogic processes of collaboration
- Digital citizenship and democratic general education in digital spaces
- Etc.

The papers and presentations included in the D4Learning conference fall within the categories of new digital/educational practices, new digital/educational environments, new and innovative educational strategies, the designs for teaching/learning for inclusion and, finally, institutional policies forming the frames of the challenge of inclusion.

In conclusion, this book reifies a variety of papers, which report on issues and approaches relevant to the discourse of inclusion. In the intersection between learning, technology and inclusion the papers of the present book point to central global issues that "foster an open and collaborative culture" and "provide inclusive, equitable, quality education for all" (Incheon Declaration, 2015).

November 2015

Elsebeth Korsgaard Sorensen
Andras Szucs
Md. Saifuddin Khalid

Editorial board

Editors

Elsebeth Korsgaard Sorensen is Professor in Digital Communication & Learning and head of the D4Learning research group (http://d4learning.aau.dk) at the Department of Learning and Philosophy at Aalborg University. She was previously director of the successful master programme in ICT and Learning (MIL), offered in equal collaboration between five Danish Universities (Aalborg University, Aarhus University, Copenhagen Business School, the Danish Pedagogical University, and Roskilde University).

Her research - which is directed towards both the field of Computer Supported Collaborative Learning (CSCL) and distance and open learning (DE) - comprises pedagogical/instructional design and implementation of technology across virtual and physical teaching and learning contexts. Currently, Elsebeth's research is focusing intensively on the challenge of inclusion in schools. As head of the project, iDIDAKT, funded by the Danish Ministry of Education, she investigates the potential and use of digital technology for enhancing the process of inclusion in schools of kids with difficulties in focusing attention, incl. difficulties related to developmental issues. In general, her research raises questions, such as e.g. how to utilize the potential and power of digital and mobile technologies to promote creativity in learning in higher education contexts and in schools. She research optic incudes a strong focus on promoting dialogue and reflection in creative learning designs that utilize the power of digital and mobile technologies to address and advance learner empowerment and digital democratic citizenship.

While spending a research semester (fall 2010) in Cambridge collaborating with scholars at Cambridge University and at the Open University on creativity and open educational resources (OER), she was elected Fellow at St. Edmunds College, Cambridge, October 2010. In 2012 she received an award from the University of Iceland for enhancing international collaborations in research and education between Iceland and Denmark.

Elsebeth has been involved in a long list of research projects. She presents her research at international conferences, frequently as keynote speaker, and she has published extensively in international journals and books within the field. She serves on the editorial board of several international journals and on program committees of several international conferences within the field. A list of selected publications may be found at:
http://vbn.aau.dk/en/persons/pp_596db7f2-e60f-4226-b9ab-5354aea1e238/publications.html

Dr. András Szűcs graduated as bio-engineer at the Budapest University of Technology and Economics in 1980. After ten years of university teaching, from 1990 held international posts as Director of the EU TEMPUS Higher Education Programme in Hungary (1990-95), Director of the EU Phare Central-Eastern European Distance Education Development Programme (1994-96), Director of the European Communication Strategy Programme of the Hungarian Government (1996).

Since 1997, Executive Director and from 2000 Secretary General of the UK based European Distance and E-Learning Network (EDEN). Director of the Centre for Learning Innovation and Adult Learning of the Budapest University of Technology and Economics since 2000. Between 2005 - 2010 served in the European Economic and Social Committee (Brussels) as Delegate in their Consultative Committee on Industrial Change. In 1996-97 worked as Secretary General of the Hungarian Association of Science and Technology Parks and was between 1998 and 2011 President of the Supervisory Board in the same Association. Vice-President of the European Civil Society for Lifelong Learning (EUCIS-LLL) since 2012.

Holder of the Eur-Ing (Euro-Ingenieur) title from FEANI, the European Federation of Engineering Associations and that of the International Engineering Educator Honoris Causa "Ing.Paed.IGIP h.c." title from IGIP – the International Sociaty for Engineering Education. Awarded by Dénes Gábor Memorial Medal (2002) and For the Modernisation of E-Learning in the Russian Federation (2010).

Md. Saifuddin Khalid is Assistant Professor in IT, Learning and Organizational Change at the Department of Learning and Philosophy at Aalborg University (AAU). Within the university network, he conducts research with the research groups D4Learning, IT and Learning Design (ILD), eLearning Lab, ICT4D, and Techno-Anthropology. His recent research focuses on exploring and circumventing the barriers to the integration and adoption of educational technologies in schools. Currently, Khalid is working on the integration and adoption of mobile devices, wearable technologies and augmented reality applications to improve learning and performance of students, and learning community development with teachers and parents affiliated with schools. With a strong academic background in Computer Science, he is involved with researchers and institutions around the globe with a particular interest in interactive educational technology development for schools: human-centered design methods, software engineering, and usability engineering.

Khalid has published 30 peer-reviewed articles as conference papers, journal articles, and book chapters. His publications within the field of educational technology emphasize on participatory action research, mixed methods, the theory of diffusion of innovations, activity theory, and methods in the fields of interactions design, designs for learning and usability evaluation. His research focuses on the integration of educational technologies in both K-12 and higher educational institutions. As a change agent, Khalid provides training to school teachers and university lecturers on pedagogical activity design with web 2.0 apps, mobile devices, wearable technologies and augmented reality applications.

Khalid received a bachelor's degree in Computer Science with Magna Cum Laude from Independent University, Bangladesh (IUB). He has a master's degree in Computer Science from Independent University, Bangladesh (IUB) with the highest academic award in the country — Chancellor's Gold Medal. His Ph.D. is in Human-Centered Communication and Informatics (HCCI) from Aalborg University (in the eLearning Lab), Denmark, was awarded in 2014, titled "Secondary Educational Institution Centered Diffusion of ICT in Rural Bangladesh".

He is very active in the online social networking platforms for researchers and professionals, namely Linkedin, Researchgate, and Academia. His profile including the publications are also available at the Aalborg University's portal for research and teaching profiles,
URL: http://personprofil.aau.dk/profil/122716.

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Keynotes

Professor Alan Tait, Professor of Distance Education and Development

Alan Tait is Professor of Distance Education and Development at the Open University UK, and has a long record of practice and publication. From 2013-2015 Alan was Director of International Development and Teacher Education, and before that was Pro-Vice Chancellor (Academic) at the Open University UK 2007-2012, and from 2004-2007 Dean of the Faculty of Education and Language Studies. He was Editor of the European Journal of Distance and E Learning (EURODL) 2005-2013, was from 1989-1998 Editor of Open Learning, was President of the European Distance and E-Learning Network (EDEN) from 2007-2010, and Co-Director of the Cambridge International Conference on Open and Distance Learning 1988-2013. In 2012 Alan was awarded an Honorary Doctorate by Moscow State University for Economics, Statistics and Informatics, and appointed as Visiting Senior Online Consultant at the Open University of China in 2013. Alan is founding Editor of the Journal of Learning for Development (www.jl4d.org), produced from the Commonwealth of Learning; Visiting Professor at Aalborg University, Denmark; Visiting Fellow of the Centre for Distance Education at the University of London; and transformation advisor to Botswana Open University. Alan holds degrees from the Universities of Cambridge, London, and The Open University. He has worked widely in developing countries, and for international organisations such as UNESCO, the European Commission, and the Commonwealth of Learning. Recent publications include 'Student Success, putting the learner at the heart of the system', ICDE, Oslo 2015; 'Enriching our Students' Lives', in Explorations in Adult Higher /Education, Fall, Number 3, Voices that shape our Vision, pp 16-20 2014 ; 'From place to virtual space: reconfiguring student support for distance and e-learning in the digital age', in Open Praxis, 2014; Distance and E Learning, Social Justice and Development: 'The relevance of the Capacity Approach to the mission of open universities', in the International Review of Research in Open and Distance Learning, 2013. Alan has given keynote lectures in a range of places, most notably in 2014 the Asa Briggs Commemoration lecture at the Commonwealth of Learning Pan-Commonwealth Forum, Abuja, Nigeria.

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Sustainable development goals and digital inclusion

The address concerns itself with the ways in which we understand inclusion in education; the extent to which the digital revolution represents both radical change together with elements of continuity; and finally the ways in which the new UN Sustainable Development Goals reframe the ways in which we need to understand how distance and technology enhanced education can build the necessary capacity at the same time as inclusion and equity in the period 2015-2030.

The development of inclusion in the UK is reviewed in summary, and the location of inclusion in a political environment of struggle, sometimes bloody, is set out as a reminder that inclusion contains strong elements of contested power. A brief history of distance education reveals the ways in which models of pedagogy have included the development of dialogic and democratic dimensions. The growth of technology in education over millennia makes clear that there are strong characteristics of continuity in the ways in which technology and associated communications have provided means for massification of cultural and educational development so necessary for so many countries over the next 15 years of the SDG's. Lastly the scope and scale of the SDG's are reviewed, and the nature of sustainability as a core organising principle is discussed. It is proposed that the concept of sustainability in and for education is challenging, not least in what it means intellectually and organisationally if sustainability is to become the central human endeavour.

Dr. Alan Bruce,CEO & Director:Universal Learning System, EDEN Senior Fellow

Alan Bruce is CEO and Director of Universal Learning Systems – an international consultancy firm specializing in research, training and project management. ULS operates for a number of clients in the educational, development and management sectors. It has offices in Ireland, Barcelona, Helsinki, Sao Paulo and Chicago. Dr Bruce is a sociologist who studied in Los Angeles, Galway and Amsterdam. He has lectured in universities in France, England and Ireland and worked in policy research for the European Commission in Brussels. In Ireland he was responsible at national level for the training and accreditation of specialists working in vocational rehabilitation in the disability sector. He has lectured and published widely on the social construction of disability, labour market policy, equality paradigms, social inclusion, strategic change and managing diversity. He has collaborated with various US universities in research and program development. He lectures for the National University of Ireland Galway in equality, diversity and systematic training. He has been an international academic adviser for the University of Memphis, appointed to its Graduate Faculty in the Department of Psychology and Counselling in 2014.He was Senior Research Fellow in Education with the University of Edinburgh from 2009-2014. He lectures on the Master in European Project Management, delivered in Florence, Italy. He is National Coordinator (Ireland) of the EU Open Discovery Space program. In 2015 he was elected as a Senior Fellow of EDEN (European Distance and E-Learning Network). In 2010 he became Vice-President of EDEN. He is centrally involved in rehabilitation and disability training initiatives throughout Ireland (as Irish Coordinator of IARP – International Association of Rehabilitation Professionals) and coordinates various initiatives in inclusion of disabled people in Ireland, the United States, Finland, Spain and Bulgaria. He was a member of the Global Committee of CORE in Chicago, Illinois. In 2014, Dr. Bruce was appointed to the Board of NCRE, the National Council on Rehabilitation Education.

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Inclusion: Mythologies and Opportunities Meaningful Citizenship in Transformative Crisis

Grave problems persist throughout the European Union, despite financial harmonization and freer movement of goods and labour. Unemployment remains disturbingly high. Social and economic inequality has grown. Racism and discrimination have increased. The grim instability of violence re-appeared with shocking intensity in the Balkan wars and genocide. Above all, the shock of the crisis since the banking collapse of 2008 has now seen a ruthless focus on neo-liberal responses based on austerity and deconstruction of social welfare systems established over the last 60 years. The wars on Europe's periphery have resulted in the shocking unpreparedness of EU States to cope with mass refugee movements and the damaging emergence of xenophobia and nationalism.

Inclusion remains as a core European value, promoted in all EU initiatives as a desired objective. But just exactly what is this notion of inclusion? How is it defined? Conceptual clarity is required from the outset in approaching issues around social exclusion. Rigorous analysis of existing conditions and characteristics of existing mainstream society must be used to make sense of the discrimination in practice and attitude that exists.

Social inclusion is not about halting the irreversible. It is about ensuring that alternative aspects of the human experience are fostered and vindicated. This calls for communities of the marginalized to better define their needs and their potential contribution to the wider societies and communities of which they are part. They should instead be seen as integral components of a global effort to ensure that the

world passed on to subsequent generations is not a uniform, suburbanized market place but a living and diverse collection of richly empowered communities.

Social inclusion will be re-imagined in this paper as an integral element in reassertion of the primacy of human values in teaching, research and best practice. Digital learning can contribute to this. But overcoming exclusion and marginalization means equipping students and educational designers not simply with the mechanisms to understand social challenges - but also, more fundamentally, to be able to do something about them. Social exclusion implies both a structure and a process in the ordering of human relations. As a structure, social exclusion relates to unequal levels of ownership of resources, opportunity and privilege and status in accessing goods, services or information. As a process, social inclusion is concerned with human categories that historically may vary but are, in whatever form, denied full participation and equality. It is also further concerned with the forces and groups that, for whatever reason, implement and maintain exclusion.

This paper will examine the challenges and opportunities of creating and sustaining inclusion within contexts of citizenship, participatory learning and rights. It will look at the trending technologies and methods that now enable meaningful inclusion possible but challenging in the highly contested spaces of globalized learning.

Dr. Terry Anderson, Professor in Distance Education, Athabasca University

Currently, I am a Professor Emeritus and former Canada Research Chair in Distance Education at Athabasca University – Canada's Open University. I used to teach educational technology courses in the Masters of Education and Research Methods courses in the Doctor of Education program. I am also the director of the Canadian Institute for Distance Education Research CIDER.

I was also the Editor for 10 years and am currently Editor Emeritus of the International Review of Research in Open and Distributed Learning (IRRODL). IRRODL is the most widely read and most highly cited journal in our field. It has always been an open access journal and we welcome contributions, reviewers and subscribers- all free of charge.

I still continue on the "keynote" circuit – having done over 50 keynotes in the last 12 years in every continent. You can check out some of the slides from these presentations on Slideshare (http://www.slideshare.net/terrya/) and my Google Scholar Research Profile: https://scholar.google.ca/citations?user=19zDF-8AAAAJ&hl=en)

My current research interests relate to social software use in distance education. You can find more about me including a long and boring CV and some of my recent published articles and presentations at my profile on the Athabasca Landing (Athabasca's boutique social network)

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Invited Speakers

Christian Quvang, Cand.pæd.psych., Ph.D., Associate Professor

Christian's has been a primary school teacher and senior psychologist on Educational Psychology (PP) in a municipality for 8 years. Since 2005, he has worked with assignments for municipalities, schools and institutions throughout Denmark as well as for Social and Ministry of Education. Today, he is an associate professor at UC South Denmark, where he besides being knowledge centre consultant, has responsibilities in NVIE for teacher training in special education and in continuing training in several diploma courses. Christian was elected as censor president in special education teacher training in 2009, and he has thus solved problems in order to optimize the quality of teacher training. Christian is appointed to carry out this task until 2018. In 2010 Christian got his PhD degree at University of Southern Denmark, with a focus on inclusion and special needs in a narrative perspective. In 2012, Christian was personally appointed by the Minister of Education for a three year period to sit in a "Practice and knowledge panel" along with other researchers and practitioners to advise Ministry in matters relating to inclusion and special teaching. Rector assembly appointed Christian to participate in the work of the new Order for teacher training LU13 and implementation of special education as a general theme. Christian is elected as "Link convener" in the network 20 of the "European Educational Research Association" with a focus on international research in education with an intercultural and innovative perspective.

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Inclusion in DK; Status 2015 from a welfare profession perspective

My invited talk at the "The 1st International Conference: Innovations in Digital Learning for Inclusion" offers me a chance to present research projects as examples of what The National Research Centre for Inclusive Practice (NVIE) has been - and is engaged in. At the core of our and my research and projects for ministries, municipalities, schools, organizations, NGO's etc.is the welfare profession perspective and how professions like pedagogues, teachers etc. are supported in their work with inclusion.

Hence my talk will be a short introduction to Danish definitions of inclusion and discourses tied to inclusion, followed by examples from our research projects that support the welfare professions in their work with inclusion when it's about learning, development and being part of communities of practice. Related to this is, on one side the debate on the professions need for methods or tools and on the other side the debate on certain mindsets for professions as a prerequisite for success with the inclusion agenda. The presentation will also include a few examples of research projects in the area of digital learning for inclusion. Finally some future aspects and reflections will conclude the presentation.

Lars Qvortrup: Professor, Department of Learning and Philosophy, Aalborg University

Lars Qvortrup is Professor at the Department of Learning and Philosophy, Aalborg University (AAU), director of LSP, Laboratory for research-based School development and Pedagogical practice (AAU). His research focuses on school development, teacher competence development and school leadership based on mixed methods approaches. Since 1983 Lars Qvortrup has written and/or edited more than 45 books in Danish or English and more than 200 articles in Danish and international readers and journals. The most well-known books in Danish are *Det hyperkomplekse samfund* (1998), *Det lærende samfund* (2001) og *Det vidende samfund* (2004). In English he has among others published the monographs *The Hypercomplex Society* (2003) and Knowledge, Education and Learning – E-learning in the Knowledge Society (2006), and he has been main editor of a series of four books with articles on virtual reality published by Springer Publishing London (2002-2006).

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In search for an operative definition of inclusive education: Levels, Types and Degrees of inclusion and exclusion

Although inclusive education is a hot topic, and although much has been said about inclusive education, no generally accepted definition has been accepted. On the contrary, many projects concerning inclusive education and inclusion policies seems to operate without an explicit definition, perhaps because inclusive education appears to be such an obvious ideal that it is not felt necessary to define it. This is both a research problem and a problem for practice. In order to compensate for these problems, in this paper an explicit and operational definition of inclusive education is presented. It is my suggestion that a definition, which can provide the basis for empirical studies, empirically informed comparisons, inclusion policies and inclusive educational practices should include three dimensions: levels, types and degrees of inclusive education. Consequently, a three-dimensional matrix definition of inclusion and inclusive education is presented.

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- Center for Learning Innovation and Adult Learning, Budapest University of Technology and Economics

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Conference Program
The 1st D4Learning International Conference: Innovations in Digital Learning for Inclusion

Tuesday, Nov. 17
(Pre-Conference day for Danish speaking practitioners)

Time	Activity	Location
9.00-9.30	Ankomst, registrering og morgenkaffe i udstillingsarealet	Hall
9.30 -9.45	Velkomst v. professor Elsebeth K. Sorensen, D4Learning, Institut for Læring og Filosofi, Aalborg Universitet	3.K.20
9.45-10.30	Inkludering i ord og handling Susan Tetler, professor mso i inkluderende specialpædagogik og leder for forskningsprogrammet Social- og specialpædagogik i inkluderende perspektiv, Aarhus Universitet	3.K.20
10.30-11.15	It-faciliteret inklusion af elever med udviklings- og opmærksomheds-forstyrrelser i folkeskolen (ididakt) v/Hanne Voldborg, folkeskolelærer og ph.d.-studerende i ididakt & Elsebeth Korsgaard Sorensen, professor og projektleder for ididakt. Begge tilknyttet D4Learning, Institut for Læring og Filosofi, Aalborg Universitet	3.K.20
11.15-11.30	PAUSE	Hall
11.30-12.00	Inklusion - muligheder og barrierer for deltagelse i læringsfællesskaber v/Christina Holm Poulsen, UCSyd og ph.d. studerende, Syddansk Universitet	3.K.20
12.00-12.30	Teknologibaseret læsning og skrivning i folkeskolen v/Helle Bundgaard Svendsen, lektor ved læreruddannelsen VIAUC og ph.d. studerende, Aarhus Universitet	3.K.20
12.30-13.15	FROKOST	Kantine
13.15-13.45	Elevengagement som katalysator for inklusion og læringsudbytte v/Hilde Ulvseth, konsulent ved professionshøjskolen UCC og ph.d. studerende, Aarhus Universitet	3.K.20
13.45-14.15	Inkluderende it didaktik v/Laura Emtoft, lektor ved læreruddannelsen UCSJ og ph.d. studerende, RUC	3.K.20
14.15-14.30	KAFFE/TE	Hall
14.30-15.00	Inkluderende støtteforanstaltninger i folkeskolens almenundervisning v/Thomas Thyrring Engsig, lektor ved læreruddannelsen UCN og ph.d. studerende, Aalborg Universitet	3.K.20
15.00-15.30	God uddannelse for alle - også for unge med særlige behov Leo Komischke-Konnerup, chefkonsulent UCSyd og ph.d. studerende, Aalborg Universitet	3.K.20
15.30-15.55	Afsluttende rapport fra dagen v. Torben Næsby, lektor ved pædagoguddannelsen UCN og ph.d.	3.K.20
15.55-16.00	Farvel og tak v/Professor Elsebeth Korsgaard Sorensen D4Learning, Institut for Læring og Filosofi, Aalborg Universitet	3.K.20
16.00-17.00	Registration	3.0.31
17.00-18.30	PARALLEL WORKSHOPS OERs for inclusion *Elsebeth Korsgaard Sorensen and Hanne Voldborg Andersen, AAU* # hashtags as organization of learning *Thomas Kjærgaard, AAU and Christian Wahl, UCN*	3.K.30 3.K.31
19.30-21.30	WELCOME RECEPTION (at University College Nordjylland, UCN)	Canteen

Wednesday, 18 November 2015

Time	Activity	Location
08:30-09:00	Conference Kit Collection	Secretariat 3.0.31
09:00-09:15 18/11/15	WELCOME *Elsebeth Korsgaard Sorensen, Aalborg University* Conference Chair	Auditorium 3.K.20
09:15-09:30 18/11/15	WELCOME *Antonio Moreira Teixeira, Universidade Aberta, Portugal* President of EDEN	Auditorium 3.K.20
09:30-10:00 18/11/15	OPENING SPEECH "The Challenge of Inclusion Revisited" *Elsebeth Korsgaard Sorensen, Aalborg University*	Auditorium 3.K.20
10:00-10:30	COFFEE BREAK	
10:30-11:30 18/11/15	KEYNOTE *Alan Tait, Director of International Development and Teacher Education at the Open University (OU), UK*	Auditorium 3.K.20
11:30-13:00	*PARALLEL SESSIONS 1 (1A, 1B, 1C)*	
11:30-13:00	*Parallel Session 1A: Biological Challenges and Inclusion* *Session Chair: Elsebeth Korsgaard Sorensen*	Session Room A 3.K.30
11:30-12:00 18/11/15	1A-1. Supporting Inclusion of Learners with Attention Deficit-Hyperactivity Disorder during Sound-Field-Amplification-Systems. *Hanne Voldborg Andersen* *Aalborg University, Denmark*	Session Room A 3.K.30
12:00-12:30	1A-2. Digital Assistive Technology Tools for Students with Dyscalculia. *Onintra Poobrasert, Thaphat Mupattararot* *National Electronics and Computer Technology Center, Thailand.*	Session Room A 3.K.30
12:30-12:45 18/11/15	1A-3. An Ergonomic and Conceptual Approach to The E-Learning Adaptation of a Training Program for Parents of Children with Autism Spectrum Disorder. *Vasiliki Mourgela, Ecaterina Pacurar, Céline Clement* *University of Strasbourg, France*	Session Room A 3.K.30
12:45-13:00 18/11/15	1A-4. Designing for inclusion: Supporting disabled students in a distance learning context. *Lisette Toetenel, Annie Bryan* *Open University, United Kingdom*	Session Room A 3.K.30
11:30-13:00 18/11/15	*Parallel Session 1B: Inclusion Concepts* *Session Chair: Alan Tait*	Session Room B 3.K.31
11:30-11:45 18/11/15	1B-1. A meaningful ICT approach to learning in contexts of multilingualism and great cultural diversity *Ana Mouta Costa, JP-inspiring knowledge, Portugal*	Session Room B 3.K.31
11:45 – 12:00 18/11/15	1B-2. E-Inclusion of Pupils with Literacy Difficulties *Helle Bundgaard Svendsen* *Aarhus University and VIA University College, Denmark*	Session Room B 3.K.31
12:00 – 12:30 18/11/15	1B-3. Media as Facilitating and Conditioning Factors in Intercultural Projects *Jonas Norgaard, Aalborg University, Denmark* *Mariona Masgrau Juanola, University of Girona, Spain*	Session Room B 3.K.31
12:30 – 12:45 18/11/15	1B-4. Inclusive E-Learning practices at University Colleges in Denmark. *Lis Lak Risager, Metropolitan University College, Denmark* *Vidar Luth-Hanssen, Fagskolen Telemark, Norway* *Anders Bindslev Rask, University College Nordjylland,* *Elsebeth Korsgaard Sorensen, Aalborg University, Denmark*	Session Room B 3.K.31
11:30-13:00 18/11/15	*Parallel Session 1C: University Education Context* *Session Chair: Andras Szucs*	Session Room C 3.0.30

11.30 – 12.00 18/11/15	1C-1. International Students' Use of Informal Web Resources and Tools for Formal Studies at an English University. *Palitha Edirisingha, Tracy Simmons* *University of Leicester, United Kingdom.*	Session Room C 3.0.30
12.00 – 12.30 18/11/15	1C-2. Transitions of Chinese International Students' Use of Web Technologies for their Studies in a UK University. *Mengjie Jiang, Palitha Edirisingha* *University of Leicester, United Kingdom.*	Session Room C 3.0.30
12.30 – 13.00 18/11/15	1C-3. Mobile Learning Using Social Networks: Preferences of University Students. *Yaacov J Katz, Michlala – Jerusalem Academic College and Bar-Ilan University, Israel.*	Session Room C 3.0.30
13:00 – 14:00	LUNCH	
14:00 – 15:00 18/11/15	INVITED TALK *Christian Quvang, Dr., Cand. Pæd. Psych., Associate Professor, Knowledge Centre Consultant at NVIE (National Knowledge Centre for Inclusion and Exclusion)*	Auditorium 3.K.20
15:00 – 15:30 18/11/15	COFFEE BREAK	
15:30 – 17:30 18/11/15	D4LEARNING NETWORK MEETING Open roundtable Join the D4Learning research group (investigating possibilities of collaboration and networking)	Auditorium 3.K.20
19:00 – 20:30 18/11/15	MAIN CONFERENCE RECEPTION At Slotspladsen 4, 9000 Aalborg	Utzon Center, Det Obelske Auditorium

Thursday, 19 November 2015

Time	Activity	Location
08:30-09:00	CONFERENCE KIT COLLECTION	Secretariat 3.0.31
09:00-10:00 19/11/15	KEYNOTE Dr. Alan Bruce *Director of Universal Learning Systems – an international consultancy firm specializing in research, education, training and project management.*	Auditorium 3.K.20
10:00-10:30	COFFEE BREAK	
10:30-11:30	*PARALLEL SESSIONS 2 (2A, 2B, 2C)*	
10:30-11:30 19/11/15	*Parallel Session 2A: Higher Education Context* *Session Chair: Alan Bruce*	
10:30-11:00 19/11/15	2A-1. Improving Student Approaches to Online Assessment in Higher Education. *David Smith, Charles Sturt University, Australia.*	Session Room A 3.K.30
11:00-11:30 19/11/15	2A-2. "Sometimes, I feel a bit decoupled": Strategies in Videoconference Teaching. *Anne-Mette Nortvig, Aalborg University Copenhagen, Denmark.*	Session Room A 3.K.30
19/11/15	*Parallel Session 2B: Designs for Learning* *Session Chair: Md. Saifuddin Khalid*	Session Room B
10:30-11:00 19/11/15	2B-1. Supporting the "Whole Learning Design Life-Cycle" through the Pedagogical Planner. *Francesca Pozzi, Andrea Ceregini, Francesca Dagnino, Michela Ott, Mauro Tavella* *Consiglio Nazionale delle Ricerche – CNR, Italy*	Session Room B 3.K.31
11:00-11:30 19/11/15	2B-2. When Innovative Instructional Designs are too Innovative: Lack of Schema. *Thomas Kjaergaard, Aalborg University, Denmark* *Christian Wahl, University College Nordjylland, Denmark.*	Session Room B 3.K.31

10:30-11:30 19/11/15	*Parallel Session 2C: Dialogical Approaches* *Session Chair: Elsebeth Korsgaard Sorensen*	Session Room C 3.0.30
10:30-11:00 19/11/15	2C-1. E-Learning in Dialogical Practice – Ethical Implications and the Practice of the Digitale Based Constructive Feedback *David Kergel, Birte Heidkamp* *Carl von Ossietzky Universität Oldenburg, Germany*	Session Room C 3.0.30
11:30-13:00	LUNCH	
13:00-14:00 19/11/15	INVITED TALK Lars Qvortrup, *Professor and Director of LSP (Laboratory for Research based Development of Schools and Pedagogic Practice), Dept. of Learning and Philosophy, Aalborg University, Denmark*	Auditorium 3.K.20
14:00-15:00	*PARALLEL SESSIONS 3 (3A, 3B)*	
14:00-15:00 19/11/15	*Parallel Session 3A: Online Learning* *Session Chair: David Smith*	Session Room A
14:00-14:30 19/11/15	3A-1. Teaching Art and Craft in an Online Environment. *Hege Gjerde Sviggum, Bente Sollid* *Sogn og Fjordane University College, Norway.*	Session Room A 3.K.30
14:30-14:45 19/11/15	3A-2. Whose Rules: Dialogue in Online Spaces. *Kathrin Otrel-Cass, Christopher Harter* *Aalborg University, Denmark*	Session Room A 3.K.30
14:45-15:00 19/11/15	3A-3. The Relocation of Learning: New Educational Spaces *Esteban Vázquez-Cano, M.ª Luisa Sevillano García, Genoveva Leví Orta,* *Spanish National University of Distance Education (UNED), Spain*	Session Room A 3.K.30
14:00-15:00 19/11/15	*Parallel Session 3B: Digital Literacy and Internet Skills* *Session Chair: Hamdy A. Abdelaziz*	Session Room B
14:00-14:30 19/11/15	3B-1. A Systematic Review and Meta-Analysis of Teachers' Development of Digital Literacy *Md. Saifuddin Khalid, Tori Slaettalid,* *Aalborg University, Denmark* *Mahmuda Parveen, University College Nordjylland, Denmark* *Mohammad Shahadat Hossain, University of Chittagong, Bangladesh*	Session Room B 3.K.31
14:30-15:00 19/11/15	3B-2. Is there a Second Level Divide in Student's Internet Skills? – A Cross-Country Analysis of Denmark & India. *Aparna Purushothaman, Susanne Dau* *Aalborg University, Denmark*	Session Room B 3.K.31
15:00-15:30	COFFEE BREAK	
15:30-17:00	*PARALLEL SESSIONS 4 (4A, 4B)*	
15:30 – 17:00 19/11/15	*Parallel Session 4A: ELT/FLT* *Session Chair: Kathrin Otrel-Cass*	Session Room A 3.K.30
15:30-16:00 19/11/15	4A-1. Online Communication in a Higher Education EFL Course: The Role of Student and Teacher Activity in Student Retention. *Jackie Robbins, Aleksandra Malicka, Laia Canals, Christine Appel* *Universitat Oberta de Catalunya, eLearn Center, Spain.*	Session Room A 3.K.30
16:00-16:30 19/11/15	4A-2. An Investigation into the Students' Attitude towards ICT-based ELT Classroom. *Mizanoor Rahman, Bangladesh Open University, Bangladesh,* *Prithvi Shrestha, The Open University, United Kingdom,* *Bangladesh Open University, Bangladesh.* *Iftekhar Khalid, Bangladesh Open University, Bangladesh*	Session Room A 3.K.30
16:30-17:00 19/11/15	4A-3. ICT-based English Language Learning (ELL) in Bangladesh: A Literature *Abu Taher, Mizanoor Rahman, Bangladesh Open University, Bangladesh. Prithvi Shrestha, The Open University, United Kingdom. AKM Iftekhar Khalid, Bangladesh Open University.*	Session Room A 3.K.30

15:30 – 17:00 19/11/15	**Parallel Session 4B:** *Short Paper: Mix* Session Chair: Hanne Voldborg Andersen	Session Room B 3.K.31
15:30 – 15:45 19/11/15	4B-1. Can Innovative Learning Applications Influence the Students' Attitudes Towards Science: The Case of Educational Robotics. *Ilias Batzogiannis, Platon School Katerini, Greece* *Evripidis Hatzikraniotis, Aristotle University Thessaloniki, Greece*	Session Room B 3.K.31
15:45 – 16:00 19/11/15	4B-2. Embedding eTwinning to affect whole-school improvement in special educational needs and mainstream schools *Kate Walker, British Council Scotland*	Session Room B 3.K.31
16:00 – 16:15 19/11/15	4B-3. ECO Project MOOCs. MOOCs for everybody. *Sara María Tejera and Sara Osuna, UNED, Spain*	Session Room B 3.K.31
16:15 – 16:30 19/11/15	4B-4. The UOC's Educational Model: From Collaborative Learning to Agile Learning. *Ingrid Noguera, Anna Elena Guerrero and Christine Appel Universitat Oberta de Catalunya, Spain*	Session Room B 3.K.31
16:30 – 16:45 19/11/15	4B-5. Analysis of Difficulties of Spanish Teachers for the Inclusion of Teaching Methods Based on Digital Reading within PISA Framework. *Esteban Vázquez-Cano, M.Luisa Sevillano García and Genoveva Leví, Orta Spanish National University of Distance Education (UNED), Spain*	Session Room B 3.K.31
16:45 – 17:00 19/11/15	4B-6. Increasing Completion Rates through a Self-Service Online Learning Strategy. *Joanne Jenson, Panfilo Cavicchia* *Acquire Learning, AcquireEd, Australia*	Session Room B 3.K.31
19:30-23:00 19/11/15	CONFERENE DINNER (With Jazz Music) BEST PAPER AWARD At Strandvejen 4, 9000 Aalborg.	Restaurant Fusion

Friday, 20 November 2015

Time	Activity	Location
08:30-09:00	CONFERENCE KIT COLLECTION	Secretariat 3.0.31
09:00-10:00 20/11/15	KEYNOTE Terry Anderson *Professor Emeritus and former Canada Research Chair in the Centre for Distance Education and the Technology Enhanced Knowledge Research Centre at Athabasca University, Canada*	Auditorium 3.K.20
10:00-10:30	COFFEE BREAK	
10:30-11:30	*PARALLEL SESSIONS 5 (5A, 5B)*	
10:30-11:30 20/11/15	*Parallel Session 5A: Quantitative Analysis* Session Chair: Hanne Voldborg Andersen	Session Room A 3.K.30
10:30-11:00 20/11/15	5A-1. The Echo of Value: A Suggested Model to Build a Culture of Personalized Learning Through Digital Media. *Hamdy A. Abdelaziz, Arabian Gulf University, Bahrain.*	Session Room A 3.K.30
11:00-11:30 20/11/15	5A-2. Collaboration for IEP on Palm. *Zrinjka Stančić, Klara Matejčić,* *Faculty of Education and Rehabilitation Sciences, Education-Rehabilitation Support Unit, Croatia*	Session Room A 3.K.30
10:30-11:00 20/11/15	***Parallel Session 5B: Educational Tech. Development*** Session Chair: Thomas Kjærgaard	Session Room B 3.K.31
10:30-11:00 20/11/15	5B-1. An Educational Platform for All: The e-Hoop Approach. *Eleni Chatzidaki, Lefteris Kozanides, Michalis Xenos,* *Hellenic Open University, Greece.* *Aliki Economidou, Yiannis Laouris,* *Cyprus Neuroscience & Technology Institute, Cyprus*	Session Room B 3.K.31

11:00-11:30 20/11/15	5B-2. Technology Enhanced Self-Directed and Self-Regulated Learning Outside the Campus – An Inclusion of Students as Designers. *Susanne Dau, Aalborg University, Denmark.* *Louise Bach Jensen, Lars Falk, University College Nordjylland, Denmark.*	Session Room B 3.K.31
11:30-11:45 20/11/15	S&D: SHOWCASES AND DEMONSTRATIONS Personal learning environment which enables inclusion and social interactions *Ebba Ossiannilsson, The Swedish Association for Distance Education, Sweden.* *Nick Etlar Eriksen and Nina Rung-Hoch* *Mentorix, European University, TEL-A, Denmark.*	Auditorium 3.K.20
11:45-13:00 20/11/15	CLOSING SESSION (including rapporteur)	Auditorium 3.K.20
13:00-14:00	FAREWELL LUNCH & COFFEE	Canteen

Table of Contents

Supporting inclusion of learners with attention deficit-hyperactivity disorder in sound-field-amplification-systems

Hanne Voldborg Andersen
Aalborg University, Denmark

ICT is internationally recognised as a valuable tool for inclusion, particular for people with disabilities, where technology can improve their quality of life, reduce social exclusion, and increase participation in life and learning. This study examines the impact teachers and learners experience in proportion to classroom and on-task behaviours among children with developmental and attention deficits when using personal Sound-Field-Amplification-Systems in the classroom. The aim of increasing knowledge about 'good practise' when Sound-Field-Amplification-Systems are put into operation will uncover further implications when implementing this technology in schools.

Introduction

The Salamanca Declaration (Unesco, 1994) and United Nations Convention on the Rights of Persons with Disabilities (United Nations, 2006) prescribes that all states should provide an inclusive education system where disabled children are able to access inclusive education where they live and receive individual support in the general education system. Therefore, the Danish Government in 2012 passed a law on inclusion, which requested public schools in Denmark to include 97% of all learners in the mainstream education system (Folketinget, 2012). As a consequence, many learners who earlier visited special schools and had Special Educational Needs (SEN) teachers now had to be included in mainstream classes taught by mainstream teachers.

School leaders and teachers are pointing at a lack of tools and competences to include a specific group of SEN learners – children with developmental and attention deficit disorders (e.g. ADHD, ADD, ASF) – and searching for new ways to handle the challenge (EVA, 2011). The investigation on which this present study is based, is part a of a work package in a wider research project, iDidact, which investigates opportunities for using ICT as a vehicle in the challenge of inclusion of learners with developmental and attention deficit disorders (focus learners) in mainstream schools.

Ainschow and Booth (2002) define inclusion as 'the continuous process of increasing the presence, participation and achievements of all children and young people in local community schools'. Alenkær (2012) and Qvortrup (2012) both introduced three perspectives of inclusion: (a) Physical inclusion – where learners are (passively) present at school, (b) Social inclusion – where learners are (actively) present and seem as a part of the social community that exists among peers at the same age, and (c) Academic inclusion – where learners participate (actively) in the educational programme, contribute to the assignments, and achieve learning results by doing this. To some extent, we are able to examine and measure the three perspectives of inclusion separately: Is the student present in the classroom, does he/she collaborate or play with peers, and does he/she receive good grades? However, as Alenkær (2012) stated, inclusion must be understood in a qualitative sense, where an individual is only fully included when he/she experiences him/herself as physically, socially, and academically included.

ADHD is a clinically diagnosis and a term for exorbitant impulsivity, hyperactivity, and attention difficulties. ADHD affects approximately 4–10 % of children of school age, and 65% of them suffer continuously from the consequences of ADHD in their adulthood (Faraone, 2005a).

Attention difficulties include having trouble maintaining concentration on a specific task for a longer period of time, easily being disrupted by external stimulus, not seeming to pay attention to direct addressing, and often needing to have instructions and explanations repeated (Hansen & Sneum, 2008). Compared to school activities, we will often notice low productivity, many errors due to carelessness, and poor organisational capability. The *hyperactivity* comes into sight by a constant fiddling with things, restless movement, or persistent movements in the chair. *Impulsivity* appears in behaviours where a child speaks out of turn, can hardly wait his/her turn, and interrupts others' conversation or play. Learners with ADHD can be classified in different ways: (a) Predominantly inattentive, (b) Predominantly

hyperactive/impulsive, and (c) Inattentive and hyperactive/impulsive (Doyle, 2004) The symptoms of ADHD are very sensitive to the situation and the context; a person with ADHD has difficulty concentrating his/her attention on one type of activities or tasks but is very engaged and immersed in others (Barkley, 2001). A very broad group of SEN learners appear to have learning problems and struggle with problems such as lack of attention, selective and continuing attention, and response inhibition as well as lack the ability for planning, promoting, strategic thinking, change in attention, flexibility in working memory, self-regulation, and self-monitoring (Hansen & Sneum, 2008).

We know that students with ADHD have a range of school related problems – specifically, problems in reading, mathematics, and written expression – and approximately 80% of them have difficulty performing at the same levels as their peers (Barkley, 1998; DuPaul & Stoner, 2003). Part of the classroom-related problems may be related to their oppositional behaviours or their inability to follow through when given instructions (Barkley, 1998), but inattentiveness may furthermore negatively impact these students' ability to follow directions (Kendall, 2000), which impair their ability to remain on task and comply with directions (Bos & Vaughn, 2002). However, as described by Abramowitz and O'Leary (1991), the elevated noise levels in a classroom could be another factor that impacts the ability of students with ADHD to stay on task and follow directions.

The general potential of ICT for supporting educational processes of participation, collaboration, and creation is widely accepted (Dalsgaard & Sorensen, 2008; Sorensen, Voldborg, & Grum, 2013). In a more focused perspective, ICT is internationally recognised as a valuable tool for inclusion (Waller, 2013), particularly for people with disabilities, where technology can improve their quality of life, reduce social exclusion, and increase participation (WSIS, 2010)

An earlier outcome of our research identified five types of ICT based including interventions, which have been shown as fruitful to enhance the process of inclusion in classrooms with learners with extensive developmental and attention disorders (Andersen & Sorensen, 2015): Structure & Overview, Shielding & Focus, Comprehension & Differentiation, Production & Dissemination, and Collaboration & Knowledge Building.

This part of the research project will investigate the impact of Sound-Field-Amplification-Systems (SFAS) as a Shielding & Focus increasing Tool for ADHD learners in mainstream classrooms. SFAS works by projecting the teacher's voice and enables learners to hear the teacher's instructions clearly.

The SFAS consists of a microphone/FM transmitter, an amplifier and one or more loudspeakers, and its amplifies and broadcasts the voice of an instructor through wall or ceiling-mounted loudspeakers or to a personal signal FM System Receiver, which provides each child with an individual amplification system and may therefore be more effective than classroom systems (Purdy, Smart, Baily, & Sharma, 2009). The teacher is equipped with a wireless microphone and talks in a normal conversational tone.

The intelligibility of speech in an enclosed space is related to both the speech-to-noise ratio, which is the difference in decibels between the levels of the received speech signal and the background noise, and the acoustic characteristics of the space (e.g. the reverberation in the room, which smearing or masks the sounds). Ching and McPherson (2005) identify three sources of ambient noise in a classroom that interferes with a student's reception of speech: Classroom Noise, Internal Noise (at the school), and External Noise (outside the school).

Poor listening environments affect students' ability to attend to and process relevant aspects of the spoken signals in classroom – and as a consequence of that – compromise learning and achievement (McSporran, 1997; Pickard & Bradley, 2001). There is 'evidence that particular groups of students are differentially at risk' (Dockrell & Shield, 2006) in such cases. Younger learners who are developing appreciation and language skills mainly due speech recognition require better acoustical conditions than adults with a rich background of life experiences. These inexperienced learners do not have the ability that adults to adjust their hearing in unfavourable listening conditions, and they typically do not acquire that kind of maturity until they are 13–15 years old (McSporran, 1997). The linguistic, cognitive, and social knowledge that is required in the listening process influences children's ability to make meaning from what is heard. Poor acoustic conditions will cause the child to spend more time and energy on deciphering the message than on its interpretation and meaning (ibid.) and may complicate the learning process for children with

learning difficulties, language disorder, second language learners, learners with hearing losses and a history of middle ear problems, and for children with ADHD.

Other research on SFAS in classrooms shows evidence for

- Improved speech recognition performance (Larsen & Blair, 2008).
- Greater literacy gains and more attentiveness to the teacher's voice (Darai, 2000).
- Higher achievements in the basic skills and improvements in attention and participatory behaviour (Flexer, 1992).
- Improved attention, understanding, and ease of listening and teaching (Berg, Batemen, & Viehweg, 1989).
- Improved listening and academic behaviours and maintaining attention (DiSarno & Schowalter, 2002).
- Improved attention, communication, and classroom behaviour and 'happier' students when they can hear better (Massie & Dillon, 2006a; Massie & Dillon, 2006b).
- Increased attention, hand raising, material gathering, and appropriate playing, and decreased disruptions and off-task behaviour (Palmer, 1998).

Maag and Anderson (2006) examines the efficacy of SFAS in improving the speed with which three learners with ADHD (kindergarten, first, and second grade) follow four types of teacher directions in general education classrooms. They reported that the study was consistent with previous SFAS research indicating efficacy across academic and social behaviours. The three participants increased in the speed of compliance on all direction types but followed high interest and alpha directions (short and precisely) more rapidly than task demands and beta directions (longer and unclear).

Research design

As a part of the wider research project, iDidact, we will examine what impacts teachers experience in proportion to classroom and on-task behaviour among children with attention and developmental deficits when using personal SFAS in the classroom and uncover implications when implementing this technology in schools in an attempt to increase knowledge about 'good practise' when putting SFAS into operation.

iDidact is an iterative and explorative qualitative research project, where data is collected in a real school context with an Educational Design Research (EDR) methodological approach as introduced by McKenney and Reeves (2012). EDR may be defined as a 'genre of research, in which the iterative development of solutions to practical and complex educational problems also provides the context for empirical investigations, which yields theoretical understanding that can inform the work of others' (ibid. p. 7). It involves a case study in the frame of Action Research (AR) (Jungk & Müllert, 1998; Tofteng, 2012) and uses a hermeneutical, phenomenological interpretation of data. It is crucial for our data collection that the unfolding research process go hand in hand with the involved teachers' work and interventions into the field of study, so the process becomes a learning endeavour in terms of learning how to work with SEN learners and integrating ICT in the classroom. Therefore, we designed this study using an AR/EDR approach, where the researchers are included as participants – and professional dialog partners and facilitators of the transformation processes – at the schools involved: 11 schools where 46 teachers in 15 classes have experimented with and examined the impact of including ICT facilitated interventions with more than 500 learners aged 6 to 16 years – including 58 learners with extensive developmental or attention deficit disorders (focus learners). We are studying the problem in its real life context: the mainstream classroom, where the borders between phenomenon and context are unclear. We have collected data from teachers' statements at seminars, in research blogs, from interviews, and from surveys and observations in the classroom, and we analyse and compare the data in a data triangulation.

The pretest of the 58 focus learners indicated that their challenges varied widely: Generally, they were challenged in proportion to memory, attention, persistence, concentration, hyperactivity, impulsivity, behaviour, or social competences. The majority had problems with attention, 50% struggled with hyperactivity, and 25% of the group showed behavioural disorders. They were all challenged in proportion to memory, concentration, and persistence. A total of 75% had relatively weak – and not age

corresponding – pro-social competences. Knowledge from the pretest was used to guide the teachers in selecting inclusive ICT-based interventions.

The SFA technology is new for all participants. A hearing aid company (Comfort Audio) put SFAS at the disposal of teachers, who find it valuable and relevant to try it out for their focus learners. The Company visited the schools, instructed the teachers, adjusted the technology for the specific context, and lent them the SFAS for 1–3 month. All schools had a teacher microphone and some personal FM receivers with different kinds of headsets tailored to the individuals' specific needs: for example, single ear, double ear, or fully closed.

Analysis and findings

The SFAS was provided for all 11 schools in the project and 6 of them found it valuable to test the technology with their specific focus learners. Analysing data from the teachers' research blogs, interviews and observations in 8 classes with a total of 18 focus learners showed a considerable amount of positive impact by 13 students – or 72% – on classroom and on-task behaviour (Table 1). The positive impact regarding classroom behaviour was described by the teachers as students staying calmer in the lessons (23%), exhibiting enhanced awareness and focus when following class teaching (46%), and enhanced participation in classroom teaching (15%), while the highest impact was found in on-task behaviour, where the teachers observed an enhanced concentration by students independently of school work (69%).

For a minor group of 5 students – or 28% – the SFAS had a negative impact, which the teachers and learners explains was caused by neither a generally high sensitivity to impressions (40%) nor a fear of being exposed when using special needs equipment (60%). Two students in grade 2 were more restless and unfocused, when the teacher's voice was increased and the voices of the peers were removed. The resistance against using special needs equipment grew with the age of the students.

Table 1
Impact of using SFAS in the classroom

	2. Grade 8 years old	4. Grade 10 years old	6. Grade 12 years old	8. Grade 14 years old	Numbers of the students	Distribution in per cent	Per cent of the students
Positive impact	3	3	4	3	13		72%
Staying more calm as usual	2		1		3	23%	
Enhanced awareness by class teaching	2	1	2	1	6	46%	
Enhanced participation by class teaching	1	1			2	15%	
Enhanced concentration by independent school work	1	2	3	3	9	69%	
Enhanced comprehension			2			15%	
Negative impact	2		1	2	5		28%
More restless and unfocused	2				2	40%	
Balking at using the SFAS – Fear of being exposed			1	2	3	60%	

From observations in the classes, we found that many students – both focus learners and peers – when possible, choose to use headphones in the classroom to reduce impressions and noises and increase their

attention on the tasks. The teachers in 2nd and 4th grade use iPads or Chromebooks to create a nice and quiet *sound-wallpaper*.

In the final survey, we asked the teachers of the value of the different technological interventions in the project. A total of 41% of the answering teachers tested the SFAS and 82% of them expressed that SFAS has a good impact when including children with attention and developmental deficits in their daily practise, while 18% said that it had no impact. None of them described any negative impact.

The data from the teachers' research blogs and the interviews indicate that there are several conditions that either prevent teachers from using SFAS or hinder fruitful implementation of the technology. All schools expressed that it was difficult for them to create continuity in the implementation of the SFAS. They were interrupted by students' and teachers' absence due to illness or professional development courses, alternative teaching activities in the classes, or a lack of agreement among teachers to use the equipment. Other obstructions such as price, technical challenges, and fear of being exposed are mentioned and presented in Table 2.

Table 2
Implications of using SFAS

Implications by implementation of SFAS		Number of schools	Schools in per cent
The cost of SFAS was too high for the schools		2	33.33%
Lack of continuity by implementation of SFAS	Reasons:	6	100%
	Students' absence due to illness	3	50%
	Teacher's absence due to illness or further professional development	2	33.33%
	Lack of time for implementation and getting used to SFAS	2	33.33%
	Lack of shared visions among colleagues	1	16.67%
	Disturbed by alternative teaching activities	3	50%
The SFAS were not able to compensate for students' lack of ability (e.g. low IQ, working memory challenges)		2	33.33%
Technical challenges		3	50%
Students' and teacher's fear of being exposed.		3	50%
		1	16.67%

Discussion

Using Alenkærs's definition of inclusion (Alenkær, 2010), we can see that the use of SFAS has a value in proportion to physical and academic inclusion of the focus learners: they become calmer and more focused in the classroom, they are more aware during classroom teaching, and they are more concentrated during tasks. Both teachers and learners expressed that they enjoy this tool. A focus learner (boy, 6th grade) said that 'I can concentrate much better and get more out of the teachers' explanations – both because I am shielded from the other students' noises and can hear the teacher clearly all the time'. Another focus learner (girl, 6th grade) continued, 'It has helped me, as I started getting better with the tasks after focused instruction'.

Five focus learners (28%) did not improve their performance using SFAS. Four of them had low IQ and/or a stunted development for concepts and language skills. They may have heard the teachers' instructions and explanations, but they were not able to comprehend the academic topics. We introduced special needs children with ADHD for the teachers in the project, but though we did not discuss the

benefits of using alpha communication instead of beta communication, one of the teachers successfully supported a very challenged-focused learner (girl, 4th grade) by using SFAS and being very aware of presenting only short messages and one piece of information at a time. Maag (2004) pointed out that even though students with ADHD follow alpha commands faster than beta commands (Gardill, DuPaul, & Kyle, 1996), there will still be a profit to using SFAS for more unconscious teachers, who – for whatever reason – prefer beta commands, because students also follows beta commands faster during the SFAS.

It is quite surprising for teachers to observe some of the hyperactivity disappears when they used SFAS. One of the teachers said, 'I have witnessed a very unquiet and un-concentrated boy the last couple of weeks – worse than earlier – but he is more quiet and aware, when he uses the SFAS', and the focus learner himself confirms this evaluation. During this relative short period of testing SFAS, we did not recognize any change in the social inclusion of the focus learners or in their ability to inhibit their impulsivity, but we may presume, as highlighted by Palmer (1998), that this factor could be affected if focus learners experience more academic success and less reprimands for inappropriate behaviour.

One of the schools conducted experiments with alternative – and cheaper – SFA technologies using a Bluetooth headset for the teacher, and connected the teacher's voice to the students' iPads using Google Hangout. Although there were some technical implications (e.g. few seconds' delay from teachers' vocal expressions until the students heard it, which disturbed some of the learners) it was very useful, and the students (2nd grade) requested further use of this method. However, even though the teacher described it as the most successful intervention tried out in the project, he stopped using it. When asking why, he said, 'I can't find the charger for the microphone – and I've forgotten how effective it was. But it was also somehow difficult for my practise in the classroom, because the dialoguing shifted to one-way-communication from the teacher to the students, when everybody was shielded with headphones'.

Testing individual receivers may have been a mistake, but we believed, as stated by Purdy, Smart, Baily and Sharma (2009), that it would be more effective than a classroom system – especially for our focus learners – where we could bring them exactly level of shielding they individually needed.

The research project might have created a more sustainable pedagogy at the schools if we, instead of using personal FM receivers, had tested a simpler wall-mounted loudspeaker connected to the teacher's cordless microphone, which – following Sapienza, Crandell, and Curtis (1999) – would have reduced the voice level in the classroom, reduced the strain on the teacher's voice (Jónsdottir, Laukkanen, & Siikki, 2003), and enabled all students to 'hear what is being taught, benefit and enjoy a higher degree of achievement' (Flexer, Biley, Hinckley, Karkema, & Holcomb, 2002; p. 38). This would also have been cheaper, and we might have avoided the fear of exposure when using special needs equipment, which was dominant among the oldest students.

Even though most of the teachers discovered a valuable impact in correlation to hyperactivity and attention deficits, none of them invested in the technology afterwards. The schools found it too expensive to buy the SFAS. Updike (2006) admits that SFAS at a short term are a costly proposition – but over a lifetime it would be a very cost-effective investment, which McSporran (1997; p. 16) confirms, saying that signal-to-noise enhancing technology is 'possible the most cost-effective, appropriate and acceptable way of maximizing the classroom acoustic environment'.

Conclusion

In the current age, where full inclusion is commanded, students with ADHD often pose great challenges to general education teachers who are pointing at a lack of tools and competences to include this specific group of learners. SFAS appears to have a high potential for enhancing inclusion of any child in the school, but it especially has high potential as a valuable tool for children with developmental and attention deficits like ADHD. Improving the listening conditions in a classroom positively impacts students' ability to be physically and academically included by helping them to

- Stay more calm, quiet, and focused in the classroom.
- Enhance their awareness and participation during classroom and teaching activities.
- Enhance their comprehension of teachers' instructions.

- Enhance their concentration by individual schoolwork.

Older students show a resistance against the SFAS – caused by a fear of being exposed when using special needs equipment. Only few students show no impact or negative impact of using SFAS. They are not able to comprehend teachers' instructions and explanations and become more restless and unfocused when they cannot hear and communicate with their peers.

Although it is quite easy to use this technology and both teachers and students express the benefits of using SFAS, it seems difficult for the teachers to reach an agreement on buying and implementing it in the schools. The research project may have created a more sustainable pedagogy at the schools if instead of personal FM receivers for individuals, we had tested simpler and cheaper wall-mounted loudspeakers connected to the teacher's cordless microphone.

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Digital assistive technology tools for students with Dyscalculia

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It is necessary to comprehend that learning disabilities can affect personal life beyond academics; it can also affect relationships with others. Learning disabilities are nervous system problems that interfere with learning basic skills such as reading, writing, organization, and mathematics. Learning disabilities in basic math skills usually relate to difficulties with language processing and visual reasoning skill centres of the brain. Math learning disabilities are affirmed to be transmitted or developmental. Learning disabilities in math or dyscalculia are not solely the result of problems with the ability to listen and understand language or the ability to communicate with others using language, visual, hearing problems, or hand-eye coordination. Individuals with dyscalculia are not unintelligent, but they struggle to learn mathematics. In Thailand, there are about 280,000 students with learning disabilities. In this study, the authors will propose an assistive technology tool for learning math for students with dyscalculia in Thailand. Assistive technology will be a tool to help improve or change the ability of students with math learning disabilities. This study showed that Calculating Aid Tools: Kid-Kanit helps improve basic calculation of students with dyscalculia study at an average of 49%. Additionally, the results indicated that the Kid-Kanit tool helps students with dyscalculia in math problems at an average of 54.66%. In addition, both categories show statistically significant results.

Introduction

Students who have dyscalculia often have difficulty understanding basic mathematical concepts and lack an intuitive sense of how numbers work. Therefore, Wile (2015) states that teachers can help students with dyscalculia become proficient at mathematical tasks by trying to (a) use graph paper to help them become aware of where numbers are supposed to be, (b) ask students to read math problems out loud, even if they are not word problems, (c) relate the math problem to a real-life situation that students are familiar with, (d) teach students manageable amounts of information by giving them time to practice each step before they must implement all of the steps together, and (e) allow students with dyscalculia to use calculators when doing multi-step problems.

Problems with learning disabilities in mathematics or dyscalculia may occur in conjunction with problems in reading and writing (Garnett, 1992). Additionally, the National Center for Learning Disabilities (NCLD, 2007) states that dyscalculia refers to a wide range of lifelong learning disabilities involving math. The Special Education Support Service at the University of Limerick, Ireland (2015), states that there are two types of dyscalculia that are identified: (a) developmental dyscalculia, where students exhibit a marked discrepancy between their developmental level and general cognitive ability as it pertains to mathematics and (b) dyscalculia where students exhibit a complete inability to manage mathematical concepts and numbers.

Moreover, Arayawinyoo (2010) states that children who have trouble learning math skills do not necessarily have a learning disability. However, there are some warning signs for school age children who continue to display trouble: trouble learning math facts (addition, subtraction, multiplication, and division), difficulty developing math problem-solving skills, poor long-term memory for math functions, unfamiliarity with math vocabulary, and difficulty measuring things. Butterworth (2011) adds that a child with dyscalculia can learn math but may require additional time and instruction. He also suggests peer tutoring for children who show signs of this learning disability. A student of the same age and peer group may be able to explain math concepts to a child with dyscalculia in a way that would not necessarily occur to a teacher. Peers working together might be less frustrating or stress inducing for a young child than working with an adult tutor, although if peer tutoring is not effective enough in getting the child to understand math, an experienced teacher may be an option to consider. With the Calculating Aid, children can quickly understand the lesson and explain it to their peers who cannot finish the assigned tasks.

Students who suffer from dyscalculia may also need extra time allowances for testing and completion of homework (Butterworth, 2010).

Currently, there are very few teachers who are specifically trained to work with students with dyscalculia. Hence, helping a student both inside and outside the classroom by identifying his or her strengths and weaknesses is the first step towards getting help. Butterworth is in agreement with Wile (2015), who suggests the following: (a) the use of graph paper for students to help organizing ideas on paper, (b) use of different ways to approach math facts by writing down and explaining them instead of memorizing where the result came from, (c) the practice of estimating as a way to begin solving math problems, (d) the introduction of new skills beginning with concrete examples and later moving on to complicate applications, and (e) providing a place to work with few distractions and having pencils, erasers, and other tools on hand as needed (NCLD, 2007).

Materials and methods

The design and development of Calculating Aid Tools: Kid-Kanit consists of materials such as addition, subtraction, multiplication, and division. Math problems are also included and can be displayed in the appropriate format and solved with minimum prompting. In order to assist students with dyscalculia, we divided the development into two main parts: Part 1 is available as an Assistive Technology (AT) tool (supports students with dyscalculia to calculate and find the results), and Part 2 is a CAI (drill-and-practice, which included administrator system and user system).

Interface design

The addition and the subtraction tool
In our study, we applied the theory of addition and subtraction, using the highlight column to display the current action (Figure 1). The theory of the line number was also included in order to navigate and help students with dyscalculia to get the results (Figure 2). This procedure helps students with dyscalculia to learn and understand the meaning of the action (Garnett, 1987).
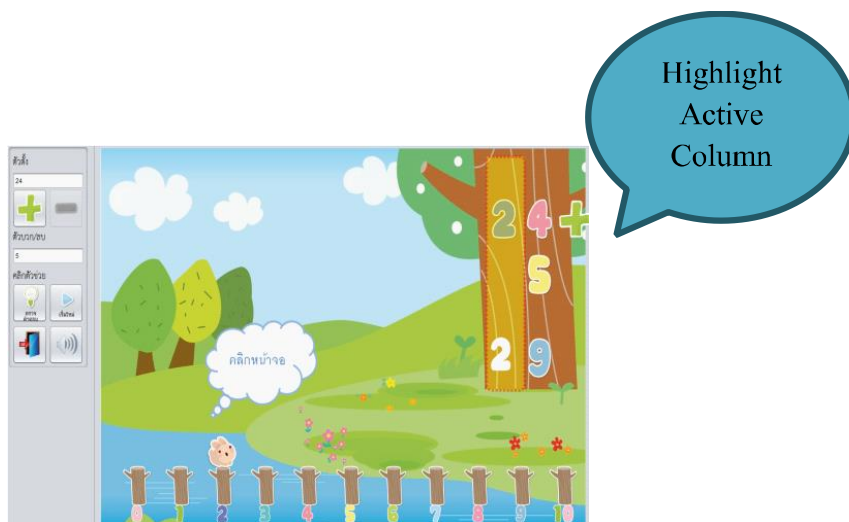
Figure 1 The addition tool.

Figure 2 The line number.

The multiplication tool

The theory of Napier's bones was also applied in our interactive multiplication tool. Napier's bones is a manually operated calculating device invented by John Napier, a Scottish mathematician and scientist (Edkins, 2007). Napier's bones (2012) can be used to perform multiplication of any number by a number from 2 to 9. Figure 3 shows Napier's bones. Figure 4 shows our interactive multiplication tool.
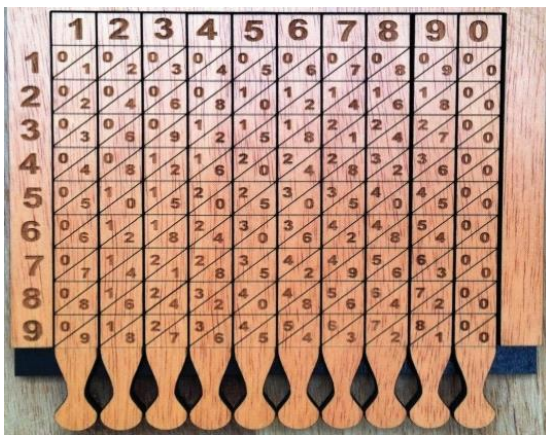
Figure 3 The Napier's Bones
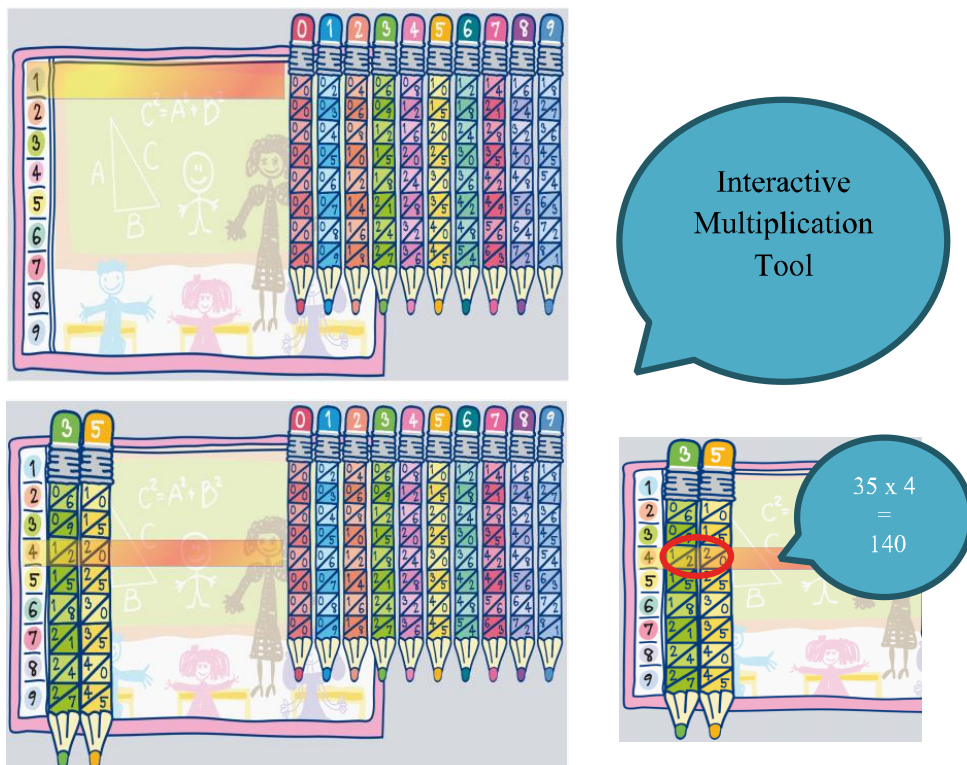
Figure 4 The Interactive Multiplication Tool

Our interactive multiplication tool can help students with math learning disabilities understand the process of multiplication clearly, and those students can finally find the correct results of each basic mathematical calculation. For example, to find out the solution to the multiplication of 35 by 4, we start by dragging the pencils corresponding to the leading number of the problem into the boards. If a 0 is used in this number, a space is left between the pencils corresponding to where the 0 digit would be. In this example, the pencils 3 and 5 are placed in the correct order as shown. Then, looking at the first column, we choose the number we wish to multiply by. In this example, that number is 4. The row this number is located in is the only row needed to perform the remaining calculations, and thus the rest of the board is cleared below to allow more clarity in the remaining steps. At the right side of the row, we evaluate the diagonal columns by adding the numbers that share the same diagonal column. Single numbers simply remain that number. Once the diagonal columns have been evaluated, one must simply read from left to right the numbers calculated for each diagonal column. For this example, reading the results of the summations from left to right produces the final answer of 140. Therefore, the solution to multiplying 35 by 4 is 140.

The division tool
For the division method, we use the concept of a 100 number chart. Our 100 number chart is interactive and animated in order to help the students with dyscalculia to find the results. Figure 5 shows the interactive division tool.
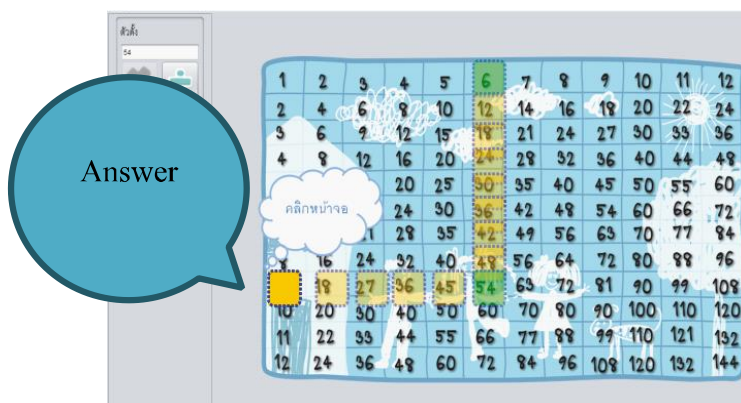
Figure 5 The Division Tool

Experiment

In this study, we applied single subject research design into our experiment. Single subject research is popular in the fields of special education and counselling. This research design is useful when the researcher is attempting to change the behaviour of an individual or a small group of individuals and wishes to document that change. We use this method when the sample size is one or when a number of individuals are considered as one group. The participant therefore serves as both the control and treatment groups. These designs are typically used to study the behavioural change an individual exhibits as a result of any treatment (Fraenkel & Wallen, 2006).

We then conducted the experiment with five students in grade 3 (ages between 9 and 11) at a school in Bangkok. All five students were confirmed to have math learning disability and basic computer skills. Therefore, all of them were required to take the pre-test at the first session and 10 sessions (3 hours per each session) for the training. Hence, after the pre-test, the researcher matched each student with a suitable level. After the sixth session, all students were required to take test number one. The post-test was conducted two weeks after the test number one and all of the students were allowed to use Calculating Aid Tools: Kit-Kanit during the test.

Results

The assistive technology, Calculating Aid Tools: Kit-Kanit, helps the students in this study learn basic calculation better than when assistive technology is not used. Figure 6 shows the learning improvement and the comparison among the pre-test, the test 1, and the post-test scores of all of the students in the basic calculation activity.
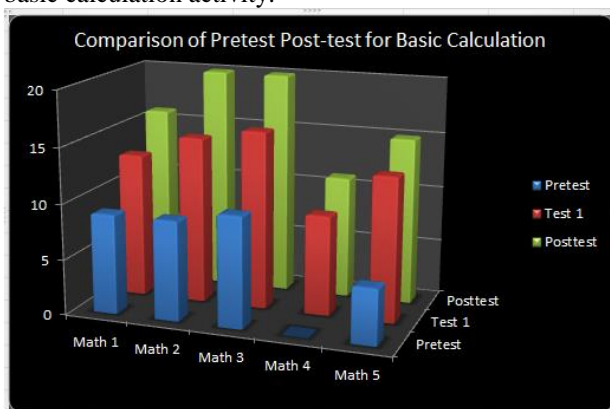
Figure 6 Comparison among the pre-test, the Test 1, and the post-test Scores for Basic Calculation Activities

Figure 7 shows the learning improvement and the comparison among the pre-test, the test 1, and the post-test scores of all of the students in the math problems activity.
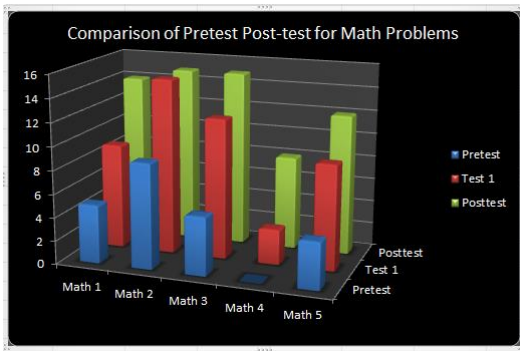
Figure 7 Comparison among the pre-test, the Test 1, and the post-test Scores for Math Problems Activities

Figure 8 shows the effectiveness of assistive technology Calculating Aid Tools: Kit-Kanit when comparing the pre-test to the post-test for basic calculation activities. As the value of t is 13.34 and the value of p is 0.000183. Therefore, the result is significant at $p \leq 0.05$.
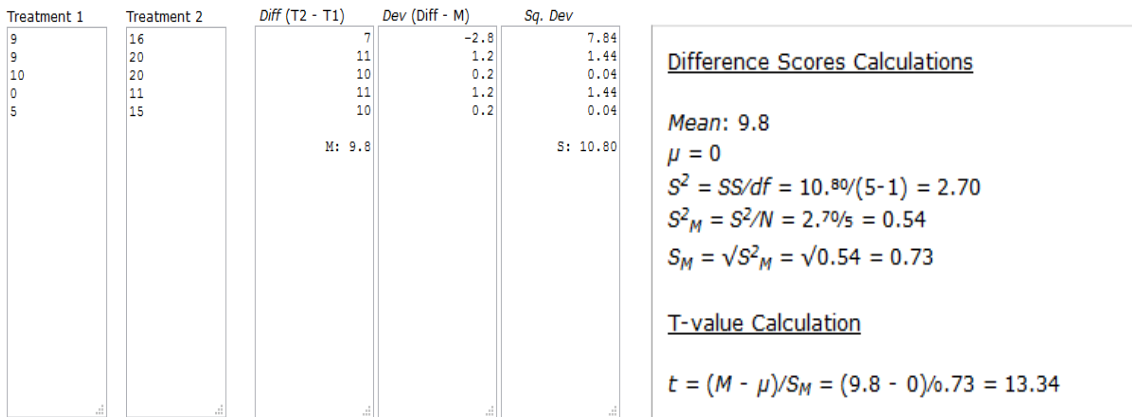
Figure 8 Comparison between the pre-test and the post-test Scores for Basic Calculation Activities

Additionally, the results in Figure 9 also show the effectiveness of assistive technology Calculating Aid Tools: Kit-Kanit when comparing the pre-test to the post-test for math problems activities. The value of t is 12.36 and the value of p is 0.000246. Therefore, the result is significant at $p \leq 0.05$.
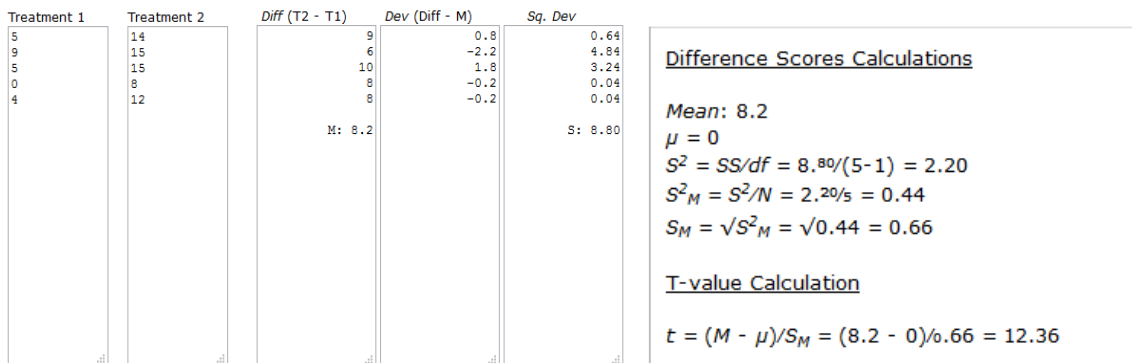
Figure 9 Comparison between the pre-test and the post-test Scores for Math Problems Activities

Moreover, we also provided questionnaires for the students. Table 1 shows students' attitudes toward the use of Calculating Aid Tools: Kit Kanit.

Table 1
Students' Attitudes toward the use of Calculating Aid Tools: Kid-Kanit

The tool makes me feel	Agree	Disagree	Not Available
1. Excited	60%	20%	20%
2. Happy	60%	20%	20%
3. Awake	40%	40%	20%
4. Asleep	20%	60%	20%
5. Relax	60%	20%	20%
6. Bored	0%	60%	40%
7. Confused	0%	40%	60%
8. Nervous	0%	60%	40%
9. Confident	80%	0%	20%
10. Unsatisfactory	0%	80%	20%
11. Comfortable	100%	0%	0%
12. Awesome	80%	0%	20%

Conclusion

In conclusion, most students in this study were in agreement with the advantages of the Calculating Aid Tools: Kit-Kanit, which could help with basic calculation and math problems quickly and efficiently. They agreed that Calculating Aid Tools: Kit-Kanit was simple and uncomplicated. The program also has a wizard that can make it easier for students to calculate and find the answers. Therefore Calculation Aid Tools: Kit-Kanit helps increase the chances of students with dyscalculia in succeeding in school.

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Acknowledgments

An ergonomic and conceptual approach to the e-learning adaptation of a training program for parents of children with autism spectrum disorder

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It has already been proven that training parents of children that present autism spectrum disorders can have beneficial results for both parents and children. For this reason, a French training program has already been developed. The objective of our research is the development of an e-learning platform with the same goals and the successful adaptation of the real-life existing program. In this paper, the process of the conceptual design, as well as the choice of our digital tools, will be described. Additionally, we examine the possibility of the creation of a virtual community of practice and the factors that will facilitate its creation.

Introduction

A psycho educational program, developed by a French and French-Canadian psychology research team aims to train the parents concerned about the issue of autism and to help them meet the challenges of raising a child with autism, as well as to stimulate the development of their child. This program whose effectiveness was evaluated on specific variables (parental stress, parental depression, child development, etc.) in a real-life version, is now proposed through several care services in France and Quebec.

For a multitude of reasons (accessibility, synchronous communication, distance, etc.), the design and implementation of an e-learning version of this training program is desired.

Conceptual design of integrated digital tools

For the conceptual design and selection of the digital tools integrated into the platform, we had to define and explore the various potential learning scenarios. Based on the work of Tricot et al. (1998), we explored the different learning scenarios, and we defined the one that will be used in our website. More specifically, Tricot et al. (1998) defined the following learning scenarios that occur in hypermedia environments:

- Learning through action: mostly used for solving mathematical problems.
- Learning by instruction: in that case, the roles of the learner and the tutor are clearly predefined as well as the information transmitted.
- Learning by exploration: the following definition is proposed for 'Learning by exploration':

    In learning by exploration, the subject elaborates his own goal by choosing from a wider target set by his tutor. The decomposition into sub-goals is a critical and complex but necessary step for the achievement of the final objective (Tricot et al., 1998; p. 13.).

In our case, learning through exploration can best describe our vision for the educational procedure involving the parents. According to the proposed definition, the development of an action plan and the definition of sub-goals are necessary steps in order to achieve the ultimate goal of learning, which is how to manage the behavior of their children. Each participant will develop his action plan individually by using the best possible tools and support offered. The individual goals and the modular structure of the platform will facilitate this process. Quoting Tricot et al. (1998, p.14) states that

    [T]he success of the learning outcome will depend on how each individual will use the initial order as well as on his level of expertise regarding the use of tools for selecting the relevant information.

Levels of help for learning through exploration

Tricot et al. (1998) proposed three levels of help for learning through exploration: the help concerning the management of the task, the help concerning the information selection and finally the help related to understanding.

The first level of help that concerns the management of the task, "helps the participant to represent operationally; his purpose in some cases helps him to change this representation while in other cases it helps him to maintain his representation stable" (Tricot et al., 1998; p. 15). The second level of help that concerns the information selection helps the learners to identify clearly the different categories of information. Finally, the help that regarding the understanding is related to the adaptation of the vocabulary and the syntax structures to the level of the participants.

Pelisier et al. (2010) proposed an alternative classification concerning the design of the help structure n an online learning environment. In particular, three aspects are distinguished:

1. The moment: At all levels, there is always both proactive and reactive help.
2. The intention: The help is also associated with the intention of knowledge and learning. Four intentions were identified:
   - The piloting that aims to promote the understanding of a problem, a task or a situation by the learner
   - The weaving that aims to help the learner store knowledge in the long-term memory. There are two types of weaving: the social and the cognitive. The objective of the social one is to promote the interactions between participants in contrast to the cognitive one that focuses on the links between knowledge.
   - The modulation that helps the learner to solve future problems or to predict future situations.
3. The process of conception: According to Pelisier et al. (2010), the creative help corresponds to one or more of the three intentions described above (pilotage, weaving and modulation). During the process of conception, there is always the step of implementation that allows the use of these intentions.

For the design and choice of our digital tools, the integration of interactive exercises and synchronous and asynchronous was necessary as it is believed that these features increase the interactivity of the pedagogical scenario and motivate learners to get more involved in their education. Inspired also by Tricot (1998) and Pelisier (2010), six helps were identified in our distance-learning environment.

Instant messaging (chat), and thematic forums as means of support and observations
It is believed that the instant messaging and the thematic forums will be a significant support for the participants as they provide the opportunity to communicate in a synchronous and/or asynchronous way with the experts (psychologists, animators) of the program as well as with other participants. By using this help, they will be always accompanied during their learning period, and they will not feel any sentiment of solitude and isolation. As in Pelisier (2010), we have also chosen the instant messaging and the thematic forums as means of observation of the interactions between participants as well as their level of knowledge appropriation. These observations are vital to the continuous improvement of our device. As Pelisier (2010, p. 3555) mentions:

> Other tools can allow observation of interactions such as forums or emails. It is in the diversity of these interaction tools that the teacher's opinion will be the most complete.

The thematic forums as a tool for knowledge acquisition
Pelisier (2010) uses instant messaging as a tool for learning, and his argument is that the interactions between participants in synchronous and asynchronous manner can often replace their readings and be used as educational resources. In particular, he gives the example of a user who reads the discussions asynchronously, without participating, and these discussions replace the readings for them. Here, we also opted for using thematic forums in order to promote the interactions between the participants as well as to use them –in a second level- as educational resources.

E-notebook as a self-reflexive space
The intention for this help is two-fold. Firstly, this notebook may help the participants to summarize better the acquired information. Secondly, we will have the possibility to observe the thought and note-taking process of the participants in order to understand better how they learn and consolidate the knowledge.

Supplementary resources at the disposal of the learners
A list of additional resources (websites, e-books, articles) will be available to the participants so that they can seek further information if they wish and be able to predict and solve problems and situations that will occur after the end of the program.

Synchronous and asynchronous communication with the program's assistant
This type of help is reactive, as the program's assistant will accompany the participant in a synchronous and/or asynchronous way.

Personal and individual objectives for each lesson (workshop)
The definition of personal and group objectives for each lesson helps the participants to manage their task and realize their goal. In this tab, the goals defined by the trainers are listed, but additionally there is a blank objective to be filled by each participant. The trainers will validate or modify (with the agreement and after discussion with the participants) their individual goal.

Levels of appropriation of the platform

Following the conceptual design and the choice of the tools and resources of the platform, we studied the different levels of its adoption by the users. More specifically, we investigate how and at what level the users adopt the platform; since, in our case, the existence and the form of this digital environment is dependent to the attitude and the active involvement of the users.

Akrich (1998) distinguishes four types of uses undertaken by users of devices. These four forms that take into consideration the object and its prescribed uses are the following: moving phase, adaptation phase, extension phase, diversion phase.

According to Akrich (1998) each device has certain flexibility and many possible uses. The designer, during the process of scenario design, leaves an incomplete portion so as to let the users explore other possibilities and possible uses. In the displacement phase, the users, although they explore the flexibility of the device, do not propose any change. In the adaptation phase, the users introduce some modifications into the device that do not influence the primary function. These changes do not require technical capabilities, but they improve the ergonomics of the device. In the extension phase, the users enrich the list of features of the device. Finally, in the diversion phase, the users make a completely different use than the one intended by the designer.

Regarding our distance-learning environment, we hypothesize that there will be three levels of adoption of the platform by the participants. At the first level, the users will *execute a prescription* by using only a part of the program and without proposing their own modifications (moving phase). At the second level, the users will make use of the entire program and perhaps will start proposing their own ideas and ways of learning (adaptation phase). Finally, at the third level, it is expected that some users will go further and adopt a logic of design by making their own proposals and inventing different potential uses. In our digital learning environment, we do not expect *a priori* the emergence of the diversion phase, since the particular objective of using the platform is predefined and concrete.

Creation of a virtual community of practice

We hypothesize that from the second phase of adoption of our program, there is the possibility that a virtual community of practice will be established, especially through the thematic forums. A potential creation of a community of practice (Lave & Wenger, 1991) will allow us to study the interactions between participants as well as their role and their relationships in the community.

The following figure (Figure 1) schematically visualizes our theory that the creation of a virtual community of practice is dependent on the use of the proposed digital tools by the participants of the program. Specifically, the first cycle contains the proposed digital tools and the second cycle indicates the potential use choices made by the users. The vertical bars represent the three adoption phases of the platform as well as our hypothesis that the more the users will be active and involved, the more they will approach the creation of a virtual community of practice.
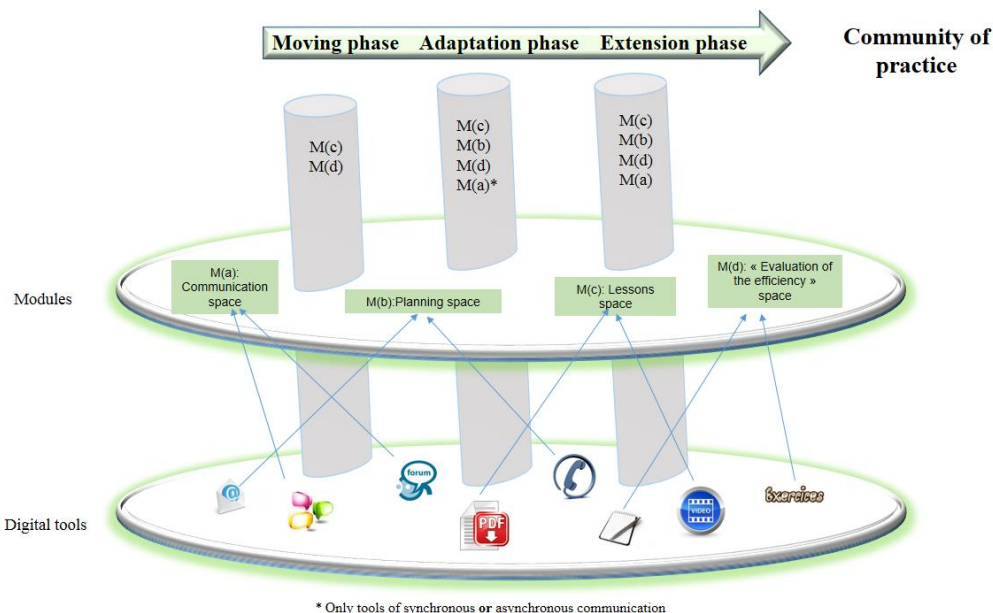
Figure 1 The creation of a virtual community of practice

Expected Results

Regarding the parents, the expected results are a better knowledge about their children disorder, a reduced parental stress and depressive symptoms, an increase of their sense of competence, and an improvement of the quality of life for the whole family. From the research perspective in the context of educational science, we are interested in studying the level of adoption of our digital interactive training tool by the parents as well as their perception of its usefulness, usability, and adaptability in its technical and pedagogical dimension. Furthermore, we aim to observe whether in the process of the instrumental genesis there is the emergence of a virtual community of practice among the participants.

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Designing for inclusion: Supporting disabled students in a distance learning context

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With increasing numbers of students in higher education, the numbers of students declaring disabilities are increasing as well. There are indicators that disabled students are less satisfied than their peers in some aspects of their student experience, and less likely to pass their courses, resulting in moral and financial incentives to address these gaps in satisfaction. In this paper, we explore the challenges and opportunities involved in designing for inclusion within a distance learning institution, focusing specifically on the provision of accessible learning materials and activities for disabled students. We employ a mixed methods approach, incorporating data which captures the learning designs of over 200 modules, as well qualitative student satisfaction data. We also include a case study of how the learning resources and activities of a specific module were designed to be accessible. In so doing, we highlight the value of anticipating students' accessibility needs when designing learning, though find that there is some way to go for this to be fully achieved at the institution.

Introduction

With increasing numbers of students in higher education, the numbers of students declaring disabilities are increasing as well. At The Open University (OU), the number of disabled UK undergraduate students has increased every year since 2008-09, with over 18,000 students declaring a disability in 2012-13. Moreover, this number has continued to grow despite overall student numbers decreasing, with the result that over 14% of the OU's UK undergraduate population now comprises students who have declared at least one disability (Open University, 2014). The actual figure is likely to be higher still, as not all students with disabilities choose to declare them to the university. As a result of this increase, the expectations of both students and staff are changing. The focus is no longer on accommodating disabled students' needs, but to design education for all.

In light of these developments, it is more important than ever to ensure that Higher Education institutions adhere to their legal and moral responsibilities as defined in the Equality Act (Great Britain, 2010). However, according to Seale (2006), legislation is a limited driver for change and a more holistic approach is needed. In line with this approach, in this paper we explore the challenges and opportunities involved in designing for inclusion within a distance learning context, focusing specifically on the provision of accessible learning materials and activities for disabled students. This preliminary study not only discusses elements of an inclusive design approach but also makes a first attempt to evaluate the current provision empirically and suggests ways in which the impact of inclusive design can be evaluated.

Background

Inclusive teaching is at the heart of the OU's agenda, as is reflected in its mission to "be open to people, places, methods and ideas" (Open University, 2015). Within the OU's distance learning context, the curriculum is increasingly being delivered online, and this presents significant affordances as well as barriers to the growing numbers of students who declare disabilities. At the same time, there are measures that indicate that satisfaction and pass rates are lower for disabled than non-disabled students at the OU (Richardson, 2014). Clearly the financial implications of this are pressing, given the increasing numbers of disabled students. In 2011, the OU responded to factors such as these by establishing the SeGA (Securing Greater Accessibility) initiative, which aims to ensure that modules and qualifications are accessible to disabled students.

Design decisions concerning the OU curriculum are shaped by the institution's Learning Design programme, which was mandated in 2014 to improve the curriculum and outcomes for students. The OU approach to Learning Design is a process whereby practitioners make conscious decisions about the design of the curriculum, using the taxonomy developed by Conole (2010). Whereas traditionally, design

decisions are often made implicitly by individual practitioners, Learning Design at the OU aims to enable these decisions to be made explicit and for an outline design to be produced through collaboration. Using this approach, practitioners are encouraged to consider an appropriate range of students in their design, including disabled students.

Initiatives such as SeGA and Learning Design at the OU are generally perceived as positive developments that will improve the experience and outcomes for students who declare a disability. However, as these initiatives tend to work across the curriculum, from initial design to production, it is difficult to measure their benefits in an empirical manner. As Seale (Seale, 2006; p. 52) puts it, "despite the rhetoric, it is hard to assess confidently the impact of increasing numbers of disabled students on practice". This study aims to provide some insights into how practice at the OU is developing as the need to design for inclusion is more critical than ever.

Methodology

Our first step was to produce visualisations of a selection of OU modules using the institution's online Learning Design tools, a suite of graphical, text-based elements which enable the user to catalogue the learning activities and materials that feature in each module. Using these tools, the Learning Design team produced an online data set which captured Learning Designs for 238 modules offered at the university, spanning a wide range of disciplines and levels of study.

Amongst the design characteristics captured in the tool for each module was its accessibility features. The materials related to accessibility were categorised as *guides*, *audio*, *video* and *other*. *Guides* relate to accessibility guides, which inform students with a disability what content is suitable for particular screen readers or other supporting software. *Audio* relates to materials for which podcasts are provided or audiobooks. *Video* relates to the transcripts provided for video material. The category *other* included downloadable alternative formats plus any additional resources for instance "accessible list view provided for photo essay slide shows". Figure 1 displays an example of the data entered in the module map of the Learning Design tools.
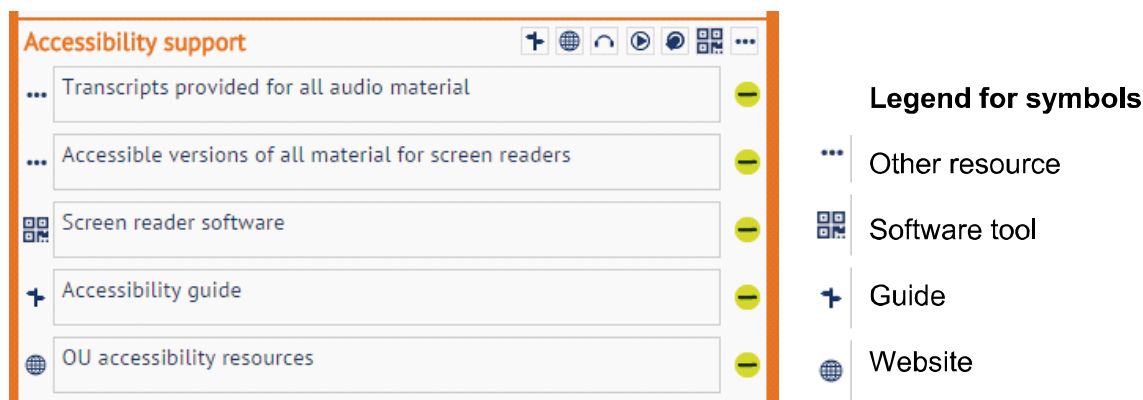
Figure 1 A screen shot of how accessibility support within a module is captured in the Learning Design tools

Secondly, we analysed qualitative data in the form of student comments pertaining to accessibility. We examined open comments from disabled students in the institution's student end of module satisfaction survey, which is gathered from across all university modules (N.B. this data is for internal use only and so cannot be reproduced here).

Thirdly, we undertook a more in-depth analysis of one of the modules, henceforth referred to as Module X, chosen as an example of a module which a) had a proportion of disabled students roughly equivalent to the institution as a whole (16% in 2014 and 14% in 2013) and b) was recorded in the Learning Design tool as including accessibility features. We analysed the Learning Design data for this module in detail and considered how accessibility was achieved through its learning activities and materials.

Findings

Our analysis of the 238 modules in the Learning Design data set revealed that 113 of the modules included material to provide accessibility support, which equates to 48% of the modules within our sample. Based upon the data set, 49 modules had accessibility guides (21% of the original sample), 9 provided specific software (3%) and 19 provided audio material for written text (8%).

The modules that stated that they had accessibility guides did not all provide bespoke guidance relating to accessibility on that particular module. Some faculties provided a generic faculty bespoke guidance document while others referred to information available for disabled students on the institution's website. Other guides related in particular to tools used for online tuition. Out of the 49 that had accessibility guides, only 29 actually included bespoke guidance for disabled students to support their overall study experience. The remaining 20 modules provided links to the institutional website, and others provided faculty-generic information, not specific information to the module.

A thematic analysis of the qualitative data from the student satisfaction survey identified a number of key areas that impacted significantly on individuals' study experience on modules. In particular, students valued having a supportive tutor who can make their teaching inclusive; examination arrangements that respond to their needs (e.g. extra time; adequate parking); and the provision of module material in alternative formats (e.g. audiobooks; comb-bound volumes). The data did not provide any matches based upon the keywords provided.

Our analysis of Module X showed that, in the Learning Design tools, the presence of a module-accessibility guide had been captured. By examining the content of the module itself, we identified a range of materials and activities that had been designed to ensure that the module is accessible to disabled students. The accessibility guide explains that material that is essential to achieve the learning outcomes has been checked from an accessibility perspective, but not that which is optional. It outlines the accessibility of module resources including books (such as the availability of PDF versions and their compatibility with screen readers and magnification software), figures and graphs (such as descriptions) and videos (such as the provision of transcripts). Alternative versions of specific learning activities, e.g. those using Flash software, are given if there are likely to be reliability issues when used in conjunction with assistive technologies. There is also particular advice on the accessibility of assessment material; for example, if students are unable to obtain their own data, a fictional data set can be made available to them upon request so that they can still complete the assessment.

Discussion

Our analysis of the Learning Design data showed that only 48% of the modules within our sample provide supporting materials for students that declare a disability. At face value, might seems rather disappointing, particularly in light of the OU's mission to provide education to all. However, module teams that follow accessibility guidelines in terms of providing transcripts for audio and video material, as well as providing alternative formats for all written content, might not see this as "accessibly support" as this is standard provision. This is particularly pertinent when providing "other formats" (e.g. PDF versions of module texts) as these are important for all students, regardless of whether they have disabilities, especially in the distance learning context. Therefore, accessibility support within modules needs to be clearly flagged to students, even if is "just" standard provision, which means that staff across the institution need to be able to identify this information. Moreover, while providing links to generic institutional- or faculty-specific information about accessibility is useful to a degree, these will not explain to disabled students how to access adjustments that are course specific. Correspondingly, it is key that module specific material is provided for disabled students to meet legislative requirements.

The accessibility guide provided for Module X, and the corresponding support that is provided for disabled students in its materials and learning activities, illustrate how accessibility can be factored into modules as part of the Learning Design process. Crucially, the needs of disabled students (e.g. accessing module books using a screenreader; completing the assessment if data cannot be collected in person) have been anticipated, and the module had been designed accordingly. This is far more cost effective than "retrofitting", or providing solutions to accessibility problems that emerge following the design of the module.

The qualitative student satisfaction data highlighted several facets of the learning experience which disabled students valued highly. Many of the aspects flagged up here, including the provision of tutors, exam arrangements, and alternative formats that meet students' needs, have implications for the Learning Design of modules. As well as working with colleagues who have particular responsibility for such provision, those who are involved with module design can usefully consider how these needs can be met even at the early stages of creating the course. For example, ensuring that alternative formats, such as transcripts, are routinely provided in the module, is likely to impact positively on its satisfaction ratings from disabled students.

In sum, then, our findings have highlighted the value of providing a wide range of formats where module materials are concerned, and of anticipating learners' needs as part of the Learning Design process. These themes largely correspond to the principles of Universal Design or designing to include all people (Null, 2013). Whilst the term has been applied in a wide range of settings, in education it amounts to "a set of principles that focus on reducing barriers in learning environments and increasing access to curriculum and instruction for diverse learners, especially students with disabilities" (Rao, Ok, & Bryant, 2014; p. 153). Our case study of Module X provides an example of how the OU, specifically through the work of SeGA, has been "developing more inclusive curriculum design in production, rather than a focus on adjustments and retrofits" (Slater, Pearson, Warren, & Forbes, 2015), in many cases without being aware of Universal Design. Significantly, however, options which meet all students' needs are not universally available for all modules.

Limitations

By exploring some of the links between Learning Design and accessibility at the OU, we hope to highlight some of the key issues and questions that arise when designing to include disabled students within the distance learning context. This paper represents an attempt to open up dialogue around these themes. Nonetheless, are a number of limitations, of which three will be briefly described here. Firstly, in an ideal world, it would be possible to demonstrate that Learning Design initiatives intended to promote accessibility, such as providing module accessibility guides, have a positive impact on disabled students. However, it is difficult to illustrate the impact of particular interventions when there are so many other factors that contribute to students' experiences. Secondly, while our samples of Learning Design and student satisfaction data offer insights into some general trends concerning accessibility, a more fine-grained analysis is needed if we are to attempt to draw parallels between the designs of specific modules and the impact on the disabled students who undertake them. Thirdly, although our analysis of Module X is intended to give an illustrative example of what an accessible module might look like, its features would not necessarily be appropriate for all modules. Clearly the means of ensuring accessibility for any one module will depend on a range of factors, including the subject area, the types of resources and learning activities involved, and the nature of the disabilities declared by its students.

Conclusion

As numbers of disabled students increase, the need to design for inclusion becomes more pressing. In this paper, we have presented insights into how distance learning modules at the OU are being designed to meet accessibility needs, in line with the aspirations of the SeGA initiative. Drawing on data from the OU's Learning Design tools, we have explored the extent to which modules are being designed with accessibility in mind and the ways in which accessibility might be "designed in" to modules. In so doing, we have highlighted some examples of good practice, which align with the principles of Universal Design, but also suggest that there is much more to be done before such an anticipatory approach is evident across the board. Once this approach is in place, it will need to be evaluated, both to ensure that it is consistently applied and to ensure that it meets the needs of disabled students. More broadly, we have pointed to some of the issues that practitioners may usefully engage with when embarking on future research in this area. Institutions, in particular, might want to take stock of their own provision of materials provided for disabled students and evaluate the quality of these, while further cross-institutional research showing the impact of features of inclusive design would enable management and practitioners to invest in more inclusive design approaches.

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A meaningful ICT approach to learning in contexts of multilingualism and great cultural diversity

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This presentation describes a methodological approach to learning inclusive and innovative practices in contexts of great diversity proposed by JP-inspiring knowledge. The particularity of an educational framework – the ik-Model – that aims at the reinforcement of systemic educational cultures in a demanding context of heterogeneity – the Plurinational State of Bolivia – is the main focus of this analysis. In 2014, an inter-ministerial process, involving national and international stakeholders, developed a Masters Training for local Educational Agents within an ICT innovative learning approach. One of the crucial challenges for the Bolivian education system, emphasized in the Socio-Community Productive Educational Model, was the adoption of new technologies in the new curriculum, taking into account the Bolivian multilingual, intercultural and intracultural education. The ik-Model was used as a methodological strategy to approach ICT in this challenging context of cultural identity reinforcement. During the training phase, participants had to design their meaningful ICT activities always bearing in mind socio-communitarian productive goals and the demand for a collaborative and inclusive learning environment that reinforces cultural roots and diversity. A particular meaningful learning plan is highlighted here, regarding the critical elements that make it a token of the most meaningful practices in education and development for all throughout the life span.

In the context of learning through sociocommunitarian interactions

Bolivia is going through a deep process of transformation to build a relevant project to its reality, according to the goals established for this Plurinational State country society. This transformation also involves essential changes in education, where the criteria and ways of educating come from their historical project. The problems and limitations verified in the previous educational models were that:

> […] Education […] only repeated and memorized contents; Education was unfeeling towards local singularities; Lack of knowledge and wisdom of indigenous peoples; Education has not allowed to leave the country's structural problems (M.E., 2014a, p. 5).

In the Article 4 of The Bolivian Education Law (M.E., 2010), it is stated that one of the Education goals is to "strengthen the development of the interculturality, interculturality and multilingualism in education and the full realization of Bolivians, for a society of Living Well" (p. 6). The consolidation and strengthening of a cultural identity of nations and native indigenous peoples, from science, technology, arts and proprietary technologies, in complementarity with universal knowledge, is one fundamental aim. The Article 7 (p. 10) mentions that education should begin in the mother tongue, and its use is a pedagogical need in all aspects of the teaching-learning process.

The Socio-Community Productive Educational Model – Modelo Educativo Sociocomunitario Productivo (MESCP) – aims to transform Bolivia into the desired reality through education (M.E., 2014a). The MESCP fosters an education based on four pillars (M.E., 2013, p. 4-5): decolonization, community, multilingual-intercultural-intracultural and productive. Decolonization considers that education should be "liberating, revolutionary, anti-imperialist and transformative", legitimizing the knowledge, skills and values of native indigenous peoples and intercultural and Afro-Bolivian communities, as well as the interaction with other cultures. Considering that education contributes to the social, cultural, political and economic transformation, it reinforces the building of a society free of discrimination and exclusion. Community refers to a "democratic, participatory and consensual" education; for the coexistence of human beings, the educational processes proposed to students incorporate socio-communitarian and coexistence practices. Generating equity and participatory opportunities for decision making, and stimulating the exercise of rights and the performance of duties is targeted by this community perspective. Intracultural education aims at the promotion of self-affirmation, knowledge and community values, contributing to the cultural identities strengthening. Intercultural is conceived as an encounter between

cultures to overcome inequities from colonialism. The multilingual education process is supported in the native language and Castilian and a foreign language as a communication tool. Education should be territorial, productive, scientific, technical and technological to develop skills and abilities for the production and intellectual creation in line with the potential of its regions, territory and territoriality. In order to achieve this, processes of research and technological innovation have to be improved. The articulating pillars are a key component of the curriculum structure. In the new Model, education enhances students' capabilities and qualities in order to enable them to transform their reality. Therefore, education supports a more comprehensive and complex way of living, i.e., it does not reduce learning to cognitive processes, but to a process that incorporates several dimensions of the student's reality (M.E., 2014b). With all these new education challenges, teachers are supposed to be part of a renewed education model that answers the challenge of promoting indigenous languages.

In 2010, there were 130.000 teachers, but only 10.000 were trained to work with indigenous languages (IEAL, 2010; p. 27). In 2014, 24387 teachers, 14984 women, and 9403 men received their graduation degree as a culmination of four semesters of study and the effort is given in PROFOCOM (teachers' training Program Complementary in Exercise), preparing teachers to implement the Socio-Community Productive Educational Model (M.E., 2014c; p. 5-6). Also, one of the crucial challenges for the Bolivian education system is that the new curriculum raises the need to adopt new technologies. The curriculum states that the aim of this linchpin is to develop inventive socio-productive vocations, with relevance and social permeability, to fully train students through community educational practices, articulating knowledge – traditional knowledge, production practices and technological knowledge. Training teachers in the application and use of ICT through initial and continuing training has been a particularly relevant issue for the Bolivian education authorities, especially since the last decade (Colque, 2006; IICD, 2007; Vaillant, 2013; M.E., 2014a). The objectives of this training are aligned with knowledge, educational research enhancement, and traditional teaching practices transformation. The challenge remains in making current, and future teachers reflect, investigate and understand how students are learning with the daily presence of technologies.

The ik-Model: a glocal framework

At first, JP-inspiring knowledge (JP-ik) was involved in this Bolivian Educational Project as an ICT solution provider, but soon its experience in transforming users into real beneficiaries was recognized through an educational proposal, where its vision for Education and Learning was clearly presented. JP-ik not only recommended a training program focused on the technological resources that could be provided to the learning formal spaces but also proposed a methodological structure to integrate all the local values, concepts and strategies of the MESCP in a meaningful and sustainable way. This means that technologies should assist and even give potential to the existing scenarios in terms of the conditions given to a full achievement of the educational goals for this Plurinational State. Since its very beginning, it was possible to support the process of educational ICT integration Using the ik-Model framework. In fact, this model was created to congregate all the phases of a meaningful ICT integration project in education, conceiving its iterative "action-reflection" life cycle. It is used in the (a) design, development and implementation of a project, either at a macro level or considering a specific learning environment; (b) training – capacity building or even empowerment – of different stakeholders, including elements from the Ministry of Education, Pedagogical Coordinators, Teachers, Parents and/or Students; and (c) monitoring and evaluation of the project, revealing its capacity to produce specific gains and enabling to recognize the particular conditions in which they are produced.
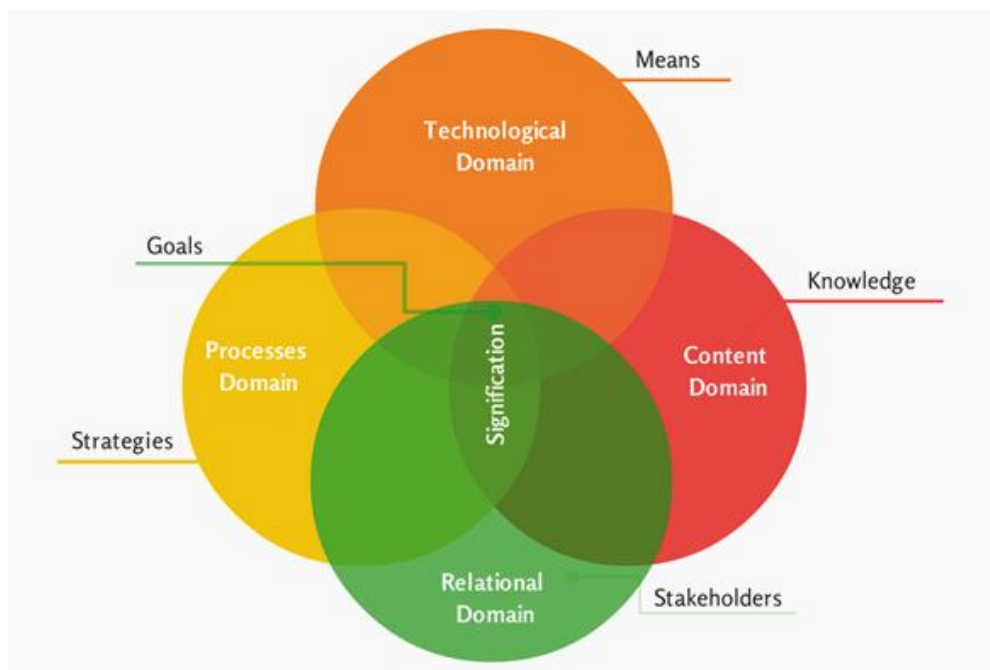
Source: Mouta, A., Paulino, A., Ferreira, J. & Couto, F. (2015)
Figure 1 The ik-Model: a framework for ICT meaningful integration in learning scenarios

This organic framework goes beyond the TPACK (Koehler & Mishra, 2005) in various ways. First of all, it considers all the components of ICT integration in learning scenarios as a Pedagogical option. In fact, it presents Pedagogy as a *techné* where all these components are integrated and configure an intentional decision that must be taken under a pedagogical procedure and its related competencies; it also gives place to a Processes Domain seen as fundamental as it is the axis that enables goals accomplishment through accurate and targeted actions. This framework also includes a Relational component that intentionally addresses stakeholders, implementers, and users. The experience in conceiving this domain as a Model axis has shown the relevance of recognizing each participant as a beneficiary of the process; only when each intervenient is conceived as a beneficiary of a developmental process may we accomplish the will of having given instruments for decision participation to all. Finally, this conceptual proposal intentionally puts Signification at the intersection of all the mentioned components. In this context, this word means Appropriation and Meaning that can only work through differentiation and integration, which are main keys to Identity production. Another noteworthy aspect of this model has to do with its capacity to cover different phases of an entire project, including monitoring and evaluation. On the one hand, it turns the process simpler regarding its structuration into phases; on the other hand, it enables participants to become progressively more capable of accurately using means to implement systematically and consolidate a project. Such a flexible and holistic structure had created the conditions to integrate Bolivian educational proposes regarding socio-communitarian values and goals. To put Signification at the heart of this process is acting on the principles of contextual meaning and not using a previous heuristic for learning and acting.

A socio-communitarian product of an ik-Model training

In July 2014, the JP-inspiring knowledge Pedagogical Team trained ninety educational agents, with different roles – elements from the Ministry of Education, Technological and Pedagogical Coordinators, Teachers and Educational Sciences/Didactics Students – in the process of ICT integration in the Educational System of Bolivia. The opportunity to fully rethink Pedagogy through the challenge created by the introduction of new technological resources did also created the circumstance to experiment, consolidate and integrate the main premises of the MESCP. As a product of the training experience, a portfolio of learning activities was started. These activities were done in small groups, showed in role-playing and evaluated by trainers and peers. This work enabled assessment, and it also consolidated regular practices of relevant sharing within the community of peers. In this paper, JP-ik presents a product of this training experience, as it seems to be exemplary in what concerns the operationalization of each

item of the ik-Model and its capacity to integrate a particular educational paradigm that works towards inclusion within an experience where diversity is paramount.

La leyenda de la papa (the potato legend)

The activity plan was designed following the principles of the Class Plans used in all public schools of the Plurinational State of Bolivia. It integrated a bunch of digital resources that were explored during the JP-ik training in a manner that beneficiates curricular and generative goals accomplishment. Those goals were posed regarding holistic objectives that address different communitarian agents, in a direct or non-direct way.

The learning activity plan – La Leyenda de la papa – was created by a group of five teachers, working in different regions of Bolivia and teaching different subjects. They have defined intergenerational learning as a critical piece of cultural heritage and focused all their work on establishing an open scenario for learning, as well as multiple means to be in relation with the world and learn in context. To preserve culture through language acknowledgment was central to the plan that is presented here.

Learning Session Plan

Educational Unit
Level: Secondary School
Grade: First Grade of the Secondary Productive Communitarian Education
Area: Community and Society
Subject: Communication and Language
Theme: Analysis of the sociocultural, natural and productive processes of Abya Yala.
Socio-Community Productive Educational Model
Holistic Objective: To develop attitudes and to practice socio-communitarian values through myths and legends that express harmony between the human beings and nature, analyzing and interpreting explicit content and implicit messages that preserve and foster culture legacy.
Content and Articulation Axes: Folk Cosmo Visions within Regional Texts
- Myths, Legends and Tales
- Community Relevant People
- Stories, TV series and socio-communitarian values

Learning Session Plan (*cont.*)

Methodological Orientations:

- **Practice**: to ask for the literature that is produced in our region; to talk about the literary production through Indian Peasant Folk oral tradition and written word (interviews); to interview recognized older people from the community on myths, legends and tales.
- **Theory**: to socialize within communitarian groups that will tell us about myths, legends and tales of our people; to synthetize those legends, myths and tales, taking into account textual structure, coherence and cohesion; to publish those texts to all community in Edmodo.
- **Valuation**: to reflect on the work done within groups through Edmodo educational platform; to reflect on what we have learned in terms of content and ICT's management.
- **Production**: to create educational audiovisual resources in order to reinforce socio-communitarian values.

Materials/Media:

- Interview guide sheets; Blank paper sheets; Pens; Computers;
- Word; Media Camera; Internet; Edmodo.

Evaluation:

- **To Be:** practice of Communitarian Values (collaboration and autonomy) within learning processes.
- **To Know:** characteristics determination of different literary texts; grammar functions acknowledgment; ICT use of literary text production resources.
- **To Do:** to write texts that show correction, coherence, cohesion and respect in terms of its linguistic origin; to demonstrate digital literacy when using ICT's.
- **To Decide:** to produce texts in original language and Castilian language where the principles of Living Well are shown.

Product: Oral and written texts where digital resources were used.
References: Program and Plans for the Secondary Level.
Final Presentation:
https://drive.google.com/open?id=0B5sGOtidiuULWFJCT2stTHhhSUk&authuser=0
Figure 2

Signification as a product of inclusive lifelong learning

The capacity of this activity to foster affective-cognitive learning processes, which rely on shared knowledge and cultural roots, is quite clear when seeing the audiovisual production shown above (*cf.* https://drive.google.com/open?id=0B5sGOtidiuULWFJCT2stTHhhSUk&authuser=0). In fact, such a learning product reflects media literacy; it presents a complex convergence of media that clearly demonstrates the capacity of growth in knowledge through the usage of multiple *old* and *new* means that are accurately articulated towards a meaningful end. This component shows us how the ik-Model Technological Domain and Content Domain – where holistic goals are considered – should converge in order to produce a meaningful achievement for personal and social development. This activity is also particularly rich in what concerns the Processes Domain. The students are asked to meet legends and tales exploring the conditions of their own realities. Although they are using new technologies with educational software and connectivity, they receive the message that the source of knowledge for that assignment is someone older on their communities and that those are the gatekeepers of information that cannot be collected anywhere else. This preserves a sense of belonging and reinforces the role of older people within a community. This also enables to go beyond the idea of work productiveness as a major will for development, where only those that are connected to a web of interests through a paid employment are concerned to a process of decision making. At the same time, this task enables each student to find its own way of learning, using different means. This way, they value each *medium* as a particular resource for meaning and signification. They may use a recorder software to keep the trace of a generation that didn't manage such tools at all, making this a sharing moment of symbolic ways of conceiving and present a vision of the world. Such an approach will make a difference when drawing the stories heard – using pencils, painting resources and notebooks or a software for drawing, like *Artrage* – and will enhance the production of a collective imaginary based on singular ways of telling stories. In the classroom, students have the opportunity to share interpretations that grasp the fundamental values of those cultural tokens in a more up to date manner, participating in the process of signification through time. The perspective of Language as a critical identity legacy will be reinforced as the conditions are

here created to perceive it as the exclusive medium through which specific *ways of Worldmaking* (Goodman, 1978) can persist.

The multiplicity of people that participate in several moments of this task enables to understand how the Relation Domain is critical to experience affective-cognitive psychological processes that enrich the acquisition of the *new*. As a matter of fact, students must find key elements in their communities through their families or more proximal references. This process also favors those proximal references to become aware and to recognize the relevance of other members from the community that are being requested to the learning process. Those people seen as a source of knowledge in terms of cultural heritage also become committed as learners, because the activities created make curiosity towards the new spring in a natural way.

Finally, the audiovisual products shared may deepen the collective consciousness of the multiplicity that characterizes Bolivia, enriching the vehicles for cultures dissemination. Preserving roots within an intercultural and intracultural participatory process that reactivates the conditions of its own production and signification through time contributes to cartography of living that is embedded in a sense of diversity and belonging.

MESCP and ik-Model: conclusions to Living Well

The opportunity to integrate ICT in the momentum of the transformative educational project of Bolivia has created the conditions to explore its premises in the context of a wider availability of resources. A framework for a meaningful ICT integration in learning scenarios also gave structure to this encounter, enabling the organic procedures of blending the conceptual with the material world, in a way that respected and fostered the singularity of the Socio-Community Productive Educational Model. At the end of the JP-ik training, all the participants felt confident regarding the further implementation of technological new resources in their schools, as they had an experience of use that was totally integrated into their educational values and pedagogical methodologies. We may see this training project as an opportunity in itself for the educational agents to develop in a *Living Well* model. Actually, this educational vision does not only concern students, but all learners throughout the lifespan and that is why each phase may be seen as part of that will. *Living Well* concerns a whole community, in its own heterogeneity and mechanisms of growth. Therefore, it matters to address each participant not only as a fundamental piece of cultural dissemination but also as a crucial figure of attachment, who experiences processes of exploration and integration in a sheltered and inspiring environment.

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E-inclusion of pupils with literacy difficulties

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This paper presents a study of pupils with literacy difficulties and their use of technology for reading and writing in an authentic school environment. It is a qualitative empirical study of the inclusive aspects of a learning design. The aim of the study is to investigate whether the learning design (a) strengthen the technology-based reading and writing strategies of the four informants, (b) is inclusive. The first question is investigated through the think-aloud method (Pressley & Hilden, 2004; Pressley & Afflerbach, 1995), the second question through observation (Bjørndal, 2013; Tetler, Ferguson, Baltzer, & Boye, 2011) and interviews (Kvale & Brinkmann, 2009). The study shows that the four informants profit from the learning design in relation to developing technology based spelling strategies, more general ICT strategies and is more motivated in their use of ICT. In relation to the inclusion potential, the results show that two of the informants are fully included in the intervention period both of which is pupils in the same class.

Introduction

This paper presents a study of pupils with literacy difficulties and their use of technology for reading and writing (literacy technology) in an authentic school environment. There is limited research with this focus (Levinsen, 2008). In Denmark, we have a number of research projects where literacy technology (LIT) is explored in context. We find to types of research in Denmark. Quantitative studies aiming to investigate whether the use of LIT has an effect on reading or writing (Christensen, Andersen, Bingley, & Sonne-Schmidt, 2014; Juul & Koch Clausen, 2009) and partly (Arendal, Saabye Jensen, & Brandt, 2010). Qualitative studies examining the inclusive potential of LIT in authentic school environments (Bladt, 2012; Levinsen, 2012; Saabye Jensen & Fuglsang Engmose, 2012). In international research, we find the same distinction, but with more emphasis on effect studies of specific tools and programs for reading and writing (Abbott, 2007). This research is criticised for being small and anecdotal. But at the same time, some studies indicate effect on some of the processes in reading and writing (Föhrer, 2003; Jacobson, Björn, & Svensson, 2012; Lange, McPhillips, Mulhern, & Wylie, 2006; Silver-Pacuilla, Ruedel, & Mistrett, 2004; Stetter & Hughes, 2010). The body of research points toward LIT as having inclusive potential and furthermore effect on part of the reading and writing process, and motivation. In Denmark, it is common practice to provide pupils with literacy difficulties with LIT. A new study shows that 77 of Denmark's 98 municipalities have purchased access to LIT (Arnbak & Klint Petersen, 2013). At the same time, however, some Danish studies shows that pupils who use LIT feel different; that they do not necessarily understand why they need to use these tools; and that they find their teachers lacking in knowledge about LIT (Holmgaard, 2010; Juul, Brahe, & Hansen, 2013). In other words, they feel excluded.
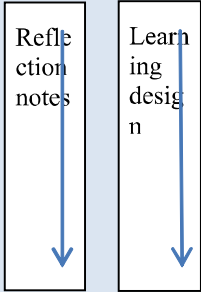
This study aims to investigate the inclusive potential of the use of LIT. It is based on two prior studies. Firstly a study of technology-based reading and writing strategies developed by young people with Dyslexia, secondly a study of instructional (didactic) reflections done by special educational teachers concerning the teaching of pupils with literacy difficulties and their use of LIT.

Method

It is a qualitative empirical study of the inclusive aspects of a learning design developed on the basis of two prior studies. The learning design is developed by the researcher and qualified through collaboration with two teachers in two different 4th grade classes. The aim of the study is to investigate whether the learning design (a) strengthen the technology-based reading and writing strategies of the four informants, (b) is inclusive. The first question is investigated through a think-aloud method (Pressley & Hilden, 2004; Pressley & Afflerbach, 1995), the second question through observation (Bjørndal, 2013; Tetler, Ferguson, Baltzer, & Boye, 2011) and interviews (Kvale & Brinkmann, 2009). Furthermore, the teachers participated in a reflective collaboration organized as dialogues before, during and after the intervention

period. The objective of the dialogues was to ensure the teachers understanding of the theoretical and empirical framework behind the learning design and to integrate their knowledge of the pupils in the adjustment of the learning design. Table 1 is a general overview of the research design.

Table 1
The research design

Before the intervention period (8 weeks)	The intervention periode (6 weeks)	Evaluation of the intervention (1 week after)
Pre Think-aloud session with the 4 informants	The 4 informants participates in the intervention	Post think-aloud session with the 4 informants
Dialogue with the principal of the two schools and the ICT-center Individual dialogues with the two teachers School 1: pre meeting Meeting 1 Meeting 2 Meeting 3 School 2: pre meeting Meeting 1 Meeting 2 Meeting 3	Intervention School 1 Intervention School 2 Observation in class Systematic co-operation with the two teachers through pre-conversations	4 weeks after: post conversation with the two teachers

The participants

Four pupils in 4th grade participate in the study. They come from two different schools, both located in the same municipal and, therefore, connected to the same ICT-centre (special needs). There is one boy and one girl in each of the classes. All four of them have completed the ICT-centres three-week course in the use of LIT at their own school. Additionally they have all received a laptop computer. The four informants have all been diagnosed having so severe reading difficulties that technology is necessary. The teachers are in their thirties. They represent both sexes and have 9-15 years of teaching experience. They have both taken over the class in 4th grade.

The learning design

The learning design is put into practice through a writing course. It is goal-driven. The overall goal is ministerial decided (Undervisningsministeriet, 2015) and is concretized in learning goals for the pupils and specific signs of goal achievement (See Table 2 for a general overview).

Table 2
Goals, learning goals and signs of goal achievement in the learning design

• 4' grade goals • (Undervisningsministeriet, 2015 own translation)	• Learning goals	• Signs of goal achievement
• Presentation • Phase 2 • Skills: • The pupil can produce multimodal aesthetic subject-oriented text. •	• The pupil can describe the characteristics of a descriptive text (a text about animals) and use them to write his own subject-oriented text about animals.	The pupil: • participate in a dialogue about ones one and others' text about animals • write a text about animals using the genre characteristic

• Knowledge:
• The pupil has knowledge about descriptive and narrative representations.
• Proof – reading
• Phase 2
• Skills:
• The pupil can spell with morphemes as starting point
•
• Knowledge:
• The pupil has knowledge about morphemes, word classes, phonology and technologies.
	• The pupil can find spelling errors using Word spell checker or digital read-aloud function, and is able to correct them by using:
	• try again by spelling in the head
	• Word spell checker
	• Wordprediction tool
	• Copy from another text and insert in ones one
	• Google search
		• has knowledge about the genre "animal text."
		
		• The pupil:
		• Can express when and why the use one or more of the five spelling strategies
		• Are using one or more of the five spelling strategies
		• Knows one or more of the five spelling strategies:
		  ✓ I spell in my head
		  ✓ I spell with Word Spellchecker
		  ✓ I spell with the word prediction toolbar
		  ✓ I spell by copying the word from another text
		  ✓ I spell with a Google search

The learning design is built on the following principles:

- Structured lessons: introduction phase, work phase and evaluation phase (Skibsted, Svendsen, Østergaard, & Langager, 2015)
- Feedforward, feedback and feed up (Hattie, 2013)
- Modelling (Bandura, 1994)
- Teaching Learning Cycle (Mailand, 2007; Mulvad, 2012)
- Authentic writing situation (Hetmar, 2000)

From previous studies:

- Making sure a number of practical background factors are in order: support, appropriate and common software, that the teacher has competence in using LIT, physical environment is suitable to the use of computer and LIT, offer the pupils a course in the use of LIT
- All texts are digitalised
- All pupils in the class use computer and LIT
- The teacher is a role model using ICT and LIT
- Openness about and acknowledgement of the use of LIT
- The lessons must have structure, use repetition, have clear goal setting
- Focus on the fact that "ICT always tease" and the necessary of coping with that
- As part of the learning content the pupils was explicitly instructed in five spelling strategies, four of them technology based (See table 2). Also, they were explicitly instructed in using the search function as a technology-based skim-read. Furthermore copying and rewriting into ones one text as a technology-based writing strategy.

Analysis and results

The study aims to investigate two questions. Do the pupils develop new technology-based reading or writing strategies and are the informants included by the learning design? By answering these two questions, a distinction between the term learning profit and inclusion is made. They are understood as reciprocally dependent in the way that inclusion is understood as a precondition for learning output (Qvortrup, 2012).

The development of technology-based reading and writing strategies

In order to investigate the informants learning outcome, they were asked to do a written assignment before and after the intervention. As introduction, they were told to show how they read and write using the computer as a tool, and they were told to think-aloud while doing so. The think-aloud sessions took place under consideration that they were children (Kolrud, 1999; Porter, 2014) trying to make a natural and secure situation for them, using the think-aloud method in a qualitative way by making conversation along the way. The method provides insights into the informants thoughts while reading and writing, and by recording the screen movements and sounds it furthermore allows close analysis of for instance how the informants use the digital read-aloud function. In the analysis of these sessions, the informants transcribed think-aloud and the analysis of the screen has been catalogued, organised and condensed into the following categories: Decoding, comprehension, writing, spelling, handling the ICT programs, handling ICT "that teases". To be able to point out what technology-based strategies the informant used before and after the intervention period.

The analysis of the think aloud session's shows that the informants profit from the learning design:

- Three of them have internalized one or more technology-based spelling strategies. Two has thereby strengthened their technology based spelling by being able to handle the spelling of words in different ways while the third do not benefit of the strategies in the same way. The spelling strategies were part of the content in the learning design.
- Three uses more general ICT functions, many of which were integrated into the learning design.
- Two shows more motivation in the post Think-aloud session while another is motivated in both pre and post Think-aloud. That ICT always teases where integrated into the learning design. This point towards the possibility that they have internalised this understanding into their own use of technology through the intervention.

Is the learning design inclusive?

To examine the inclusive potential of the learning design the concept of inclusion is operationalized into 3 parameters: Physical inclusion, i.e. that the pupil is located in the same physical surroundings as the other pupils; Social inclusion, i.e. whether or not the pupil is participating and psychological inclusion, i.e. the pupils experience of being included or excluded (Qvortrup & Albrechtsen, 2014; Qvortrup, 2012). The analysis is focused on the academic inclusion: (a) Is the informant present in the class? (b) Is the pupil participating in the academic activities? (c) Does the pupil experience to be included in the academic activities? By operationalizing the concept of inclusion, it is possible to observe specific signs of inclusion. For example (a) is the informant present in the class and how is he/she located in the classroom? (b) Does the informant raise his hand? Is he/she writing during the activity of individual writing? Is he/she cooperating with peers during group work? The third parameter – psychological inclusion – is not directly observable but is examined through qualitative interviews of the informants.

The analysis of the inclusion potential shows that all four informants are physically included during the intervention. Additionally the laptop computer as primary artefact (Bundsgaard & Illum Hansen, 2011; Levinsen, 2010) shows to be of significance in relation to the informant's location in the classroom and thereby setting up conditions for their participation and by that their social inclusion. Especially two of the informants in one of the classes are participating during the intervention. The other two is mainly not participating. The analysis shows that only two of the informants experience being included, and thereby psychologically included. Summarising only two of the informants is fully included (all three parameters) in the intervention period both of which is pupils in the same class.

A significant epilogue points towards the computer as a primary artefact having a significant influence on the informant inclusion. After the intervention period one of the two informants, that was not fully included, suddenly resisted to use the computer in the class. It turned out to concern some of her peer's reaction on her having a computer, having bullied her, telling her that it is cheating to use a computer for reading and writing. The solution became that the teacher handled the issue with her peers and that her parents bought her a small laptop computer that was more practical to transport and to use in the class than the quite big one, she got from the ICT-center. Even though it wasn't possible to demonstrate that

this particular informant was included; she possibly did feel more included during the intervention than after. That was the teacher's analysis of the situation.

Discussion

Research in the use of LIT in an authentic context is a manifold and complex assignment, knowing the complexity of capturing such complicated relations trough concrete data collection methods. Above is accounted for a method, analysis and results, remains to discuss the contexts importance for the intervention, because it has implications for the results. Even though the intervention was carried out with great effort in relation to secure that it was as identical as possible in the two classes, it was not conducted in the same way by the two teachers. The differences in the collaboration with the two teachers owing to their different personalities, differences in the two classes concerning classroom culture, whether or not other pupils was included in the class and thereby occupying the teachers time is all conditions of significance for the realisation of the learning design. The observations showed in the class where the informants were fully included the teacher had integrated the concept of the learning design into his practice, especially emphasising the principle of modelling. In the other class, the teacher was under more pressure due to the classroom culture and inclusion of other pupils, and, therefore, had difficulties carrying out parts of the learning design, among them the principle of modelling. It is difficult to rule out that this context related connections could be significant for the divided result of the inclusion potential, knowing that the differences in relation to learning output were not quite as significant though showing the same tendency.

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Media as facilitating and conditioning factors in intercultural projects

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This paper considers how media and its applications facilitate teamwork in complex projects conducted over long distances and questions how discussion is conditioned by these applications. While procedures and languages that use such applications can facilitate in-depth discussion or a simple exchange of information, the relation between users and media can also be an important factor in limiting participation. Users' relationship with media also influences group discussion, making it rich and multimodal, or limited and impoverished if account is not taken of all relevant factors.

Introduction

This paper reflects on the role of media for intercultural work teams undertaking complex cultural projects. The analysis is based on our experiences as partners in Teacher 2020, a European project supported by the European Commission to promote entrepreneurial education, with a special focus on teacher education and schools. The project involves nine partners from six different countries, representing schools, universities, teacher training institutions and NGOs.

The literature in this area is growing (Zhao, Pittaway, & Cope, 2007) and includes recently published official documents on entrepreneurship and entrepreneurial education (European Commission, 2011, 2014). However, it remains conceptually vague, drawing on different fields of knowledge (economy, pedagogy, psychology) and leading to differing practical approaches. For this reason, the project involves both practical initiatives and theoretical discussion. Three meetings will be held during the lifespan of the project, but the team must find means of working and debating across long distances.

During the first year of the project, each partner has commenced development of at least two projects experimenting with entrepreneurial education in schools and in teacher education. These initiatives are eclectic regarding goals, participants, duration and scope; examples include the following.

- Bkids: Business in school, focusing on the improvement of entrepreneurial culture through the creation of business plans (Foligno, Italy).
- Designing art exhibitions: Staged by primary school pupils in Girona, Spain, showing art works they have been working on during the school year.
- Innovation challenge: Project at Mølleskolen Secondary School in Ry, Denmark to improve the school environment, with a broad focus on social, cultural and economic values.

At the same time, we are building a virtual entrepreneurial platform for teachers and student teachers to share these initiatives and the results of the discussion. This should also enable teachers and student teachers to develop content to improve their ideas, with new perspectives for further experimentation.

The first meeting of the project involved an intensive debate and conceptual discussion of entrepreneurial education. This was organised as a cooperative exercise, in which all participants had to design a word cloud with key concepts relating to entrepreneurial education. The result was a word circle, in which all partners related their contributions to previous ones. Beyond the word circle, the team was able, through dialogue, to construct a conceptual frame to be worked on together, making the implications of entrepreneurial education more explicit to identify notions requiring further investigation. The first goal was to define entrepreneurial skills. The challenge, then, was to find the optimal media for conducting the long-distance discussion process. Apps such as Trello, Google Drive, Facebook and Padlet were already being used by partners, and it was decided that some other apps should be introduced in order to enhance

the global dialogue between different cultures. The intention was to make it easy for everybody by using suitable apps to facilitate the process, although in practice these could sometimes become an obstacle.

We strongly believe that dialogue and collaboration between different cultures in entrepreneurial processes can offer new perspectives on the challenges or problems in one's own community. However, the use of ICT in distance education between cultures also affects the outcome of the discussions. Media use depends on a range of factors, such as age, country, gender and community habits, making it necessary to take account of all experiences and skills in shaping discussion and knowledge-sharing processes. The challenge is to be an entrepreneur, experiencing new applications as part of the project that can also be useful for productive collaboration with students. The guiding principle is that discussion cannot be vague; to be useful, it has to define and achieve specific goals.

Goals

The goals of our project are to reach to a common definition of what entrepreneurial education is through dialogue and to compare different practical experiences in different countries. As the notion of entrepreneurship comes from business, defining entrepreneurial education is not an easy task. As a search term on Google, the first three hits for *entrepreneurship* are business-related, but Teacher 2020 necessarily addresses a broader conception:

> Recent thinking has shown that narrow definitions based around preparing learners for the world of business may place limitations on both learners and the teaching community. Instead a broader definition which sees entrepreneurship education as a process through which learners acquire a broad set of competencies can bring greater individual, social and economic benefits since the competences acquired lend themselves to application in every aspect of people's lives.

Entrepreneurship education

Having reached common agreements about how entrepreneurial initiatives should and should not be defined, the main objective of the team is to transform these general agreements into specific proposals. The other important challenge is to be aware that because entrepreneurship and entrepreneurial education is a current issue in many countries, it is important to rigorously define long-term proposals that will contribute to generating a new pedagogy for a new century. This means that (a) we must be able to define the roots of entrepreneurial education, highlighting its new contributions while relating these to the previous proposals for innovation on which they are founded; (b) we must be able to provide specific guidelines for how to be entrepreneurial (and why), using new methodologies such as service learning and cooperative work; (c) we must be able to define what good entrepreneurship means within the field of education; (d) we must compare and analyse our practical experiences; (e) and finally, we must be able to foresee how this perspective will evolve in the context of social change and of new technologies that are changing our ways of learning and, consequently, our ways of teaching.

It follows that we have to be able to further investigate shared ideas through effective use of media. But how is this to be done? And how are vague intuitions to be turned into specific proposals when only long-distance dialogue is possible? The Internet offers endless possibilities, but not all of these fit specific goals or an eclectic team. Following trials of various options, we now have a fuller understanding of how media and new technologies both facilitate intercultural work and shape content and dialogue.

Project experience

Following the first face-to-face debate about entrepreneurial education (Girona, March 2015), the partners agreed to continue the discussion by means of a number of online platforms, which include the following.

Trello: This collaborative tool enables teams to manage and organize complex projects as boards and to comment new documents. The platform enables coordination of all the requisite information to conduct the project, which partners can access in one place. However, although it has become a repository of important documents, this is not an intuitive platform—for instance, the procedures for uploading documents take a long time and are not visible to users—and partners sought alternative ways to interact with colleagues.

Facebook and Google Docs: In conjunction with the coordinator, the partners from Denmark launched a combination of Facebook and Google Docs to facilitate discussion, with the aim of concentrating the debate on entrepreneurial skills. In the face-to-face discussion, it was agreed that this topic entails different issues in relation to primary school, secondary school and teacher education. For that reason, the facilitator created three different Facebook groups to facilitate three different discussions. Through a pinned post, the three different groups linked to the different Google documents, all of which addressed four questions. Using these tools in combination, the facilitator and other participants would be able to answer questions regarding the use of Google Docs through Facebook for those unfamiliar with the former. While few people actually participated in the discussion, both applications were used in other ways. Facebook has proved useful for uploading and commenting on documents, schemes, websites and videos related to entrepreneurial education. In Google Docs, partners have shared specific information related to entrepreneurial skills, but we have been unable to hybridise contributions, which instead have simply been added in correlative order. One possible reason could be the timing of the launch (at the start of the examination period), but other factors may also have influenced the virtual discussion, including the complexity of two different platforms in combination with a lack of ICT skills, as well as issues of motivation, trust, cultural differences and habits. Additionally, three different discussions in three different groups may further increase complexity; in combination with the two platforms, this meant that there were multiple places to navigate.

Padlet: The team has also used Padlet, a platform that requires only a click on a link. This application makes it easy for users to leave answers or opinions, like Post-Its on a board. It has been used to discuss motivation. The question to be answered through Padlet was "How do we engage teachers and pupils in learning processes?" The nature of the application encouraged most of the partners to participate in the debate, with very interesting results. Because they must leave comments in the appropriate place on the board (screen) in relation to other earlier posts, participants are juxtaposing and organising ideas in a coherent mosaic. For that reason, more progress was made with Padlet towards the goals of hybridising ideas and creating new values than with other applications, even though Padlet does not allow further discussion—contributions are short and there is no discussion, only juxtaposition.

Skype: This telecommunications software application enables video chat and voice calls from computers and other devices and has been used by partners to talk in pairs, to get to know each other better, to solve problems and to discuss proposals that require accurate explanation. For that reason, it is considered a very important tool, generating meaningful debate and trust among members of the team. However, it can be difficult to use systematically in complex teams.

E-mail: This has played a parallel role in the development of the project. As it requires no synchronicity and all partners use it daily, it has become the fundamental tool for communication between partners.

Website (www.teacher2020.eu): Alongside internal research, the group has also begun to produce external outputs. The first of these is a website, where all partners can explain their entrepreneurial initiatives and share them with educators as a source of inspiration. To date, this website has been used only as a dissemination tool. However, to enhance global dialogues in an entrepreneurial setting, Teacher 2020 hopes to make this a digital entrepreneurial learning environment for teachers and student teachers to share and develop best practices between cultures.

Coggle: Right now, our working team has started working with Coggle. This application allows users to create complex schemes or force maps using shapes, connectors, colours and sizes, which we hope will help in this process of discussion and generation of new ideas.

Ladder of generation of cultural value through media

Generate new ideas Skype coggle Wikis ...

Organise contributions in a global mosaic padlet ...

Juxtapose and organise contributions

Comment other's contributions wwwebsites - blogs ...

Exchange information (mail) Skype ...

Figure 1

Discussion

Participation, motivation and trust

The first goal for our working team is to achieve high and active participation in long-distance discussion processes. During this first year, we have realised that this is very difficult to achieve, for a number of reasons. One possible explanation, widely supported in the academic literature, relates to the level of collaboration readiness once a discussion moves from face-to-face to face-virtual-face. In this case, motivational factors become important. Through their research on conducting projects virtually, Olson and Olson (2014) found that collaboration took place only when writing the proposal; once a grant had been secured, the level of collaboration fell. To increase collaboration after the proposal stage, they suggested building social connections through small events during collaborative projects. This view is supported by Traxl et al. (2015), who suggested that social events should be included in the group formation process as a means of getting to know one another. Vivian Robinson (2015) also states that the establishment of relational trust is important because people do not generally wish to collaborate with people they do not trust.

Different habits and ICT skills may also contribute to challenges for collaboration. Grzesik and Chutnik (2010) report that different personalities and habits can make it difficult to remain effective or to maintain good relationships. In an intercultural setting, cooperation becomes even more challenging. This is supported by Shachaf (2007), whose exploratory study of the effects of cultural diversity and ICT tools on team effectiveness with 41 team members from 9 different countries found that cultural and language differences resulted in miscommunication, jeopardising trust, cohesion and team identity:

> Participants suggested that cultural and language barriers produced communication challenges. In particular, lack of accuracy created difficulties in both written and spoken language, requiring team members to invest more time and effort in encoding and decoding messages. Thus, the cost of interaction for both senders and receivers increased. In addition, the cost of interaction was higher for both native, who had to be accurate and yet simple, and non-native speakers. (Shachaf, 2007, p. 6)

Among other factors, the findings in relation to increased time dedicated to the project are very important in the present context, as participants in projects like Teacher 2020 have many other responsibilities.

In summary, it is important for the Teacher 2020 project that future ICT solutions can be easily used. The team should also focus on establishing better social connections between participants, as this will probably have an impact on the level and quality of collaboration.

**Affective factors in virtual discussions
in long distance cultural projects**

Figure 2 Affective factors in virtual discussions in long distance cultural projects

Different Cultural Identities

As Europe is a mosaic of very different cultures, all partners in this project represent cultural minorities, in the particular sense that we have different cultural identity traits that make the project rich and complex. We also differ in our ICT habits and skills, depending on social tendencies, our core relationships, gender, age and facilities available at our respective institutions. It follows that, in order to work together, we have to build up a new community of practice in order to find ways to talk and discuss, regardless of distance. Peer-to-peer discussion of subjects that are of common interest is one way to demolish stereotypes about each other's cultures, encouraging mutual respect as well as establishing connections by sharing different experiences and knowhow. Following Wenger (2004), Nørgaard and Jørgensen (2015) used his model of learning design to identify some of the important factors in designing a community of practice:

> In order to facilitate a collaboration of mutual knowledge exchange, it is important to consider which artefacts should be included. It is important to create space in which people are at the right place in the right relation. Furthermore, it is important to create a specific didactic for the platform. What is the content? Who is it for? How can people get to the platform? Why is it relevant? How should people collaborate? And what is the main language? (Nørgaard & Jørgensen, 2015, p. 46)

Technological Skills

The following factors also determine the use of the tools among partners. Are these tools intuitive (i.e. is the process entirely visible)? Are they fast? Is it easy to access them? Are they global (well known) or are they new or generally unknown? Are they only working tools or are they also social media tools? Are they translated into different languages or do they work only in English? Which modalities can we use with these apps (e.g. visual—photos, schematics, drawings, videos; oral; written)? Are they uni- or multimodal?

In the examination session, we described some of our experiences of collaborating over the Internet. These programs are well-known programs or apps; millions of other programs are available free of charge, but many of these are seldom used because people tend to use the ones they know. One Nielsen analysis showed that the time spent monthly by each person on app use has increased from 18 hours and 18 minutes in 2011 to 30 hours and 15 minutes in 2014 while the number of apps used every month has only increased from 23.3 to 26.8. Although people may not use the same apps every month, the report says "This appears to indicate that there may be an 'upper limit' to how many apps users will engage with every month" Perez (2013).

Clearly, better-known apps have a huge advantage, and these results suggest that teachers may tend to use well-known free apps in the classroom, even though they may not be best for the specific context and content. It is essential, then, to help teachers to find the right apps for their teaching sessions to limit time spent looking for these. This exploration and experimentation is very important for entrepreneurial education, as we cannot innovate if we fail to take account of social and technological innovation, and so, the Teacher 2020 project must itself be transformative. If the goal is to promote open attitudes towards new technologies among teachers, the Project must be able to work with new platforms and applications. The qualities of being inspirational, being a team player and having a good network are among the most essential skills for entrepreneurial teachers:

> Entrepreneurial teachers have a passion for teaching. They are inspirational, open-minded and confident, flexible and responsible — but also, from time to time, rule-breakers. They listen well, can harness and sell ideas and can work student- and action-oriented. They are team players and have a good network. (European Commission, 2013; p. 5)

It is difficult to change education and teaching methods; entrepreneurial education is one attempt to innovate, focusing on the empowerment of students and pupils (Freire, 2002). Although many EU strategies suggest a broader definition of entrepreneurial education, the most common definition remains too focused on establishing a business. For this reason, many teachers will have a natural resistance to the idea because they do not consider it their role to educate children in business start-ups. Some teachers also feel more comfortable teaching within the traditional teacher-oriented approach, and they do not share the need to change the paradigm:

> It requires nothing less than a sea change in the approach to education, emphasizing active learning and the provision of new experiences for students outside of the classroom. For many education systems this represents a fundamental shift away from traditional approaches. (European Commission, 2011, p. 1)

It is therefore of great importance that the change process starts from the inside and that teachers who value entrepreneurial education can find communities of practices that will give them inspiration and entrepreneurial skills. With this in mind, Teacher 2020 is seen to be the best way to produce a ripple effect in promoting entrepreneurial education. By the end of the project in September 2016, Teacher 2020 will have implemented an open virtual platform for teachers to find, share and develop best entrepreneurial practices.

Collaborative Work

Some partners in Teacher 2020 are going entrepreneurial by experimenting with different ICT resources (such as wikis) to enable teachers to develop shared content. Although the wiki is a relatively new tool within education, a number of projects have already used it to enhance global dialogues and collaboration between physical locations. In a study of 202 pre-service teachers in a 2 ECTS point module, Ertmer et al. (2011) concluded that students' wiki experiences expanded their view of learning with diverse others (that is, in an international collaboration involving different cultures, including England, Russia, South Korea and Sweden). Granted its great potential, there are challenges in using the wiki in a more informal context. A smaller but longer-term study by Hadjerrouit (2013), involving 16 students from a Web 2.0 technology course, revealed a reluctance or resistance to editing each other's contributions, which has an effect on collaboration. In general, the level of collaboration through wikis is quite low in relation to issues such as technical problems and grammar corrections. Based on her findings from the wiki history log, which shows that the writing work was more individual than collaborative, she states

> This behaviour may be explained by the fact that collaborative wiring is more challenging in terms of cognitive efforts, active participation, group interactions, and time management than just splitting up the writing tasks into subtasks, working individually without collaborating, and finally putting all the subtasks together and create a final wiki. (Hadjerrouit, 2013, p. 309)

Hadjerrouit also discusses the importance of authenticity; if students do not perceive their tasks as authentic activities, for an authentic audience, the level of motivation will be lower.

One of the most important challenges for the Teacher 2020 project (and for entrepreneurial education in general) is to make learning processes more collaborative. As discussed here, new technologies can play an important role in this task, but not all applications help people to work productively together. As educators, most of us are already able to share ideas and content with people all over the world. We are also able to comment them, to agree or disagree, in an inverse pyramidal process (often commenting the comment of the comment of an idea and losing significance with each new contribution). We also have to be able to hybridise our speech and our ideology to generate new ideas and new approaches. We must be able to work together to ensure that innovation in education will respect all minorities and not only the mainstream to which we belong.

Conclusion

ICT applications now provide multiple ways to collaborate, reducing distances between people to establish new communities of practice across countries and time zones. However, the experiences gained from Teacher 2020 confirm that collaboration by means of ICT platforms is a complex affair, and a lot of different factors must be considered when establishing communities of practice between different cultures. Along with a thorough focus on establishing an authentic environment, the development of trust, motivation, skills and new habits are among the most important elements in this process. The results of these learning activities from the Teacher 2020 project may be of use to others seeking to establish an ICT-based entrepreneurial environment.

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Inclusive e-learning practices at university colleges in Denmark

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Status Quo for e-learning at the Danish university colleges (UC) has been investigated. The colleges have 12 years of experience, and during this period of time, knowledge about how to establish and deliver e-learning that aims at including and unifying students in a collaborative learning endeavour has grown, not only at the European level but also in the entire world. In a Computer-Supported Collaborative Learning (CSCL) approach focus is on the establishment of learning processes, digital education, collaboration, dialogue, critical reflection and the establishment of Communities of Practice (CoPs).This paper aims to assess how – and to what extent – knowledge about CSCL permeates and qualifies the way the e-learning practices in the UCs. The article suggests that the challenge to promote and qualify the use of e-learning at University Colleges may be an organizational one.

Introduction

In the six out of seven University Colleges in Denmark, who offer E-learning it is organized and practised in, practically, the same way (EVA 2014) in the effort to include learners in a collaborative learning endeavor. It is a combination of e-learning and physical classroom teaching with a relatively high level of ordinary classroom lesson compared to what one would find in, for example, our neighbour country Norway (Fossland, 2015; Luth-Hansen, Rask, & Risager, 2015). Every month there is a three-day long mandatory seminar where students and teachers gather for eight or ten hours a day. It is not possible to attend online and the seminars are not streamed. Between these seminars weekly lessons are held in Adobe Connect and the students work together in groups. The education is based on the VLE called *Fronter*, which supports sharing of documents and handing in assignments as well as dialogue in closed forums. However, both students and teachers find that Fronter and Adobe Connect do not answer their demands regarding communication and collaboration. Therefore they add Facebook, Google Docs and other tools of their own choice, regarding teacher and students.

During monthly seminars, teachers prefer to facilitate group work amongst the students, but the majority of the students prefer teacher driven lectures. This suggests that the students do not regard the virtual lessons as *real* lessons, as *real lessons* to them mean that they as students and the teacher are present in the same physical room at the same time. This indicates that the teachers do not succeed in creating at reliable and trustworthy virtual learning environment for the students (Sorensen, 2010). They do not have the skills for this and, more importantly, they do not feel convinced that e-learning can compete with ordinary classroom teaching. Some of the teachers use the phrase: *Keeping the screen warm* when they describe their interaction with students in-between seminars. This indicates that the teachers regard the technology a cold and alienating barrier that they have to compensate for with their human *warmth*. We in our group find this conception of e-learning very common amongst our colleagues. Stahl, Koschmann and Suthers (2006) note that: "…CSCL stresses collaboration among the students, so that they are not simply reacting in isolation to posted materials (p. 2). In other words: If the teacher organizes and facilitates collaboration between the students, they will feel connected instead of lonely and thus *keep each other warm*. Bruner (2003) shows us the importance of narratives in learning and Sorensen (2010) argues that a teacher in a virtual environment must act as an information architect who designs and creates a narrative for the learner to frame the learning process. If the teacher – as the case seems to be at the UCs – believe

that e-learning is nothing but a poor substitute for classroom teaching, this is exactly the impression the student gets.

Method

Our research is based on a fresh report (EVA 2014) from the Danish Institute of Evaluation (EVA) from 2014 and our experiences as teachers. The report *E-læring på læreruddannelsen og sygeplejerskeuddannelsen* (E-learning at the Teachers College and Nursery School) examines the web-based educations for primary school teachers and nurses in Denmark. Six of the seven University colleges in Denmark offer web-educations and all of these have taken part in the research. The report builds partly on desktop research concerning demographic matters and likeability for the students to complete the education and partly on qualitative interviews concerning perceptions and experiences regarding e-learning among students, teachers and students' counsellors.

Students in the web educations

The new report from EVA (EVA, 2014) states that in Denmark, web students are up to ten years older than the ordinary students. The average student at both Teacher College and Nursery School is 25 years old, whereas the average web-student at Teacher Colleges is 32 years old, and at nursery school 35. The majority of the ordinary students at both educations are women. When it comes to Teacher's College, the share of men is 30% of the ordinary students but just 15% of the web-students. For students at the Nursery School, the share of women is practically the same at both educations: 4-5%. The web-students report that they choose this way of learning out of concerns for their family. They very often have children and report that they evaluate the flexibility regarding when they study and meet with their group and the time saved in transportation. Research shows, that when the group of students is humongous it might very well be easier to negotiate and agree on solutions in group work, but students tend to learn less than they do in more heterogeneous and perhaps more troublesome groups (Dillenbourg et al., 1996). In this specific case, e-learning leads to a separation of younger and older students, which causes loss of synergy for both groups of learners. The students at the web-education may find it relatively easy to collaborate, but their skills in interpersonal communication are not challenged the way they could have been in a more heterogeneous context. Dewey (1619) argues that skills should be trained in an environment as close to the setting we need them for as possible. Otherwise, it affects the quality of the learning in a negative way.

The web-students possess a very high level of motivation, which may very well be connected to the fact that this is their last and only chance to have an education at all. The students may claim that the lack of consistency in the web-education makes them loose motivation at times, but the statistics of the report show that they very rarely drop out. One could claim that the University Colleges in Denmark do not explore the full potential of inclusion that is offered through CSCL since this only matches a very narrow target group: Relatively old women with family and children with no other place to turn to for an education.

Teachers' skills and training

The EVA report (EVA, 2014) states here is a great variety as to whether the teachers receive any training in e-learning before they begin to teach online. In some cases they are trained by peers with experience in e-learning. In other cases, this peer might have received some formal education in e-learning, e.g. a Master in ICT and Learning. In yet other cases they only receive a brief introduction to the technicalities in using Adobe Connect. From there on they have to make their own experiences. The students feel this lack of common standards very clearly. They report that teachers differ significantly regarding technical as well as pedagogical skills. This shows that the teachers may share the same practice and may very well interact on a daily basis, but they do not engage in a community of practice (Wenger & Lave, 1991) although this would help them to share examples of best practice and thereby improve their teaching. For some reason the UC's do not seem to prioritize the potential organizational learning in relation to e-learning although a stronger focus on this could very well strengthen the teachers motivation and improve their skills significantly (Shipton & DeFillipi, 2007).

Institutional perspectives on e-learning

The EVA-study (EVA 2014) reports that student's counsellors regard e-learning as a *lonely way of studying*. They do not recommend young people to choose e-learning as their experience is that younger people are likely to drop out of an e-learning education. They do not express any concerns whether this could somehow be related to the quality of the education. Their major concern is that some young students think that e-learning is less demanding than the ordinary education, hence the relatively few scheduled lessons per week. These young students, they strongly advise to choose the ordinary classroom-based education. The report states very clearly that the University Colleges do not pay enough attention to their web-educations on an institutional basis. They do not support the teachers with the necessary time and opportunity to educate themselves and share knowledge. This conclusion the report builds partly on the teachers' opinions. In our experience, teachers very often claim lack of time to be the reason, regardless what the problem is. If one turns to Engeström (1990), extra resources alone are not likely to change the perception of a specific matter in an organization in order to facilitate sharing of knowledge. One will have to address the stories, the contradictions within the organization. In this case, the report shows – but does not address – a contradiction between the *warm* classroom and the *cold* virtual environment. It is stunning that the University Colleges still after 12 years of e-learning carry this perception.

Conclusion: Our recommendations

At a students' level we recommend that the University Colleges ensure the quality and homogeneity of teaching of the teaching becomes more homogenous. We recommend a higher level of knowledge sharing among teachers and a shared "code of conduct" or shared principles for online teaching. In this way, the students will not have the feeling that the quality of their education is a "game of luck". They will feel motivated all the way through their education, and hopefully – learn more. At the same time we recommend the UCs to allow the group of students to be more heterogeneous. They should aim at adjusting the web-education in order to meet the demands of different kind of students, instead of excluding them.

At a teacher level, we recommend more formal training. In addition, we recommend that the leaders support sharing of knowledge in communities of practice and to expand these to include more than one University College.

At an institutional level, we wonder if the inclusive quality of E-Learning (Andersen & Sorensen, 2015) could be improved if it was offered in one central place, in which the expertise to promote and innovate e-learning was located. If one institution could specialize in web-education, the teachers' attitude, their handling of the challenge to integrate technology and, finally, their recommendations to their students may potentially change and point towards a more innovative future in terms of integration of – and inclusion through – e-learning.

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International students' use of informal web resources and tools for formal studies at an English university

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This paper presents findings from research on a sample of international students at Leicester University, UK to identify their access to, and the use of Web-based tools for their formal learning. Using a questionnaire survey and focus group interviews, we develop both a quantitative overview of their technology use and a qualitative account of their engagement with web-based resources for their learning. Our study highlights how students develop digital literacy skills in terms of identifying "academic" sources alongside collaboration and sharing of user-recommended online resources. It notes the cultural context in thinking about the strategies that international students develop in their use of web resources and the implications this might have for Higher Education (HE) institutions.

Digital participation and learning in higher education

At the onset of the economic crisis, the Digital Britain Report (DCMS, 2009) set out the UK government strategy in placing technology at the centre of the UK's economic recovery, and recognised the importance of people having the "…capabilities and skills to flourish in the digital economy" (DCMS, 2009; p. 1). Equipping the citizens with digital literacy skills was seen as key to increase participation and use of new technology in the information age. The Committee of Inquiry into the Changing Learner Experience headed by Prof. Sir David Melville (2009) has also identified Web literacy skills as a pre-requisite to participate in the information society.

This Committee's finding, however, warns us that although students in HE may well be pervasive users of social networking sites and online tools, they may lack deep critical skills to analyse and validate information on-line. The report, therefore, recommended that HE institutions should see digital literacy as a priority area not only in learning contexts but as part of increasing student employability. Dijk (2005) highlights the impact of inequality in society due to lack of digital literacy skills and the importance of formal learning contexts for people to use and develop their information skills. The ability to search for and critically evaluate information on-line is a key skill for students in a digital economy.

With free and low-cost availability of Web 2.0 technologies and tools, and access to Internet within the university, halls of residences and social spaces means that current HE students at least have the technological means to take part in what Jenkins et al. (2006; p. 3) considers a "participatory culture" – a culture that poses "… relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing one's creations, and some type of informal mentorship whereby what is known by the most experienced is passed to novices." It is also a culture "in which members … feel some degree of social connection with one another" (ibid. p. 3). Such a participatory culture has a number of beneficial effects for learners: opportunities for peer-to-peer learning, and the development of skills valued in the modern workplace, amongst others (Jenkins et al., 2006).

However, as the Melville report (2009) highlighted, not all students can be considered as having the skills to participate effectively in this participatory culture. Jenkins et al. (2006, p. 3) identifies three concerns: The participation gap - an unequal access to the opportunities, experiences, skills, and knowledge that will prepare youth for full participation in the world tomorrow; the transparency problem – the difficulty that the young people face in making sense of how the new web tools that they use can shape their perceptions of the world; and the ethics challenge - the use of web tools which can breakdown the traditional norms and practices, e.g., the fair use of content and intellectual property rights. Students need support in understanding these issues as they inhabit a Web 2.0 world. Jenkins et al.'s (2006) ideas on these concerns are useful in our research into understanding HE students' Web 2.0 practices.

Research aims - international dimensions of digital literacy skills

Since the early conceptualisations of the importance of digital literacy skills for learning (e.g., Gilster, 1997) much research has been reported on university students' use of technologies for learning and their digital literacy skills (e.g., Sharpe, Beetham, & De Freitas, 2010; Francis, 2010; Goodfellow & Lea, 2013). Much of this research, however, does not reflect the diverse nature of students in universities today. Internationalisation of higher education means that a significant proportion of students in UK universities comes from many countries, e.g., East Asia, South Asia, Africa, and the Middle East. It is important to investigate how students from such diverse backgrounds make use of the digital environment available to them once they start their studies at a university in the West.

Our study combines theoretical insights from academic research on digital literacy with perspectives on pedagogy. It was carried out at the University of Leicester with two main aims:

1.   to investigate international students' access to and use of digital technologies and Web 2.0 tools for their formal and informal learning at the university, and
2.   to explore their digital literacy, and awareness and skills in their use of Web-based resources for learning activities.

Data collection (over two academic years) involved a questionnaire survey of undergraduate and postgraduate international students to identify their ownership of, access to, and use of digital devices and Web 2.0 tools (Year 1, n=53; Year 2, n=41), and focus group interviews with a self-selected sample from the same group of students (3 or 4 in each focus group, Year 1, n=10; Year 2, n=11) to gain deeper insights into their use of Web 2.0 tools in a learning context.

Results

All students in this study were from abroad, mostly from China with a preference for Chinese-based websites and platforms such as QQ (a Chinese version of social networking with instant messaging similar to Facebook); they use it seamlessly to organise and collaborate with colleagues for group work, both virtually (in QQ) and off-line in, for example, the group study spaces in the library.

Access to and use of digital devices and Web-based tools and resources

The data from the questionnaire showed that the ownership of laptops, Tablet Computers, Smartphones, digital cameras and MP3 players, was high amongst these students. These students reported that laptops, Smartphones and MP3 players were the three most important digital devices for their studies and study-related activities (Fig. 1). More reported using mobile phones in the second survey than in the first, probably because of increased ownership of Smartphones and the wireless access to the Internet through Smartphones provided by the university's IT services. Term-time accommodation, university library and university computer rooms were their top three locations for most of their studying (Fig. 2). These were the locations where they accessed the internet most during term-time (Fig. 3).
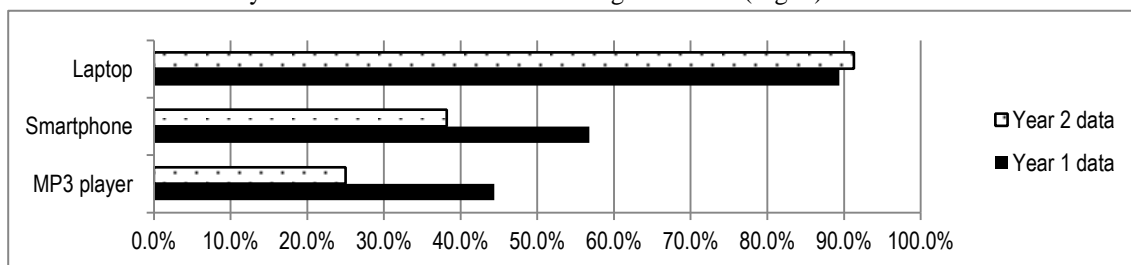
Figure 1 The most important device(s) for studies and study-related activities (% of those reporting)
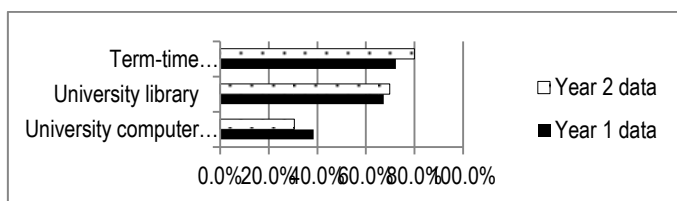
Figure 2 Top three locations where students used computers (% of those reporting)
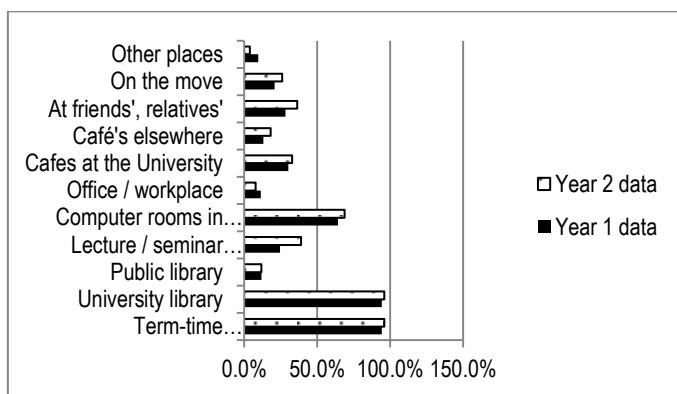
Figure 3 Locations where students used computers during term time

Approaching assessed work

Nearly all the international students in our focus groups reported a similar pattern of navigation across online and off-line resources and spaces, such as the course VLE and the library, as they did assessed work. Their mastery of digital literacy skills became important as they began to use online resources and Web-based tools to locate and identify relevant sources.

> Anu: "I first go to Blackboard, check my lecture notes. I read that. Second, I go to the links that the professor has given me, and I read those. 3rd, I go through the reading lists. 4th I search for journal articles. For media and advertising, I have specific databases. Business premier and Waris[?]. These are the two where I can find most journals. I also use digital library. I also find books from the library. I also use Google Scholar to get things, to collect things. You can type certain key words … ." [Second round, FG3].

How students navigate across these resources may be driven by how they are taught and assessed. Students are taught in lectures and seminars and through projects and group work. Students also have access to a personal tutor. The predominant assessment at Leicester in Arts, Humanities and Social Sciences post-graduate Masters' modules (30-credits) is an essay of 4–6,000 words.

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Figure 4 Students' most used Web-based resources for learning (n = 49, First survey)

Figure 5 illustrates the resources available for students' use and spaces that they inhabit when they go about learning and carrying out assessed pieces of work. The classroom and face-to-face contacts are at the centre because of their role in campus-based studies.

We asked students about their use of physical spaces for learning, to explore how these spaces are related to their online environment. Most of the students who took part in our study mentioned that their choice of a place to study is dependent on the task at hand (access to books) and the atmosphere of the place of the study (a quiet place, e.g., halls of residence, or a place to study with their peers such as a study room in the library). In focus groups, students talked about technologies they use to shift between online and off line spaces, communicating with friends online and face to face, thanks to digital devices they own, the mobile phone contracts that they pay for, and the internet services provided by the university (email, VLE, online library) that they can access through these devices. The

Figure 5 Resources and spaces that international students use in carrying out their assessed work

following extract from a focus group illustrates one student's typical day and place of study; other students' experience was similar.

> Anu: "I study in the library. 24, 7 in the library! In the postgraduate study room. I think there is half India and half China there [laughter] so you feel at home! You feel motivated and if you need any help at 2 o'clock at night you have friends to ask questions."
>
> Interviewer: "Can you think of an example of a question that you ask from a friend?

When we were doing SPSS, everyone was helping each other. It really went on well regarding that specific assignment.

> I am on Facebook as well. I have my professors on my Facebook. So if I have any problems, I can send a message on Facebook. They will answer me. Even if I apply for a job or writing a proposal they will help me, give me information."
>
> Interviewer: "Are they professors of your previous university?"
>
> Anu: "Professors and friends. … In advertising we had lot of modules and we had a really bad time so I ask some of my friends to find me journals. They couldn't because they didn't know how to find them. But they tried to find me things."

Web tools and resources used for formal learning

For students in the focus groups, major sources for learning the formal curriculum and for carrying out assessed work were learning materials provided by their tutors and those from the library. The focus groups revealed that they also used a range of Internet resources and tools.

Recommendation tools for web-based resources
Clearly, some students have access to websites and online tools in their own country, and may continue to use them after arrival in Leicester. One student described a website she used before arrival in the UK:

"I want to mention a special website. It's a Chinese website and its name is Douban. I find, it's a very useful website for me, because if I want to read a book and I search the book in Douban, I will find the book. There is specific webpage for this book and some recommendations and some comments from other readers, their recommendations, their comments about this book. Besides, this website allows people to use tags about books, music or films, so members of this website can just search these tags and they can find relevant resources. And the website will give you recommendations. If I search for a book, and the website will give some most relevant search results about, relevant to books. It means that, besides the book that I am searching it will display several books on the same topic, in the same theme, or several books most of the readers of this book were also interested in. So, for me, I suppose, it's a very useful website for learning. But I haven't found English websites that have the same function." [First round. FG2]

The student showed us this website and explained that other people's recommendations about books and films have been useful sources for her.

Online videos – YouTube, TedTalk, and other sources
Students talked about using YouTube to access relevant material for their learning activities. Their tutors could be influential in introducing such sources. For example:

> "In our first semester, our tutor used videos from YouTube. One was a lecture by Ken Robinson [an educational thinker]. We could find a lot of videos by him. He is a well-known person on creativity, reforms in education, and technologies in education. I used those videos for my essays." [Second round. FG3]

This student also spoke about students' use of TedTalk, which her tutor had shown her. She subscribed to TedTalk via YouTube, an example of YouTube being a point of access to other sources. Other students also found YouTube valuable for their learning, as in this case:

> Anu: "I think YouTube is another great source after Wikipedia. You can type in anything and you can get information. Even if there is a lecture in Boston you can access it. Just from learning to entertainment to music – everything is there."
>
> Interviewer: "Would you refer to YouTube in your essays?"
> Anu: "Yes. There are lots of interviews which I am referring to from YouTube. I study advertising. When we study [classroom] half the time we are using videos from YouTube."

Another student explained how she has used YouTube to learn SPSS.

> Yan: "I used YouTube to learn SPSS. Because the university only offered some basic modules… Some of the material was not clear. I wanted to understand what exactly the Chi Square is. I found YouTube videos that explain how Chi Square works, and I got it – how the Chi Square works."
>
> Interviewer: "How did you find it?"
>
> Yan: "I search on YouTube using keywords."

Another student talked about a similar video-sharing web service, in Chinese, called Youku (or Youqu), to help him when he didn't grasp what the tutor was saying.

> Hans: "it is very useful for studies. If I don't understand the tutor in the classroom, I search for video that can teach me the theory, the content is better than the tutor's."

> Hans: "Some tutors use YouTube to teach us. Some videos can inspire us [Second round. FG2]."

These focus group extracts suggest that students do not restrict themselves to using learning material and resources provided by their tutors and what is available in the library. The Internet provides them with media-based material such as video and simulations, beyond what a tutor may be able to produce. In addition to locating such material, students need to know how to evaluate its accuracy and relevance.

Blogs
These students also provided examples of their use of blogs to supplement VLE course material, the library and tutors' suggestions. For one student, such blogs had been particularly useful for her optional module focusing on social media.

> "Well, more about their [blog authors'] personal response to a phenomena or something. And they give you their [personal views], their recommendations…. or like their writings." [Second round focus group. FG1]

She said she would read these blogs regularly to find "as many sources as possible [to make] the essay outstanding." She had found most of these blogs by herself, though her lecturers recommended some too.

Other students mentioned in focus groups that they read blogs written by reputable news editors and journalists, such as that by the BBC's business editor Robert Preston. They read these blogs "not for academic [purpose]", but to keep up with events as students specialising in new media.

Students said they were aware of the need to critically assess information in informal websites such as blogs:

> "But I think blog, sometimes, you should be very careful… if you do a really academic essay, you don't want to use personal thoughts or something like that." [2nd round focus group. FG1].

> "… when we did the web assignment. I also looked at blogs. … But like my college said the challenge with blog is how authentic and credible." [Second round focus group. FG1]

The second student above explained how he had used blogs as a source for his essay on British Royal weddings.

> "My topic was the British royal weddings. I had to discuss … the preparations, the buildings and stuff like that. But whereas there are some details let me to look. From details like from BBC. We also have Guardian… The royal family also have website… the Royal Wedding Blog. … I was so confused. There is incredible amount information. I felt sceptical so I had to read in detail." [Second round focus group. FG1].

The language used in blogs tends to be informal and easy to understand for international students. Blogs can help students see things from a different writer's perspective. The student above talks about challenges he faced when using blogs for his essay: blogs from different sources provided information from different perspectives (e.g., BBC, the British Royal family, journalists and editors from different types of news agencies). Students need well-developed digital literacy skills to assess what they read.

Twitter
Focus group students talked about using Twitter for learning. This is what two students said:

> Yan: "I find it quite useful for my academic work because all the people I know, professors here [at the University of Leicester], are on Twitter but it is not easy to find these professors on Facebook. When I follow my supervisor on Twitter I can also see others who are also following him on Twitter who are also professors so we can have useful conversations." [Second round focus group. FG3]

> Interviewer: "What are the advantages of following your professor on Twitter?"
> Yan: "He always updates on some academic news, what has he has found, his recommendations."
> Zara: "My Twitter is more academic than my blog … I started using it quite recently because that is for my optional module. Yeah … I write something and I re-tweet someone else's. The reason is that is part of my course." [Second round focus group. FG2]

Not all focus group students had Twitter accounts, or posted messages regularly on Twitter. One student who claimed that her use of Twitter was limited to following others:

> Cynthia: "Yes. I am following others and read their resources. And Dr. [the name of the tutor] is very famous in Twitter. So I just follow him and see his [research] projects."
> Interviewer: "When did you open your Twitter account?"
> Cynthia: "I opened an account in Leicester."
> Interviewer: "And what made you to open the account?"
> Cynthia: "[name of the tutor], because he recommended it in his class." [2nd round focus group. FG1].

In this particular case, the tutor posted in his Twitter account academically relevant messages, information that he did not normally share in class or in PowerPoint slides. Indeed, in courses/modules taught by a team, some tutors may take only one or two classes per term, but Twitter can provide for continued contact with students. Twitter offers this tutor a channel for useful information shared with his students and a wider community of "followers". Even if the student were included in the tutor's Facebook as a "Friend", the tutor might not be sharing academically relevant information on Facebook.

Wikipedia
Focus group students said that Wikipedia also served as a useful resource for their learning, in an indirect, mostly unrecognised way. Almost all these students stressed that they don't cite Wikipedia as a source in their assessed work. They were uncertain whether the information from Wikipedia could be trusted. Their views on Wikipedia seemed to be based on advice from their module tutors and other staff responsible for their development of academic writing skills. Nevertheless, all these students mentioned that they use Wikipedia to learn what is of interest to them, as in this case:

> "Sometimes I read Wikipedia like that because I like … interesting to know things, Wikipedia gives you a lot of information, for example, why the Queen doesn't have a passport, and I got information from Wikipedia, it was quite interesting!"

In indirect ways, Wikipedia had been useful for their studies.

> Val: "I wanted to information about statistics. The Wikipedia has information about the leaders, the times, the revolution, there are some photos. These are for my personal interest.

The other thing I look at in Wikipedia is population information. When I want to know information about the countries, I like the table that they have on the right hand [talking about the layout of pages on Wikipedia]. It gives the size of the country, the population, the flag, they have all these information."
Interviewer: "what about information for studies?"

> Val: "They [referring to tutors] believe that the information is not reliable. Of course there are references on the top. Because I have been told that the information is not reliable, I chose not to use them."
> Interviewer: "would you look at them though, just?"

Val: "yes."
Interviewer: "but you wouldn't use them in your essay?"
Val: "no."
Interviewer: "who has told you that they are not reliable?"
All: "teachers. [laughter]. Some teachers."

The same student talked about a friend studying maths, who frequently wants to use Wikipedia. In the library he asks if he can borrow her laptop to look up definitions:

Val: "He comes to me asking for [the use of my laptop to look for] Wikipedia definitions for various maths topics. All the time! All the time!!"

Another student spoke about how she makes use of Wikipedia:

Yan: "I may use some of the references [from Wikipedia]. I hear authors' names in lectures but I can't hear/remember the full name. I search Wikipedia using keywords and find his academic area then I use references and find relevant references."
Interviewer: "so you wouldn't quote anything, but use as background?"
Yan: "Yes [meaning No]"

Another student mentioned how she uses Wikipedia to understand difficult concepts:

Anu: "If I [come across] a word, I go to Wikipedia, to get the basic idea of what it is, e.g., a theory, but I don't know what it is, so I just check to understand the basic idea of what it is."

Wikipedia is a valuable source of information for these international students' learning. For many, Wikipedia is a launch pad for jumping into other resources, an informal advisor providing definitions of difficult concepts, or a source of background information about what they are interested in.

Students said they used many online resources in addition to resources available to them from the VLE and via the library. Figure 6 shows this range of Web-based tools and services.

International students in this study tended to use these sources, media and tools for different purposes at different stages of study and assessed work, though not all of these students used all types. Some students were uncertain "whether it is appropriate to use videos" and cite them in their essays. Learning material and research reports in video and other formats (non-text, non-conventional publication types) are still not common in academia. Students said their tutors used them, for example, at the beginning of a class to introduce the subject and create interest among the students: students found them "fascinating", but when it came to using these resources in their essays they were uncertain how to judge their "academic quality".

Discussion and concluding remarks

Our research revealed a number of interesting insights. Our sample consisted of international students mainly from China. They, therefore have a familiarity and preference for Chinese based websites and platforms (e.g., social networking sites similar to Facebook). Many of our students used QQ (a Chinese instant messaging site) seamlessly to organise and collaborate with colleagues for group work both virtually (in QQ) and off-line (e.g., in study rooms in the Library). This has a number of implications for universities like Leicester, who have a considerable body of international students. As academics, we need to recognise that the information society

Figure 6 Online resources and tools used by international students for their academic learning

has distinct national characteristics. Our international students are already embedded in virtual information structures from their own country, and maintain them while studying at Leicester. For instance, Chinese students' use of QQ in their native language can mean that non-Chinese students may feel excluded. Others may prefer certain web tools or spaces they grew up with. There are critical issues to be considered, for example, about exclusions and inclusions.

It is clear that students are engaged in participatory culture on-line especially in terms of peer-supported learning. One example, from our research, is the use of book review recommendation sites. Students may search for a book and then follow recommendations by others on other useful related books. This flags up the horizontal nature of virtual spaces that challenge the traditional top-down vertical structures of academia (Francis, 2010). Students are combining reading recommended by their tutors alongside peer recommendations. This practice has implications for how students understand the status and authority of the information; lecturers are no longer the gatekeepers of knowledge and expert information.

Students are also developing a critical sense of what sources are academic and those that are not. This needs to be explored further, but there is recognition of the limits of sources on-line. Wikipedia, as revealed in focus groups, is a key starting point for students preparing an essay. They are aware of the "user generated" basis of this site, but it can provide a snap shot or definition of the topic they are researching. They may go on to follow links to other sources of information, and follow up the references that are used on the site. Such moves raise a key issue of what are the dominant places online that students go to, to prepare and develop their work. It would be no surprise to many of us that the Google infrastructure (Google Books, Google Scholar, Google Docs) includes key tools used by students. Critical issues related to biases and limits of using these tools need to be considered.

The next stage in our research is to develop approaches that can encourage students to reflect deeply on their levels of web literacy. As educators, we need to think about our own understanding of what international students are doing and learning with technologies, the cultural dimension of these practices and the major way they challenge traditional models of teaching and learning in HE.

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Acknowledgements

Transitions of Chinese international students' use of web technologies for their studies in a UK university

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There is much research interest in the use of web tools by so-called "digital natives" for their studies in education. However, the focus of much of the leaner experience studies have not taken into account the diverse backgrounds of students in higher education. Driven by transnational higher education, a significant proportion of UK students currently come from non-western countries like China. However, the access to and the availability of Internet-based tools and technologies in China is different from that in the West. For example, popular web tools and services such as Wikipedia, Facebook and YouTube are not easily accessible in China. There is also a digital divide within China itself. Therefore, Chinese students' experience with web-based technologies needs specific attention. The present paper reports findings from a case study at a UK university carried out to gain an insight into how Chinese postgraduate students adapt to web-based resources and tools which they encounter once they start their university courses in a UK university and the factors that contribute to these transitions.

Introduction

The use of web-based methods is ubiquitous in higher education sectors in western contexts, and universities have dedicated e-learning platforms to providing course support (Herrington, Reeves, & Oliver, 2010). As students are involved in learning activities where technologies play important roles, empirical studies have been conducted to investigate learners' use of web tools and related technologies within and beyond the classroom (e.g. Jones & Lea, 2011). However, these studies have focused mainly on general student groups in the western context. The trend towards internationalization within higher education (HE) has led universities to attempt to acknowledge the needs of international students and to internationalize their curricula to support international students with diverse backgrounds (Ramsden, 2008). In recent years, demands for HE degrees in China have surged. Data from the Higher Education Funding Council for England (HEFCE, 2014) show that Chinese international students make up about 23% of full-time postgraduate entrants, almost equal to the proportion of home master's students. In adapting to the internationalized university, UK HE sectors are facing the challenge of understanding their international students (Grimshaw, 2007), which implies that Chinese students' learning experience with technologies also needs to be researched.

Web technologies and their applications in education: China and the West

The last two decades have witnessed a significant development of the Web since the innovation of the World Wide Web by Sir Tim Berners-Lee in the early 1990s (Berners-Lee & Fischetti, 2000). The shift from the static Web 1.0 to the dynamic Web 2.0 has created more opportunities for learners (Dabbagh & Reo, 2011). A more recent development is the application of Web 2.0 technologies to education (De Freitas & Conole, 2010). Web 2.0, a term popularized by Tim O'Reilly, is considered to have the characteristics of an "architecture of participation; collective intelligence; data on an epic scale and user-generated content" (O'Reilly, 2005). Others have pointed out the value of Web 2.0 as "participatory and collaborative" (e.g. Lindstrom, 2007, p. 6).

The term *Web 2.0* itself is a subject of debate. It appears to be overused and inappropriate (Hemmi, Bayne, & Landt, 2008), and the clarification of using *Web 1.0*, *Web 2.0* and *Web 3.0* to describe the evolving stages of the Web is debated by academics (e.g. Jones, Ramanau, Cross, & Healing, 2010). An alternative term, *social software*, has also been used by researchers (e.g. Coates, 2005). Nonetheless, whatever the label is, researchers (e.g. Surowiecki, 2004) have argued that the development of technologies has contributed to the decentralisation of authorship in knowledge creation, stressing content which is remixable, user-generated and user-controlled, and has contributed to a platform of participation that takes advantage of "the wisdom of crowds" (p. 3). Studies have looked into the properties of social networks and their possibilities for educational uses (Bates, 2011). Interactive tools like blogs, wikis and

other social media enable a range of authors to co-edit, comment, and share creation in various ways (Alexander, 2006).

Although most social media sites like Facebook, Twitter and YouTube are a central part of the technology landscape of many students in the West (and in other parts of the world), the context of China offers a different perspective, with some implications for Chinese students arriving in the West for their higher level studies. Chinese international students may not be familiar with western technologies due to the inequity of access and the lack of *eDemocracy* in China (Kuzma, 2010). China is noted for stringent censorship and surveillance (New York Times, 2010), with the "great firewall of China" tightening control over sensitive websites, contributing to a digital and knowledge divide between China and the United Kingdom. After riots in the western province in Xinjiang, Twitter and Facebook were deemed sensitive and were banned in China in 2009 (Mackinnon, 2011).

China has its own home-grown Internet services and tools that are designed in such a way that their use can be monitored by the central authority (Hanwei, 2012). The UBS Investment Research (Ling & Zhou, 2012) listed some Chinese Internet-based tools and services that imitate western technologies. For instance, Baidu is a substitute for Google, while Taobao is a close clone of eBay. WeChat, QQ and other social software have functions that are similar to those of Facebook and Twitter.

China also offers a different picture to that of the West in terms of access to the Internet. According to the 2008 statistics of Internet users by the World Bank, China has the biggest population of Internet users (over 400 million), while its penetration rate is under 20%, which is comparatively lower than that (over 60%) of the UK (Graham, Hale, & Stephens, 2011). There are disparities in terms of access to the Internet within China too. As the China Internet Network Information Center (CNNIC, 2013) reported, the growth of Internet use in China has resulted in internal inequities, with the Internet user rate reaching around 60% in urban areas but only 23.7% in rural areas. Moreover, less than 1% of all the Wikipedia articles are shared by China, whereas Europe and North America possess 84% of all Wikipedia articles (Graham et al., 2011).

Discussions of access to web-based tools and services also need to take into account the users and their competencies for using these technologies. Terms like *digital natives* (Prensky, 2001) have been brought into the spotlight in discussions of current HE students and their uses of technologies. Some argue that young students are much more likely to search for information using Google than embark on a journey to the library when they are seeking for knowledge (Jones, 2010). However, the concept of digital natives itself (like the concept of Web 2.0) has been a subject of debate among researchers and commentators. For example, the literature on digital natives provides neither theoretical nor empirical evidence to explain the gap between the so-called digital natives and *digital immigrants* (Bennett, Maton, & Kervin, 2008), and the use of generational distinctions overdetermines the relationship between students' characteristics and technology (Bayne & Ross, 2007). Some researchers (e.g. Eynon, 2010) argue that not every digital native is equipped with digital literacy skills.

Researching HE students' experience and use of new web-based tools and services and their use of these tools for learning is still a priority area in higher education research. However, the focus of much previous study in this area has been centred on western contexts (Jones & Shao, 2011). The present study aims to build our understanding of how Chinese students access and use various web-based resources and tools for their learning. We pay particular attention to the issues surrounding the transition that these students undergo in terms of their use of web-based tools and services available when they begin their HE studies in the UK. The research questions are:

1. What is the transition in the use of web-based tools and technologies for educational purposes by Chinese overseas students?
2. What are the factors that lead to this transition?

Research design

The study was conducted within an interpretivist framework to understand the Chinese students' experiences of using web-based tools and resources during their studies in China and after they have arrived in the UK for their HE studies. The study was carried out following the principles of the case

study approach. The case chosen for the research was the University of Leicester. The study was carried out over six months in the latter part of 2012. Online questionnaires (using www.questionpro.com) were used to gather data on students' access to and use of a variety of technologies, both in China and in the UK. Focus group interviews were conducted to collect students' experiences of using web-based technologies and resources for their learning and their stories of transitioning to a new technological landscape.

The targeted population for this study were Chinese students who were studying at the University of Leicester during the academic year 2011–2012. The online questions were viewed by 172 students, and 74 completed the questionnaires. Online questionnaire responses were generated from 46 female students and 28 male students across different disciplines including biology, economics, education, engineering, finance, management, marketing, media and communications, and mathematics. Email, Facebook and Chinese social media tools such as QQ and WeChat were used to arrange the focus group interviews. Three focus groups were conducted with each group consisting of four students.

The majority of the informants had completed undergraduate studies in July 2011 and started their postgraduate studies in October 2012. Two informants had working experience before their postgraduate studies, and two informants had overseas undergraduate experience, one in Scotland and the other in Hungary.

Quantitative data were analysed using descriptive methods, while focus group data were analysed using thematic analysis.

Results and discussion

Transition in the uses of web tools for learning

Data for this theme come from the open text entries for one of the questionnaire items, where participants were asked to specify comparatively the most frequently used web tools for undergraduate study in China and postgraduate study in the UK. Open text answers were entered into Wordle (www.wordle.net) first, to generate the *word clouds* where the size of a word in the resulting cloud is related to the number of times it has been mentioned. The first word cloud (the left half of Figure 1) shows participants' uses of web tools in China, while the second shows their uses of web tools in the UK.

Figure 1 Main web tools used by Chinese students for undergraduate study in China and for master's study in the UK

Quantitative data showed that Baidu, Google and CNKI were the most frequently used websites for educational purpose for the participants' undergraduate study. This was supported by the China Internet Network Information Center's report (2010) that among the students in higher education in China, the most popular website used for searching academic articles is Baidu (72.4%). From the interview data, 10 out of the 12 participants reported using Baidu as the main search engine for their undergraduate studies. Other commonly used web technologies were QQ, Douban, Xueke, Sohu and Sina Weibo, and their possibilities for learning were pointed out during the interview. There was, however, a disparity in terms of the uses of web technologies across different disciplines.

In the context of UK postgraduate study, data showed that the most popular web technologies were Google Scholar, Wikipedia and YouTube. Almost all respondents reported that they used Google Scholar to seek journal articles when writing essays. Wikis also played a vital role in students' coursework learning; 7 of 12 participants said they used them to search for information and for group work. Students also watched lectures on YouTube both in formal and informal settings. The usefulness of Blackboard (the university's e-learning platform) was also mentioned; it facilitates interaction through e-activities and wikis. Again, interviewees were using different web tools that catered to their own study or communication needs. Some examples of the names and uses of these tools are as follows: using an online disk to share materials; using a dictionary like *Youdao 2.0* on mobile phones to check vocabulary; using WeChat to transmit voice messages or photos and using English websites like BBC and the British Council (http://www.teachingenglish.org.uk) to learn subject matter.

Some transitions in the uses of web tools and resources were identified, as summarized in Figure 2.
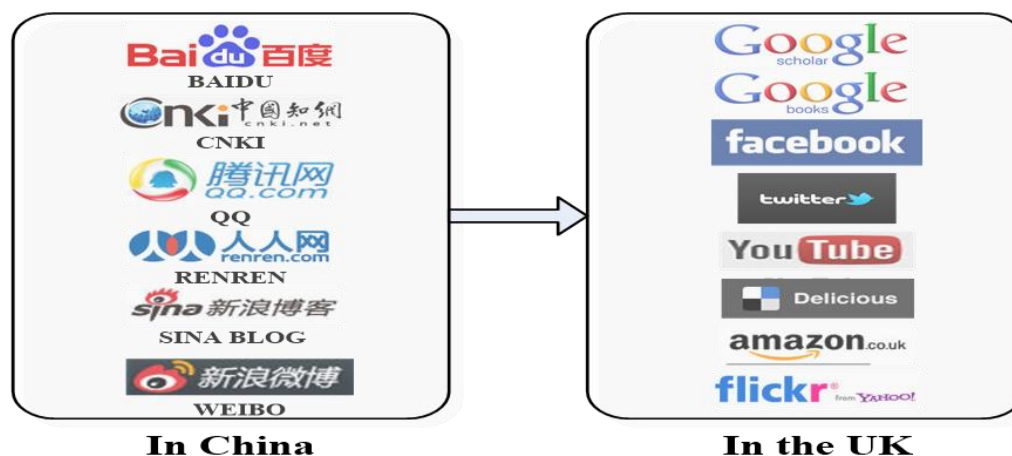
Figure 2 The transitions in the use of web tools by Chinese international students

The questionnaire and interview data showed that Chinese overseas students have already started to use a range of web technologies before coming to the UK, some for their undergraduate studies in China. They could be regarded as digital natives in the sense that they are living in a digital-rich environment. After starting the postgraduate programme, most of the participants began to use Google as their main search engine, and they recognized some issues with Baidu, as pointed out by P6, a student from the Media and Communication department:

> I think one problem of Baidu is commercial elements, as contents are created by contest price. So if you search for some information using Baidu. The information might be ranked depending on how much is the bid offered by organisations but not the relevance of the information. But Google does not have this problem. And I believe Google is less controlled over by the censorship as it has more comprehensive information. Google just seems to be more academic to me.

The above quote illustrates an issue concerning the digital literacy of these students. While the student is aware of the commercial interests associated with search results returned from the Chinese web tool Baidu, they are not aware of similar issues related to results generated from the Google search engine.

Data shows that participants have started to use Google Scholar and Wikipedia more instead of using Baidu and CNKI after they have started postgraduate studies in the UK. But this is not a simple adoption of new tools, purely owing to the availability of these tools in the UK. Participants revealed that they combine these technologies (both Chinese and Western) for their learning and that they sometimes cross-reference the Chinese website if they do not understand certain English definitions.

A further questionnaire item asked participants to specify different time periods during which they adopted certain web technologies (Figure 3).
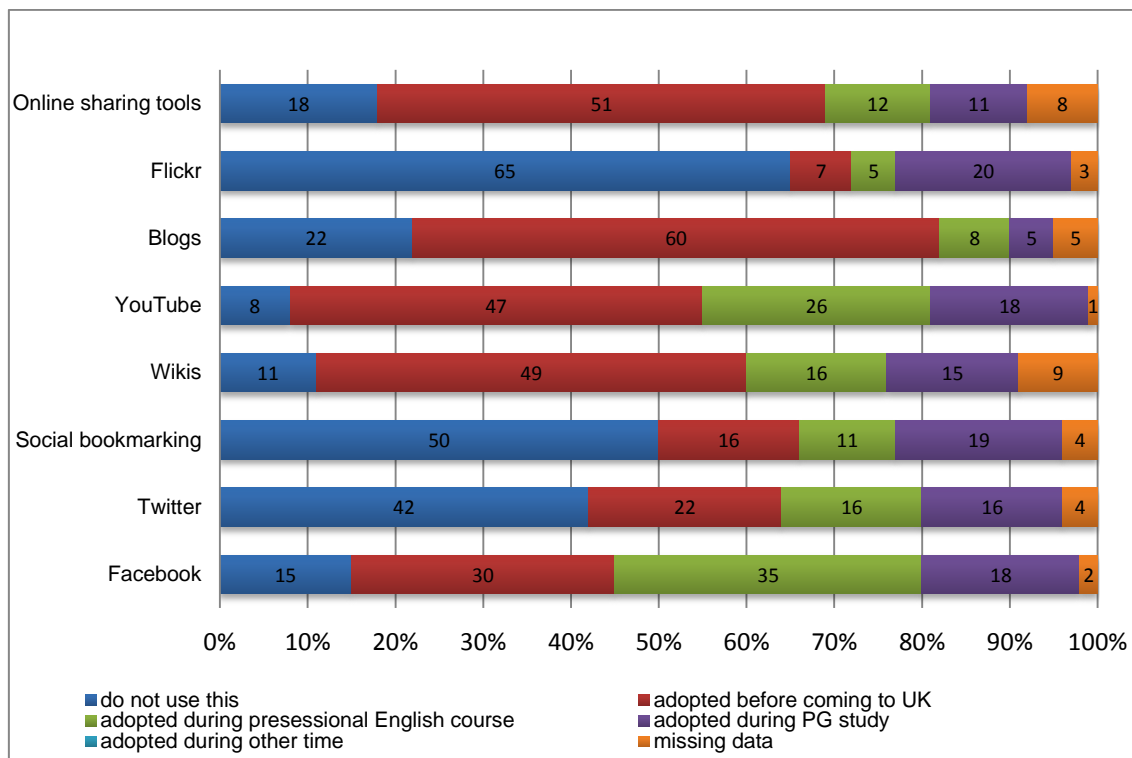
Figure 3 Time period for Chinese international students to adopt web technologies (N=74)

A significant percentage of students have started to use most of the tools before coming to the UK: Facebook (30%), Twitter (22%), wikis (49%) and YouTube (47%). This is an interesting observation, because these tools are blocked in China, using what is called the Great Fire Wall of China. Some possible reasons, according to the interview data, were as follows: students had used these tools before, but then stopped using them after they were blocked; students had a period of overseas experience before starting their postgraduate studies; or students have crossed the Firewall to use these tools in China by using VPN or FreeGate. However, the reason for adoption of some tools such as Flickr is not obvious. This echoes Graham et al. (2011), who reported that, as it was a public repository, there were about 13.8 million geotagged photos on Flickr from the UK; however, its potential in China is constrained, because there are alternative tools available in China (Graham et al., 2011).

Other transitions in the learning patterns among Chinese international students are also associated with their shift in using web technologies for study, as identified in interviews and illustrated from the extracts from the interview transcripts (Box 1).

Box 1
Transitions in learning patterns associated with more frequent uses of web technologies for coursework learning (Focus groups, N=12)

Transitions in access to digital devices and Internet
'The universities in the UK…are well equipped, say, the library provides students with more desktops. The Internet speed is good. And the university provides Wi-Fi services while most of the colleges in mainland China do not have this service…And not only university library, almost every café has Wi-Fi as well.'

Transitions in teaching model from teacher-centered to independent learning
I feel the learning …for the undergraduate level [in China] was based more on the teachers' instructions and textbooks, rather than the Internet. When locating the literature I often asked my tutors for advice. I felt they are professional. Then I went to the library to borrow some textbooks. Unlike in China, here we have less taught sessions each week. But have more opportunity for self-learning. And instead of seeking knowledge passively from tutors in China, the tutors here encouraged us to learn by ourselves too. I tend to spend a lot of time for self-studying. So sometimes when I have some questions, I will search on the Internet first'.

Transitions in attitudes towards online resources
In China, my tutor believed that the articles published in the textbooks are more reliable, thus recommending us to use textbooks as reference. But here, tutor recommended us to download Journal articles when writing essay. Because sometimes, Journal article is more specific and up-to-date'.

Transitions in assignment and assessment
'The main form of testing and assessment of Chinese higher education is based on exams, so we had fewer chances to use Internet for doing assignments. But now, essays are the main assessment and we have other assignments too, like presentations, posters, and so on. So we have more opportunity to search for pictures and text to make PowerPoint'.

Transitions in academic requirements
'Back home, the requirement for academic writing, plagiarism and referencing is not that strict. I did not have to use Internet to find many references and check them carefully. And sometimes I could write my personal views without evidence support. However, here the study is really rigorous and academic'.

Factors of the transitions

In order to investigate the factors that may have contributed to the adoption of new web technologies, the Technology Acceptance Model (TAM) (Davis, 1986) and the decomposed theory of planned behaviour (Huang & Chuang, 2007) were employed in the questionnaire and interview to examine why these Chinese students began to use new tools. TAM is suitable for the study to investigate the association between cognition, affection and technology adoption (Davis, Bagozzi, & Warshaw, 1989), and it has been used as a measurement to understand the perception and adoption of web tools (Ajjan & Hartshorne, 2008).

Figure 4 shows data from the questionnaire on the students' perceptions of the usefulness of web tools for their postgraduate studies.
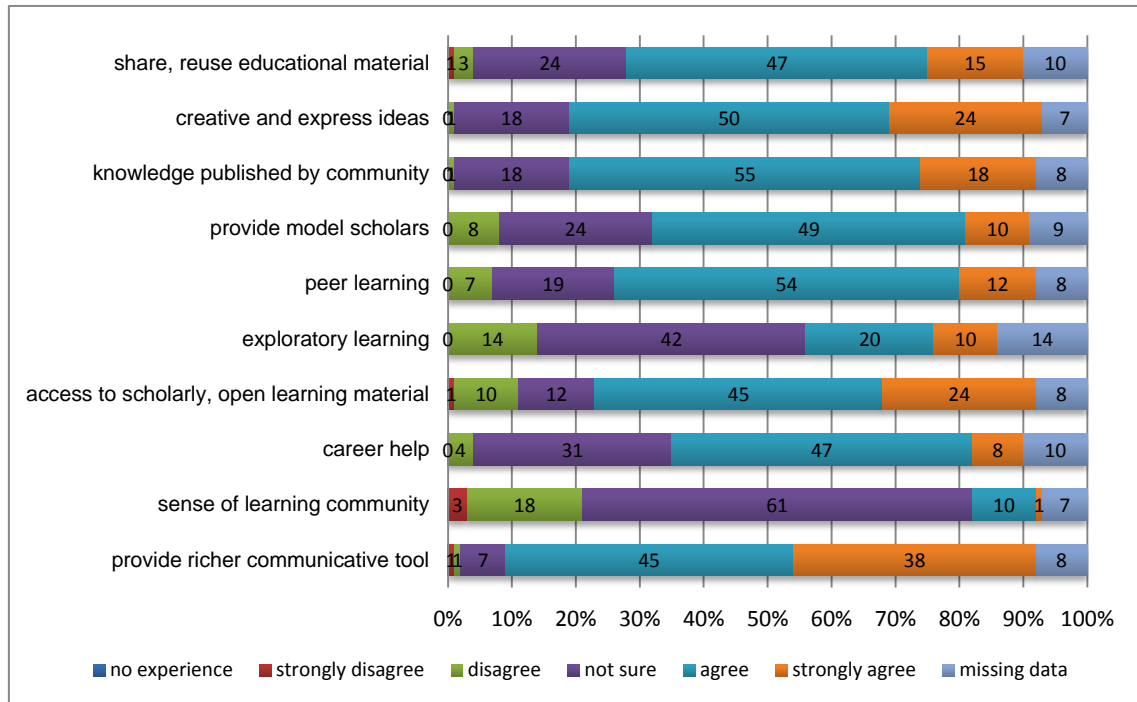
Figure 4 Students' perceptions of the usefulness of participatory web tools in postgraduate studies in the UK (N=74)

Generally, participants hold positive attitudes about the usefulness of web technologies, and interviews also identified some factors which contributed to their adoption of new web technologies. For instance, two students from the School of Education described the way their tutors have shown some videos on YouTube as short introductions to seminars, and they felt they were engaging more in that class and that some lectures on YouTube are worth watching. And under peer influence, some participants started to use Facebook to arrange group meetings.

Based on the analysis of quantitative and qualitative data, the factors that influenced Chinese overseas students' adoption of new participatory technologies can be presented as follows (Figure 5).
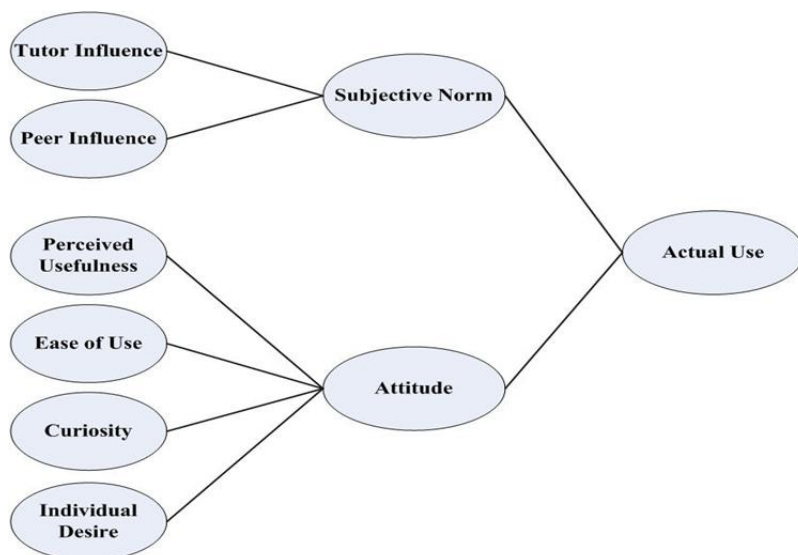
Figure 5 Chinese overseas students' adoption of new web technologies

Specifically, tutor influence and peer influence were identified as the main factors in the Chinese students' adopting new web technologies. Perceived usefulness and ease of use also brought about students' adoption. Curiosity and individual desire (e.g. following the trend or fashion) resulted in students' attitudes in favour of using new technologies as well. This could be explained by the gratification approach (Rubin, 1993), in which the main focus is on how and why people adopt media. In particular, the following reasons are explored by Rubin (2002): people's decision about the technology use is motivated and goal-oriented; people select media to meet their satisfaction or desires, like indicating their identity as active communicators; social and psychological factors are the key ingredients which lead people's communicative behaviour; and people's initiative affects the patterns and results of the technology use.

Conclusions

The study found that before enrolling in courses in the UK, most Chinese overseas students have already started to use web tools such as blogs, online video sites and wikis. In this sense, they could be characterized as belonging to the generation of digital natives. The transitions to and adoption of new web tools like Facebook, Twitter and wikis occurred during their postgraduate course. The main factors that led to their adoption of the participatory web tools identified are tutor influence, peer influence, perceived usefulness, ease of use, curiosity and individual desire (e.g. to follow the fashion). Other reasons also accounted for such transitions, including opportunities presented from living in a non-Internet-censored environment in the UK. The study also revealed that Chinese international students' transitions into using web technologies for learning activities are associated with their course-related uses and activities, for example, assessments that require students to develop and demonstrate their experience with new technologies and develop their digital literacy skills to accomplish certain tasks. In this sense, the tutors and study arrangements have a large role to play in helping these students make the transition to a new technology landscape.

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Mobile learning using social networks: Preferences of university students

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Three groups of first-year university students who studied historical Jewish concepts in a semester-long course were exposed to SMS, Facebook or WhatsApp delivery of the concept definitions to their smartphones. The first group received weekly lists of definitions sent via SMS delivery, the second group received weekly lists of definitions sent through Facebook and the third group received their definitions via WhatsApp delivery. At the end of the course, all students were tested on a standardized historical Jewish concepts achievement test and responded to a questionnaire that examined attitudes towards learner friendliness, learner control of learning and learner curiosity. Results indicate no significant differences between students in the SMS, Facebook and WhatsApp delivery groups on the achievement test or in their attitudes towards the learner friendliness of the delivery platforms. However, there were significant differences between the students in the groups regarding learner control of learning and learner curiosity. SMS delivery was associated with significantly more positive attitudes towards learner control of learning and WhatsApp delivery was associated with significantly more positive attitudes towards learner curiosity. It is thus suggested that social networks should be legitimately considered as potential learning delivery platforms at the university level.

Distance learning

Distance learning has become an increasingly common solution to university campus overcrowding and student requirements for flexible schedules. According to McKee (2010), distance learning systems are perceived by students as being user-friendly, efficient, flexible and convenient. In addition to the abovementioned reasons for adopting distance learning, another major advantage of the introduction of distance learning and the efficient use of technology-based resources at the university level is that students may potentially benefit from increased analytical thinking, enhanced learning autonomy and problem-solving skills (Katz and Yablon, 2011). Fujioka-Ito (2013) confirmed that distance learning at the university level supplements and enhances traditional classroom-based learning because students are necessarily more active in distance learning than in face-to-face lectures and express more satisfaction with a learning process that incorporates distance learning.

In summary, recent research studies (e.g., Chandra & Watters, 2012) indicate that distance learning can enhance students' learning experiences, promote students' learning flexibility, contribute to positive student attitudes towards the learning process and increase learning efficiency.

Mobile learning

Mobile learning, a specific aspect of distance learning, offers a learning environment that is especially characterized by the flexibility offered to the learner (Author & Yablon, 2009). Al-Fahad (2009) indicated that mobile learning enhanced Saudi Arabian university students' learning experiences. He found that the most significant advantage of mobile learning is its potential to promote learning flexibility since it can be used anywhere and anytime. According to Premadasa and Meegama (2013), mobile learning provides more flexibility, mobility, convenience and seamless integration of data access for students than more traditional or other digital learning environments. Ducate and Lomicka (2013) reported that mobile learning, which offers students unlimited access to resources, is an effective platform for the delivery of learning. Yang (2013) confirmed that mobile learning contributes significantly to a more comprehensive educational environment for learning. Kee and Samsudin (2014) found that learners held positive attitudes towards the use of mobile devices when learning. Learners felt that mobile learning is convenient and easy to use in order to access knowledge. Rui-Ting et al. (2014) emphatically stated that mobile learning has become a key learning channel in the educational system and it is thus critical that researchers and practitioners concentrate on further developing mobile technology for learning.

Social networks and learning

Social networks may be defined as dedicated websites or other applications which enable users to communicate with each other by posting information, comments, messages, images etc. (*Oxford Advanced Learner's Dictionary*, 2015). Recent studies have indicated the increasing effectiveness of the contribution of social networks to the learning process. Gilroy (2010) suggested that the idea of adding social networks as educational tools in the academic landscape is catching on fast as colleges recognize the potential offered by the networks for learning purposes. Casey and Evans (2011) reached the conclusion that learning via social networking is positively received by students and contributes to the enhancement of positive student performance in the learning process. According to Alvarez and Olivera-Smith (2013), social networks afford ample and effective opportunities to improve student learning at the university level. In summary, the research literature offers increasing evidence that supports the notion that social networks contribute to fostering student learning at the university level (Derakhshan & Hasanabbasi, 2015)

SMS learning delivery platform

Mobile-assisted language learning (MALL) through SMS messaging is fast developing as a legitimate learning delivery platform (Godwin-Jones, 2010). Godwin-Jones (2011) indicated the effectiveness of SMS messaging for language learning and Stockwell (2008) showed that a majority of Japanese language learners preferred to receive study materials via SMS delivery rather than on personal computers. Motallebzadeh and Ganjali (2011) confirmed the effectiveness of the use of SMS text messages for language and vocabulary learning. Alemi et al. (2012) indicated that SMS delivery of vocabulary had a more significant effect on students' vocabulary retention than traditional instruction based on the use of dictionaries. Hayati et al. (2013) reported that students who studied language via SMS delivery were more enthusiastic about their learning of language idioms and attained higher scores on an achievement test than their counterparts who studied idioms using traditional teaching methods. Chen (2014) confirmed that students who received English vocabulary lessons through the medium of SMS delivery performed significantly better on an achievement test than students who received their vocabulary lessons via traditional face-to-face instruction.

Facebook learning delivery platform

Facebook has also become a learning resource within the domain of mobile learning. Harris (2012) indicated that university students who studied hospitality studies agreed that as a learning delivery platform, Facebook is effective and stimulating for learning. Robbins-Bell (2008) indicated that Facebook provides students with the benefits of open and collaborative learning beyond classroom and campus limits. Isacsson and Gretzel (2011) noted that university students valued Facebook for providing a motivating learning environment. Other research projects have indicated the positive potential of Facebook as a learning delivery platform at the university level (Duncan & Barczyk, 2013; Lateh, 2014). Cerdà and Planas (2011) and De Villiers and Pretorius (2013) found that at the university level, Facebook enhances innovative and collaborative learning and learning motivation. Mitchell (2012) indicated that Facebook-based learning facilitated language learning of foreign students spending time studying at a US university. Kassem (2013) found that the use of Facebook in the Egyptian secondary educational system as a major learning delivery platform led to the narrowing of social gaps between students studying in general (more elite) and technical (less elite) high schools.

WhatsApp learning delivery platform

WhatsApp is a popular social network application which allows users to exchange messages in real time (WhatsApp, 2013). Aburezeq and Ishtaiwa (2013) found that the WhatsApp platform had the power to enhance students' instructional interaction, providing participants with an open and flexible space for communicating and exchanging information. Bwalya (2014) alluded to the use of WhatsApp as a university library learning resource in Zambia, while Gerpott et al. (2014) and Shambare (2014) described the use of social networks, including WhatsApp, for learning in universities and other communities. Minimol and Angelina (2015) confirmed that the use of WhatsApp as a learning tool increases student curiosity and motivation in the learning process. Echenique (2015) contended that all social network

tools, but especially WhatsApp, are highly advantageous in the learning process because they allow for interactive discussion and communication.

Affective attitudinal variables and learning

Learner attribution, learner autonomy, learner control of the learning process, learner creativity, learner curiosity, learning flexibility, learner friendliness, learner locus of control, learner motivation, learner satisfaction, learner self-confidence, learner self-efficacy, learner self-image and learner self-esteem are some of the major variables known to positively contribute to enhanced language and concept learning delivered via technology-based delivery platforms. Katz (2013a; 2013b; 2013c; 2014a; 2014b; 2014c) confirmed the positive association of some or all of the above factors with effective technology-based delivery of language and concept learning.

Chapman and Henderson (2010) stated that one of the variables considered to be a critically important factor in the learning process is the learner friendliness of the learning delivery platform. They indicated that learner friendliness is an important benchmark when assuring the quality of a digital learning delivery platform. Katz and Yablon (2011) confirmed that learner friendliness is a vital component that contributes to the enhancement of positive attitudes towards learning in a technology-based environment. Llorente-Cejudo (2013) concluded that learner friendliness is a major variable vital for efficient use of digital technology in the learning process. Students' attitudes towards the learner friendliness of SMS, WhatsApp and Facebook delivery of learning will thus be examined in this study.

Another important variable strongly related to the learning process is learner control of learning (Hasler et al., 2007). Katz and Yablon (2011) identified learner control of learning in a digital environment as an important variable that positively contributes to enhanced learning behaviour. Karim and Behrend (2014) indicated that scheduled learner control of the learning process positively enhances learning performance. Hermans et al. (2014) constructed an e-learning environment that facilitated learner control of the learning process and, as a result, led to enhanced levels of learning. Therefore, in the present study, students' attitudes towards learner control of the learning process vis-a-vis the relationship with SMS, WhatsApp and Facebook learning delivery platforms will be investigated.

Learner curiosity regarding the learning process is another important variable that leads to effective learning. Moon (2010) contended that information is retained longer and evokes greater learner curiosity if it is professionally relevant. Ju-Ling et al. (2011) indicated that digital libraries need to enhance learner curiosity in order to be efficient. Rosen and Beck-Hill (2012) described a constructivist, one-to-one computer program designed to promote learning that enhanced the curiosity of learners. Katz (2013b) confirmed that it is necessary to evoke learner curiosity for learners to successfully utilize a digital learning delivery platform. In light of the above evidence, the level of attitudes towards learner curiosity regarding SMS, WhatsApp and Facebook learning delivery platforms will be researched in this study.

Method

Sample

The research sample consisted of 134 first-year students enrolled in a 14-week semester-long elective foundation course on traditional historical Jewish concepts offered at one of the seven chartered universities in Israel. Students came from similar socio-economic backgrounds and were all enrolled in the Faculty of Humanities at their respective university after attaining the university acceptance criteria of a mean matriculation grade of at least 80% as well as a mean psychometric university entrance score of at least 550. The students were randomly assigned to three comparison groups and received lists of definitions of historical Jewish concepts sent to their personal smartphones via three alternative learning delivery methods. The first group of 43 students received their historical concept definitions via a SMS delivery platform; the second group of 47 students received their historical concept definitions through the medium of a Facebook delivery platform and the third group of 44 students received their lists of historical concept definitions by way of a WhatsApp delivery platform.

Instruments

Two research instruments were administered to the students on completion of the semester-long historical Jewish concepts foundation course. The first instrument was a 50-item multiple-choice standardized achievement test which was administered to the participants in order to assess their mastery of historical Jewish concept definitions taught in the elective semester-long course. The test scale ranged from 0–100, with the higher grades indicating higher levels of achievement on the test. The second instrument administered to the participants was a 23-item Likert-type scale response questionnaire (students responded to a 5-point scale in which 1 = totally disagree and 5 = totally agree) designed to examine participants' attitudinal levels towards learner friendliness, learner control of learning and learner curiosity. The first factor, learner friendliness, contained eight items (Cronbach $\alpha = 0.84$); the second factor, learner control of learning, consisted of eight items (Cronbach $\alpha = 0:89$); and the third factor, learner curiosity, consisted of seven items (Cronbach $\alpha = 0.82$).

Procedure

Students who were enrolled in the elective historical Jewish concepts foundation course and possessed personal smartphones were eligible for participation in this study. Following the selection of the students who met the above criteria, they were randomly assigned to the three delivery platform groups. Students in the first group received historical Jewish concept definitions by way of a SMS delivery platform; students in the second group received identical historical concept definitions through a Facebook delivery platform and students in the third group received the same historical concept definitions via a WhatsApp delivery platform. The students in the three groups were sent weekly lists that contained 20 definitions of historical Jewish concepts studied in the course delivered via the three respective learning delivery platforms. Thus, each of the students received 280 historical Jewish concept definitions during the 14-week-long course. On completion of the course, the students in the three groups were administered a standardized achievement test in order to assess their level of knowledge of the 280 historical Jewish concept definitions taught in the course. In addition, they were administered the 23-item attitudinal questionnaire which examined their scores on the three attitudinal research variables, namely learner friendliness, learner control of learning and learner curiosity.

Results

Two research questions were posed in the study: the first examined the level of achievement attained by students on a standardized achievement test after acquisition of historical Jewish concepts and the second investigated students' affective attitudes towards learner friendliness, learner control of the learning process and learner curiosity as related to the three learning delivery platforms. Standardized means and standard deviations of students' scores on the achievement test and on the attitudinal variables are presented below in Table 1.

Table 1

Means and Standard Deviations of Students in SMS, Facebook and WhatsApp Delivery Groups for Academic Achievement, Learner Friendliness, Learner Control of Learning and Learner Curiosity

Factor	SMS delivery (N = 43)	Facebook delivery (N = 47)	WhatsApp delivery (N = 44)
Academic achievement	M = 84.76 SD = 6.22	M = 83.99 SD = 7.14	M = 84.21 SD = 8.37
Learner friendliness	M = 3.11 SD = 0.63	M = 3.06 SD = 0.78	M = 3.29 SD = 0.71
Learner control	M = 3.58 SD = 0.79	M = 2.89 SD = 1.04	M = 3.10 SD = 0.94
Learner curiosity	M = 2.81 SD = 0.73	M = 2.63 SD = 0.68	M = 3.05 SD = 0.49

One-way analyses of variance (ANOVA) were conducted in order to investigate intergroup differences in the four research variables. No significant differences were found between students in the SMS, Facebook and WhatsApp delivery groups in the grades attained on the standardized historical Jewish concepts achievement test. There were also no significant differences between students in the three delivery groups in attitudes towards learner friendliness. However, significant differences were indicated between students in the SMS, Facebook and WhatsApp learning delivery groups in attitudes towards learner

control of learning [$F(2,131) = 5.67$, $p < 0.01$, $\eta^2 = 0.08$ as well as in attitudes towards learner curiosity [$F(2,131) = 4.12$, $p < 0.05$, $\eta^2 = 0.06$. Results of a post-hoc Scheffe test indicated that students in the SMS delivery group were significantly higher in terms of their attitudes towards learner control of learning than students in the Facebook or WhatsApp delivery groups with no differences indicated between the latter two groups. Students in the WhatsApp delivery group were significantly higher in terms of their attitudes towards learner curiosity than students in the SMS or Facebook delivery groups with no significant differences found between the students in the SMS and Facebook groups. Results of the one-way ANOVA procedures and the post-hoc test indicated that students in the SMS delivery group are significantly characterized by higher levels of learner control of learning. Students in the WhatsApp delivery group were significantly typified by higher levels of learner curiosity. Finally, students in the Facebook delivery group were not significantly characterized by any of the research variables.

Discussion

The findings of this study indicate no significant differences on the standardized historical Jewish concept definitions academic achievement test between students who experienced the three learning delivery platforms, namely SMS, Facebook and WhatsApp delivery. Thus it seems that different learning delivery platforms do not necessarily lead to differences in academic achievement. Although this result directly contradicts evidence presented by Efendioglu (2012) and Guzeller (2012), it confirms similar results which have indicated that academic achievement is not conditional to the type of learning delivery platforms used to facilitate the learning process (Dyer & Osborne, 1996; Katz, 2013a; 2013b; 2013c; 2014a; 2014b; 2014c; Katz & Yablon, 2009; 2011; 2012). There were also no significant differences between members of the three delivery groups with respect to the learner friendliness variable. It seems that the three technology-based learning delivery platforms in this study evoked approximately the same feelings of user friendliness in students, which thus indicates that the participants felt a similar degree of affinity towards the three delivery platforms. It also appears that when comparing SMS, Facebook and WhatsApp delivery platforms, learner friendliness is not a significant issue that leads to a preference of one of the three learning delivery platforms.

Additional research results clearly indicate that the three different learning delivery platforms employed in the present study are related to significantly differential levels of learner control of learning and learner curiosity. Attitudes indicated by students in the SMS delivery group regarding the learner control of learning variable were significantly more positive than attitudes held by students in either the Facebook or WhatsApp delivery groups. It appears that the students felt more in control of the learning presented to them via SMS delivery conceivably because the simple texting features of SMS technology, coupled with isolation from outside interferences over and above the text messages which contained the historical Jewish concepts to be studied, provided them with a feeling of security and control over the learning material delivered to them. Katz (2014c) postulated that Facebook delivery, where spam messages and unwanted social interactions easily infiltrate the Facebook course page, may have negatively affected the students' focus on the learning material and somewhat negated their feelings of control of the learning process. One can speculate regarding WhatsApp delivery that in comparison with the relatively simple SMS delivery, it has more sophisticated features beyond just texting. These features could have inadvertently caused diversions from the core learning process, thereby mitigating students' feelings of control of learning as delivered by the WhatsApp platform.

Regarding the learner curiosity variable, results of the study indicate that the attitudes of students in the WhatsApp delivery group with respect to this variable were significantly more positive than those of students who received their learning content via the SMS and Facebook delivery platforms. Students in the WhatsApp group felt more curious about this digital application than their counterparts in the SMS and Facebook delivery groups felt about the features of their particular delivery platforms. This appears to be congruent with Munshi's (2014) postulation that WhatsApp greatly enhances student learning because of the curiosity, creativity and motivation aroused by the application. The results of the study also fit in well with Minimol and Angelina's (2015) conclusion that use of WhatsApp as an academic source of learning content significantly enhances student curiosity and student motivation. Furthermore, Echenique et al. (2015) stated that WhatsApp delivery of learning more significantly encourages interaction between students than the SMS and Facebook applications. These interactions could well have contributed to increased learner curiosity as exhibited by students who received WhatsApp delivery as opposed to

delivery via the SMS and Facebook platforms which do not intensely arouse students' feelings of curiosity.

Conclusions

The results of the present study indicate the potential of social networks as digital learning delivery platforms. Although the three delivery platforms have no advantage over one another in terms of their contribution to academic achievement on a standardized historical Jewish concept definition test or the attitudinal variable of learner friendliness, SMS delivery of learning is perceived as a delivery platform characterized by its relationship to more positive student attitudes towards learner control of learning. WhatsApp is perceived as a learning delivery platform typified by its relationship to more positive student attitudes towards learner curiosity. As a learning delivery system, Facebook seems to have no advantage over SMS and WhatsApp learning delivery vis-à-vis academic achievement or with respect to any of the attitudinal variables examined in the present study. The results of the study regarding Facebook are rather strange as Facebook is the most widely used social network; as of March 2015, it had over one billion registered accounts. Other social networks, such as WhatsApp, are lagging significantly behind in terms of the number of users (Statista, 2015). Before clear cut models for digital learning delivery platforms can be constructed, additional studies need to be conducted to further explore the possible relationship between SMS, Facebook, WhatsApp and other social network digital learning delivery platforms and the plethora of cognitive and affective variables related to the learning process. However, the present study indicates the potential of social networks as learning delivery platforms at the university level, and thus university policy makers are called upon to take note of this significant technological development. The time has come for social network applications, such as SMS, Facebook and WhatsApp, to be considered as legitimate and positive learning delivery platforms at the university level. They should be given serious consideration as viable alternatives to the more traditional learning delivery platforms widely used in university education.

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Improving student approaches to online assessment in higher education

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Studying via the Internet using information tools is a common activity for students in higher education. With students accessing their subject material via the Internet, studies have shown that students have difficulty understanding the complete purpose of an assessment which leads to poor information search practices. The determination of the relevant information for particular learning assessments is the topic of this paper as it describes a case study that focuses on the information tool use of a small group of participants and is a continuation of a similar research study. The study and discussed research findings point to a student's lack of capacity to fully engage with material online and the need for particular interventions to focus higher education students on the relevant learning cues. The findings of this case study form the foundations for future research with particular implications for the development of online assessment tasks for higher education

Introduction

Customising technology use and practices to enhance learner experience provides students with an affordance (Jones & Shao, 2011) to capitalise their learning and benefit from technology. Yet many students still struggle with aspects of information literacy even though their access to technology has improved and they appear to be very familiar in its daily usage (Jones et al., 2010). Selecting the correct search tool, determining constructive search criteria and evaluating the retrieved information is still problematic for many students. Students persist in using search platforms such as Google or Wikipedia instead of using technologies in a sophisticated manner to make use of the increasing set of information platforms. Students rather conform to a conventional pedagogy using generalist information platforms (Judd & Kennedy, 2010). Margaryan et al. (2011) found that teaching staff who do experiment with newer technologies, usually revert back to established tools and methods and are reluctant to use emergent social technologies. The students are then influenced in their technology use by the guidance and professional practice set by their instructors (Bennett & Maton, 2010).

Whilst students may demonstrate a level of familiarity with technology Ng (2012) argues that students do not take advantage of the nuances of educational technology as they are unaware of such advantages but can be guided to use such technology more effectively. Greene, Yu and Copeland (2014) found that better planning in the use of technology led to students being able to construct knowledge pertinent to the task and hence convey their understanding accordingly. After all, the need for information is pivotal and foundational to the learning experience and the students must be able to develop effective search strategies to find, refine, and learn from the discovered information.

Some of the technological tools commonly used by university students as identified from the literature (Kukulska-Hulme, 2012; Li, 2012; Thompson, 2013) and a case study conducted by Qayyum and Smith (2015) are software made available by instructors in Learning Management Platforms, the Google suite of learning materials, mobile or smart phones and messaging (including text messaging), Wikipedia, and other organisational websites. Interestingly, Kennedy et al.'s study (2008) indicates most students still wanted some training in technology use for university learning despite the fact that they were reportedly comfortable in its usage. Findings from the Qayyum and Smith (2015) case study similarly indicates that even with these well known tools, there was a need to train new university students in the use and organization of information tools so that they are better able to undertake their routine academic learning work and be able to tackle *online distractions*. In a study involving 264 students, Lai, Wang and Lei (2012) found that students' technology use was overwhelmingly influenced by the conditions created by their lecturers. Li (2012) reports in findings from a study focusing on technology and assessment that lecturers should have given students more information on assessment requirements and that lecturers need to address these shortcomings during lectures.

The reading habits of students are generally changing also, and on-screen reading trends indicate a shift towards nonlinear reading and skimming content rather than following the content very closely (Liu, 2005). The debate on which format (online versus paper) is better will undoubtedly continue for a while, but researchers (Coiro, 2011; Konnikova, 2014) argue that online distractions affect a reader's focus more than the environment itself. Online readers tend to prefer online browsing for quick information retrieval and spend less time on sustained in-depth reading (Stoop, Kreutzer, & Kircz, 2013) and hence take a long time to comprehend content. Remove the flash banners, images, and other online distractions, and readers are likely to read on screen as well as they do on paper, especially if they also take notes along the way (Subrahmanyam et al., 2013). The reading differences may be pronounced however if longer texts are to be read online that are further complicated by the varied distractions of visual media (platform dependent) and may lead to a longer time in front of the computer screen while reading said articles.

Whilst there is a cost benefit in universities moving towards electronic over print resources, the preference for print based material by university students means that university personnel should structure the in-depth online reading to motivate students in sustaining their on-line study practice (Ji, Michaels, & Waterman, 2014). Strategies should be developed for a range of students to help them improve their online speed reading abilities, thereby achieving the lexical processing abilities needed for a university level education. These skills take time to develop and can continue to develop in students even after graduation, but the main central theme is that the online reading habits of students need to be refined earlier-on in higher education institutes.

A further challenge in learning from internet-based material is the sheer amount of information available online that can potentially hinder deep reading. In a comprehensive study of web browser logs of 25 participants, Weinreich et al. (2008), analysed nearly 60,000 first page visits to conclude that 17% of new pages were visited for less than 4 seconds, while nearly 50% of the first page visits lasted less than 12 seconds. It seems that users generally scan or glimpse over the information to pickup keywords rather than doing any actual reading. Most user stops on Google search results were even shorter (ranging from 2-12 seconds), and there were no lengthier stays. Thompson (2013) reports similar searching trends from a survey of 388 first year university students and recommends students be given explicit instruction in forming search terms and evaluating the discovered information.

This paper showcases some aspects of information retrieval by describing a second phase pilot study that examined how university students use information tools to answer assessment tasks. The study investigated how students interacted with online information tools in conjunction with the reading and information seeking activities as they approached a learning task. Some of the data from the study will be presented along with some initial key findings and serves as a forerunner to a larger intended piece of research.

Methodology

The study was undertaken at Charles Sturt University in Australia in the Faculty of Education and continues the methodological approach adopted for the first phase of the research. In the first phase case study ten participants from a transitional education subject volunteered to participate in the study and were required to complete two short tasks. These two tasks were related to the subject but not part of the required assessment, as the researchers did not want any perception of bias for students who did not participate in the study. The first phase of the study found that very few students carefully read the required task and that in all but one instance the search engine used was Google despite some students asserting that for academic purposes they would only use Google Scholar or the Library database search facility. The characteristic confirms research that users will gravitate to a commonly used simple working solution that invokes a commonly used behaviour (Margaryan, Littlejohn, &Vojt, 2011). The findings also found that the few students who displayed elements of re-reading, comparison and reading slowly all exhibited better achievement in the task result.

Phase two of the study focused on 6 fourth year students who were either graduate entry students or in the fourth year of an undergraduate study who volunteered to take part in the study. The subject used was part of a suite of subjects utilized by the Faculty of Education in the Bachelor of Education K-12 (undergraduate) and the Bachelor of Teaching (Secondary-Graduate Entry). During a one-week period in an arranged mutually convenient time, students met with one of the researchers in the usability lab located

on one of the university campuses and were requested to employ their usual study approach to develop their answer for the subject's first required assessment in a one-hour period. As part of the ethics approval students were told at the start of the academic session that participation in the study would not advantage the participants and that the researchers would not assist the participants with any part of the assessment task.

The Phase 2 case study continued to employ the Phase 1 mixed methods approach, using eye tracking observations and retrospective interviews. Each student completed their information activity (one hour) in a usability session that was captured and recorded on a computer (see Figure 1) including all recorded eye movements on the computer screen in real time, search browsers used, search terms and techniques used, web pages visited, documents browsed, mouse/keyboard actions and any words spoken. Immediately following the task completion a short interview (15 minutes) was conducted between the researcher and the participant, gathering feedback about searching for information for the required assessment as well as gathering data about the participant's usual information searching process and opinions about the use of social networks and media sites for academic investigation and study.
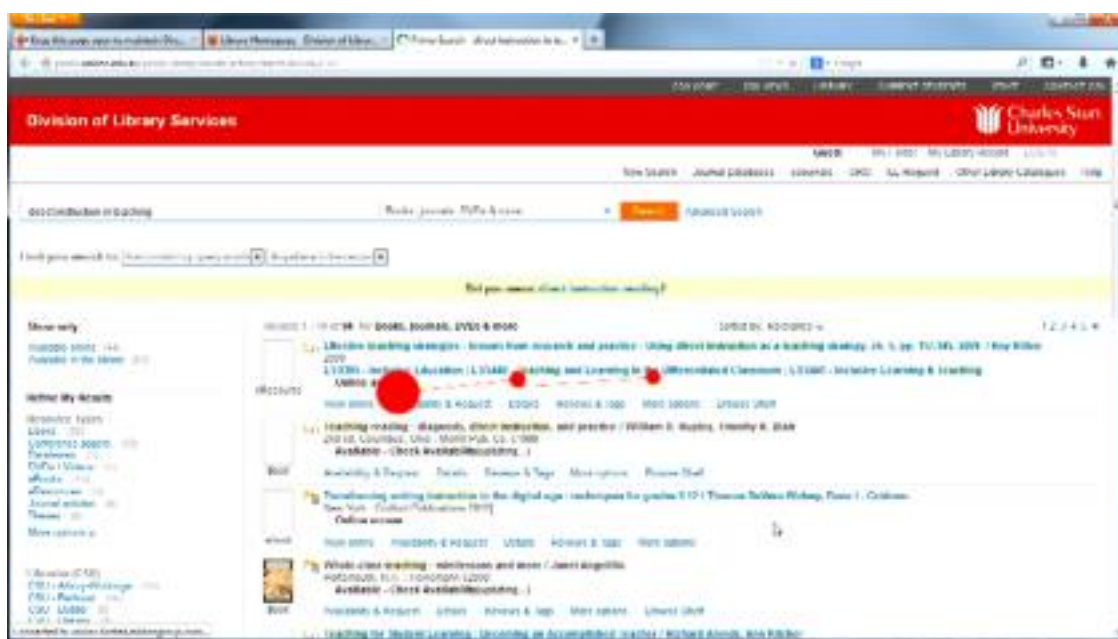
Figure 1 Screenshot displaying recorded eye movement of a participant

The three researchers independently examined the recordings to determine whether the data would support the common themes established in the phase 1 study. The researchers then met and confirmed the four themes established in the phase 1 study were suitable for the phase 2 version of the research. The common themes are:

1. Question analysis;
2. Information tool selection and manipulation;
3. Information searching and retrieval;
4. Information synthesis for answer.

Findings were then clustered into these four groups to establish patterns within the data. The results section is organized into the four themes for the purpose of clarity and to enable some comparison with the phase 1 study.

Results

Question Analysis: The eye tracker data showed no evidence of participants opening the subject site in the LMS, locating the assessment and reading the assessment criteria. However, the data did show evidence that all students had read the assessment as the search criteria used by students contained words

that were aligned with the assessment. There were no other notes present that indicated students evaluation of the assessment and their particular approach to formulating their response to the task.

Tool Selection: In the interviews, the information tools identified for use in academic study were Google Scholar and the library database software. Social media platforms such as Facebook and YouTube were identified only for interaction and some idea development related to the subject and were not considered as suitable platforms for academic information search and retrieval. There was also an association made between social media and recreational use. The same reasoning was applied to search engines such as Yahoo or Google and sites such as Wikipedia were discarded owing to the dubious nature of some of the sources. The study, however, showed that Google Scholar was the most preferred option with 56 use instances recorded confirming research that as university students progress through their studies they will gravitate to a commonly accepted academic search tool (Couthran, 2011).

Information Searching: The searching behaviour of the participants uncovered some interesting findings that are displayed. In the first research phase the findings showed superficial search techniques and limited instances of sophisticated information retrieval. This second case study found that even though students were using more sophisticated search engines, the search terms used failed in all cases to fully encompass all the key words contained in the assessment task. The number of unproductive searches by the students (41) does confirm the lack of scholarly guidance given to students when they learn in the digital world (Lea, 2013).

Accompanying the data searches were findings showing increased elements of higher order thinking where students displayed behaviour that indicated evaluation of the material they were reading (Hung et al., 2010). There were,

- 45 instances of careful reading (reading slowly),
- 32 instances of text focusing (see Figure 2), and
- 72 instances of re-reading.
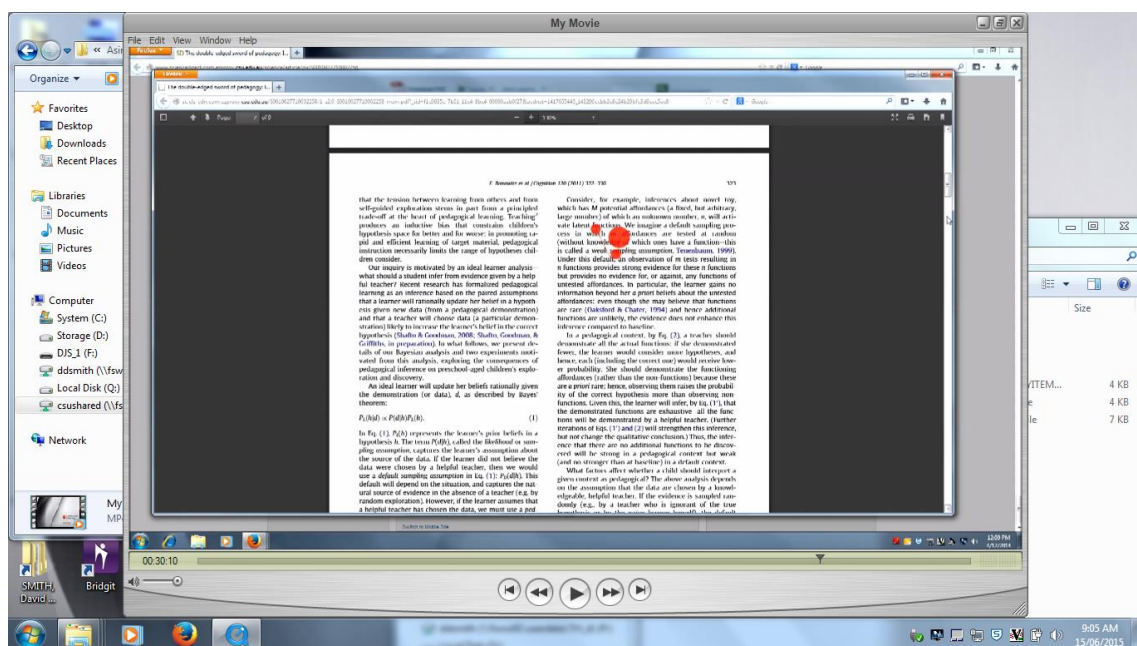
Figure 2 Screenshot displaying participant focus on a particular word associated with assessment

The above results compare to only 3 instances of reading slowly and 9 instances or re-reading in the phase 1 research. However, there were only 18 instances where information results were transferred to a document for use later and one participant did not transfer any information during the observation period. The transferred information represents another layer of interpretation when associated with the participants' possible answers but during the study no attempt was made to structure the information or evaluate it.

Information Synthesis: Characteristics of higher order thinking are apparent in the comparison of sites behaviour and point to some indication of information evaluation and analysis by the participants in the formation of their answers. There were other observed behaviours such as 23 instances of returning to a website to compare an overall result and in some cases specific pieces of information with other web page information. This information page behaviour compares to 11 instances of returning to a site in the previous study which could mean that the phase 2 participant's search terms returned results that better met their information requirements.

The readability and format of online learning material including assessment adopts some importance if students are to be engaged in the materials associated with the subject as well as the cognitive process associated with determining the required assessment of learning and the individual student's response to the assessment. Goodyer and Ellis (2008) state that online material should be sufficiently structured so that students are engaged, are informed of the subject requirements and know how to approach the required particular learning tasks. The assessment task set for the phase 2 participants did not contain any formatting cues about the assessment keywords and depth of learning required. However, there was information about the required learning in the attached assessment criteria.

Discussion

The findings for this pilot study illustrate behaviours that demonstrate a development on the range of sophistication in the selection of search browsers, search techniques, the interpretation of tasks and evaluation of search results displayed by the participants in the first phase of the research. The participants selected search bowsers that were immediately focused on academic investigation and for some of those searches the participants utilised the advanced search function. The demonstrated information searching patterns displayed a better knowledge of the use of some key words, refinement of search terms and reading abstracts before the entire document was downloaded. However, there appears to be little development in the range of abilities displayed by these students as compared to the participants in the first case study in the interpretation of the assessment task and the information that was retrieved. Whilst there was refinement in the use of search terms, there was little evidence that all the key words were linked in the search and there were some disparate search events as a result. Participants rarely examined more than 5 search results on the one page and did not select anymore than the first page of results. Participants also persisted with skimming the text behaviour, seeking a key term in the search results and leading to an action where each participant would abandon one type of search platform for another without having downloaded any of the search results. This type of behaviour increases the risk of students' misunderstanding the intent of the assessment and/or employing ineffective information search strategies in attempting to answer the assessment question. Therefore it is postulated that providing focus and structure, or scaffolding of online reading and information searching begins with the student's reading of the assessment task description to ensure that the intent of the task is understood.

The findings from the two research case studies form a foundation for a continuation of the research phases to test the effect of specific formatting interventions. The third phase of the research will involve a greater number of students engaged in an online subject with a different faculty in the university. For the purpose of authenticity and to compare findings to the previous two case studies, the key data gathering instruments will be the same as those used in the previous two research phases, interviews and observations drawn from portable eye-tracking technology that provides an unobtrusive method of monitoring students' screen reading while they carry out online reading and information searching for an assessment task specifically modified to optimise the reading and information search process. The use of a potable eye-tracking unit will enable researchers to travel and collect data from the students' usual workplace rather than require the student to travel to one the university campuses. Traveling to the student's workplace will capture the intent of the online delivery of the subject with all manner of the subject interaction taking place outside the university premises. The methodology for the third research phase will explore:

- patterns of students' online reading and information searching – i.e. how students read the assessment task and then seek and engage with information during their online research for the assessment, including their tool usage, search strategies and reading behaviours;
- learning effectiveness – as determined by an evaluation of university students' information search activities and assessment scores, after it has been marked according to the criterion-based

marking rubric for the assessment by the lecturer or the marker assigned to mark the assessments.

The aim of the third research phase will be to investigate the impact of an assessment design intervention to provide students with cues on information searching within the design and presentation of assessment tasks and to facilitate students' online reading by highlighting the key terms of the assessment. The objective of the proposed study will be to test whether improving the design and scaffolding of assessment tasks initiates more effective online reading and information searching amongst university students in the context of an assessment.

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'Sometimes, I feel a bit decoupled': Strategies in videoconference teaching

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This paper is about videoconference interaction and teaching strategies. On the basis of participant observation and detailed video analyses of videoconference teaching, this paper lists three different categories that were employed in a professional bachelor's programme in physiotherapy. These categories were developed with respect to the ways the teaching strategies include or relate to the e-learning space in the physical part of the videoconference classroom. The study found a *distancing* strategy which was employed in order to focus activities in the physical classroom and keep the videoconference space at a distance; an *appendixing* strategy which linked the e-learning space to the physical one by the use of specific technology, communication form and time; and an *annexing* strategy which related to both the physical space and the e-learners' space and coupled the two spaces by very frequent use of multimodal communication with both groups of students.

Introduction

E-learning has often been found to enhance social inclusion of students via learning innovation (Bader & Kottstorfer, 2013) with its metaphors relating to, for instance, the creation of gateways, to opening doors, and to letting people in (Seale, Draffan, & Wald, 2010). However, it can be questioned whether e-learning groups are more welcoming of diversity than other groups (Hughes, 2007). Many structural reasons, including Information and Communications Technology (ICT) skills and language and family backgrounds also play important roles in relation to feeling included in the online setting (Hatlevik & Christophersen, 2013). Even if access to an online educational setting is granted, a balance must be struck between the mechanics of 'belonging' to a community and active participation in it (Hall, 2006, p. 505).

When e-learning enters the *traditional* classroom, changes in interactions are to be expected, because not only does technology affect the learning environment, teachers' attitude and their relation to the e-learning space also frame the opportunities for the students to participate actively in the digital and physical environment. Technological artefacts facilitate people's involvement with reality, but it also coshapes people's perceptions, actions, experience, and existence (Verbeek, 2011), and the institutional demands of changing the traditional way of teaching to a new e-learning approach can mean a change in professional teacher identity as well (Hanson, 2009; Spencer, 2011). Some researchers (Gildersleeve & Kuntz, 2011) argue that teachers carry 'embodied markings' from previous teaching environments and that institutional environmental change may expect them to ignore or erase these markings, although many teachers prefer the classroom to remain the same physical and traditional classroom that they feel familiar with (McNaughton, Westberry, Billot, & Gaeta, 2014). Even if it is found (Walsh-Pasco, 2005) that '[...] the qualities of effective videoconferencing teachers are the same as effective classroom teachers' (p. 38), and that videoconference teaching is both appreciated by students and found to be effective when interactivity is a part of the learning design (Greenberg, 2009), research finds that special attention towards communication with e-learning students is needed because body language can be understood differently when it is transmitted through a camera and a computer screen (Pytash & O'Byrne, 2014).

Given that the remote location in videoconferences can remove a sense of accountability among the students (Garner & Buckner, 2013), eye contact from the teacher is even more important in this setting (Levinsen, Ørngreen, & Buhl, 2013, p. 253ff; Orman & Whitaker, 2010; Tipton, Pulliam, Allen, & Sherwood, 2011) if the students are to experience inclusion and presence in the classroom. Online students often need more attention and support in social interaction (Zhan & Mei, 2013), but the use of diverse technology and applications are also found to enhance the students' experience of belonging and of social presence in the course (Roseth, Akcaoglu, & Zellner, 2013; Tipton et al., 2011).

In this paper, I will analyse a videoconference setting that was new to the teachers—a setting they often spoke of as *difficult*, *challenging*, or *damn hard to teach in*. It consisted of a blend of students – that is,

both on-campus and remotely connected e-learning students in the classroom – and it was just recently introduced as a way to complete the physiotherapy diploma. The question to be answered in this paper is thus as follows: What strategies did teachers employ in the videoconference blended classroom in order to teach and communicate with both e-learning and on-campus students?

Empirical settings, and methodological and theoretical frameworks

A general definition of the term *blended learning* has developed significantly throughout the last twenty years (Sharma, 2010), and thus the terms *blended learning*, *hybrid learning* and *mixed-mode learning* are often used interchangeably in current research (Pytash & O'Byrne, 2014). Moreover, the blend can consist of mixes between, for instance, offline and online learning; between self-paced and collaborative learning; and between synchronous physical formats, synchronous online formats, and self-paced, asynchronous formats (c.f. Lim, Morris, & Kupritz, 2007). The term can also mean blends of online and face-to-face students in the same physical space (Osguthorpe & Graham, 2003). In the physiotherapy programme that generated the empirical material for this paper, e-learning was implemented in a *double-blended* format: the e-learning students participated in traditional on-campus teaching three days every second week, and the rest of the days, they attended the on-campus teaching via videoconference from home, or they studied at home independently or in groups. Thus, one of the blends consisted of the mix of e-learning students' online and face-to-face learning. The other blend consisted of mixing the remote e-learning students and the physically present on-campus students in the same classroom via videoconference technology. To sum up, when the teaching took place on campus, either the classroom consisted of only physically present students, or half of the students were physically present on campus and the rest of them – that is the e-learning students – participated online via Adobe Connect or watched the lesson afterwards. The study presented in this paper was conducted in this setting of blended learning, and the focus will now be on the blended – or hybrid – classrooms with both e-learning students and on-campus students present.

The research design consisted of participant observations of the e-learning students' videoconference lessons during 8 autumn weeks the first year and 3 weeks the next autumn, and of focus groups with 32 e-learning students and interviews with five teachers in the physiotherapy programme. With inspiration from grounded theory's coding and constant comparison (Bryant & Charmaz, 2013; Charmaz, 2009; Glaser & Strauss, 1967), field notes and transcripts from focus groups and interviews were analysed, and the emerging themes were grouped in order to categorise the teachers' different ways of teaching, communicating, and relating to students in the videoconference lessons. In order to further saturate these emerging categories of the videoconference interaction and teaching strategies, theoretical sampling was conducted (Morse, 2013), and three exemplary lessons were chosen and further analysed in order to be able to show different patterns between them.

Research sometimes considers it problematic to use video with the intention of capturing interactions between participants, because the presence of the camera can make these participants behave differently (Herman-Kinney & Verschaeve, 2003) or make them assume the role of *research participant on video* (Pink & Leder Mackley, 2014; p. 147). However, in the second year of the project in the physiotherapy programme, the videoconference lessons were recorded, digitally saved, and stored so that students had access to them and could watch them whenever and as many times as they wished. Thus, even if the teachers knew of the research that was going on, the video observations and analysis of the lessons could be conducted without having to make a special camera setup for the sake of research; the setup was already made for the sake of the e-learning students, and performing the role of 'teacher on video' was becoming a part of their daily life. They thus seemed to pay little attention to the supplementary role of research participant on video.

In order to identify patterns in the teachers' interactions with the e-learning students and the on-campus students in the same classroom, a table for structured observations was created (Bryman, 2012; p. 253 et seq.), which was inspired by other video observation studies of teaching and learning (Cobb & Whitenack, 1996; Majid et al., 2006; Oliver & McLoughlin, 1997; Saw et al., 2008). On the basis of the participant observations in the videoconferences, it was found that interaction took place not only as verbal and body language in the classroom lesson; important interaction also took place during breaks, through written communication in the chat, and by the use of technology (e.g. turning of camera, choice of new software) (c.f. Hampel & Stickler, 2012). Thus, it was found to be useful to register the way the

teachers included and interacted with the students during videoconference lessons, but also to differentiate between bodily/verbal interactions and those that took place via digital technology in the form of chat, use of specific software, camera angles etc. Due to the research interest in how the interactions between the teachers and the e-learning students could be compared with those taking place between the teachers and the present on-campus students, the table also needed to differentiate between interactions with the two groups related to time, technology, and content.

The tables below count the interactions between the teacher and the two groups of students as they appear either through the teacher's verbal/body language or through his or her use of the technology. In both kinds of interaction, the teacher's body is, of course, a prerequisite for the teaching in the videoconference, but technology affords him or her an opportunity to relate to the e-learning students not only through speech, but also through the use of eye contact (i.e. looking towards the camera) and/or body movements towards or away from the camera in order to appear on the e-learning students' computers at home. However, he or she can also address and interact with this group of students without letting their body appear on their computer screens, when choosing only to chat with them, turning their attention towards something just by turning the camera or opening or closing certain areas in the videoconference interface. Below, I will analyse the influence of these choices of strategies on students' interactions in the videoconference.

Teaching strategies

The way the teachers taught in the videoconference blended classroom and the strategies they employed in doing so are registered by counting the elements that are also considered important in a traditional face-to-face teaching lesson (Dalzel-Job, Oberlander, & Smith, 2011; Garner & Buckner, 2013); in this case, this includes eye contact, looking towards the camera, and directly addressing the students though verbal and/or body language in the videoconference in the blended classroom. In the tables, vertical differentiations are made between subject and technical/social matter of the communication and whether the *t*eacher is addressing /questioning /responding to the *o*n-campus *s*tudent or the *e*-learning *s*tudents: (abbreviated: (T->OS)/(T->ES)); the *o*n-campus/*e*-learning *s*tudents addressing /questioning /responding to the *t*eacher (OS->T)/(ES->T); and the *o*n-campus/*e*-learning *s*tudents addressing /questioning /responding to their *f*ellow *s*tudents (OS->FS)/(ES->FS). Furthermore, the tables differentiate between interactions taking place during the lesson or during breaks and whether the interactions happen on the basis of body language/spoken words or through technology/written words. The tables are thus intended to show how the interactions during the lessons/breaks are distributed among the two groups of students and in relation to time, body and communication content.

However, before I turn to all the numbers, some field notes will introduce each of the three lessons.

'I've ended up just saying 'Welcome', and then I've done my teaching': Distancing strategy

Before the lesson begins, a colleague starts the videoconference software and asks the e-learning students whether the sound and the picture are okay. He leaves once the technology is working, and the teacher *Joe* takes over. He has taught the subject matter for many years, and this afternoon he teaches from 1:15 PM to 4:35 PM. He bases his lecture on PowerPoint presentations that include pictures and text, and he very often relates the content of his lecture to the students' everyday experiences and their sports. Joe asks the students a lot of questions, and they are able to answer if they have prepared for class or know of the subject already. All the questions are answered by one of the students in the classroom. The camera captures him from the knees and up; however, he walks around the classroom and therefore frequently steps out of its reach. The e-learning students never answer any of the questions, neither verbally nor in the chat, and Joe never addresses them directly. However, he does seem aware of their presence for he turns the camera three times when he goes to demonstrate something in the middle of the classroom. One of the e-learning students comments on the lecture only once, but when doing so, the student turns to his fellow students, and Joe does not follow up on the comment.

Joe relates very actively to the students in the classroom by walking towards the student that answers the question, and by waiting and looking at them silently after asking a question like, for instance, 'How long should the ice stay on [the injured leg]?' or 'Have any of you had a brain concussion?' Furthermore, Joe

asks questions relating to technology, like 'Is it on now?', or relating to the teaching procedure, like 'Did you buy the book?'

Table 1
Interactions in 'Joe's' lessons

Agents	Matter	Language/cues during lesson		Language/cues during breaks	
		Verbal/body	Written/via technology	Verbal/body	Written/via technology
T->OS	Subject	130			
	Techn./Social	12		3	
OS->T	Subject	125			
	Techn./Social	13		2	
OS->FS	Subject				
	Techn./Social				
T->ES	Subject				
	Techn./Social				3
ES->T	Subject				2
	Techn./Social		1		4
ES->FS	Subject		3		
	Techn./Social				6

In the table, the number of interactions between the teacher and the on-campus students in the classroom stands out, as does the lack of communication with the e-learning students who watch the lesson live or asynchronously later on. The only indication that the lesson is targeted at the e-learning students is Joe's angling of the camera in order to make sure that it captures what he demonstrates, even if their (few) attempts to participate seem partly ignored. Interactions with e-learning students emerge as something that is not a part of Joe's teaching strategy. His presence is distinctly located in the physical classroom among the present students, and the interactions are focused on verbal and bodily communication with the present on-campus students. Joe's strategy could be categorised as *distancing* because it rarely integrates the e-learning group of students other than through technology in the form of camera angling without accompanying comments. This strategy seems to stress the importance of the 'traditional' teaching with its opportunities for frequent dialogue with rapid questions and answers between the teacher and the students, which seems easy and natural in the shared physical space. Technology can be seen as a hindrance to the flow of the lesson (c.f. Vetere et al., 2012) and to 'the classroom ping-pong', as one teacher put it, because it demands that the teacher focuses on the camera now and again and is aware of the sound, the camera angle, the light etc. This can be a difficult challenge for some teachers. One teacher described this challenge as follows:

'I think it's very difficult to keep the focus on…well, if you are to keep the focus on both…you really need big reserves of energy to be present both in the classroom with the students and to pay attention to the chat and respond to the e-learning students without making the on-campus students think, 'Well, well, now I'm just wasting my time'. So I think it's really difficult to be synchronously present virtually and in the classroom; I haven't been able to do it…I've ended up just saying 'Welcome', and then I've done my teaching'' (Teacher interview, *Philip*).

To e-learning students, this teaching strategy might signal insurmountable distance between the space of the e-learners and the physical classroom, and several of the students expressed a feeling of isolation or being invisible in the videoconference lessons:

'And you feel a bit decoupled sometimes. Well, the other day, I was disconnected from the lesson in half an hour and I sat there and tried to get in contact with people on Facebook and what have you to say, 'Helloooo, couldn't you just…' But they just don't look at the screen...and then I'm like, 'Hey, there are people sitting out here too, you know?!''

However, technology—and even its breakdowns—can also contribute to a feeling of belonging and teacher presence when a strategy other than the distancing one is employed.

'I'd prefer separating them': Appendixing strategy

In this example of a strategy in videoconference teaching, the teacher *Harold* seems to focus mainly on present on-campus students like Joe did. However, Harold is very aware of not leaving the space that can be captured by the camera, and he often looks directly into it when speaking. He stands right in front of it when he is demonstrating something on his own body. For instance, when he speaks of the red bone marrow, he shows the camera where 'the red bone marrow T-shirt' is located. Harold addresses the students in general—and the e-learners especially—through the use of technology. During the 90-minute lesson, several technology breakdowns occur, but Harold actively chats with the e-learners during the time without any picture on the videoconference. When showing the heart's structure and later an ECG curve, he uses the computer program Paint instead of drawing on the black board. Due to the imprecise lines, his so-called 'little creative drawing' leaves much to be desired aesthetically, but Harold uses his voice while drawing it and thereby makes the drawing easier to understand. In the drawing process, he never looks into the camera or addresses the e-learning students directly, but through the multimodal expression of the drawing, the e-learning group is connected actively to the physical classroom. Furthermore, in relation to questions and dialogues with the e-learning students about technology issues, he chooses to communicate through technology and chat and, for instance, when he wants to check whether the sound is on, he asks silently in the chat.

Table 2
Interactions in 'Harold's' lessons. The + indicates that the use of technology was accompanied by speech but without addressing the e-learning students specifically

Agents	Matter	Language/cues during lesson		Language/cues during breaks	
		Verbal/body	Written/via technology	Verbal/body	Written/via technology
T->OS	Subject	15			
	Techn./Social				
OS->T	Subject	15			
	Techn./Social				
OS->FS	Subject				
	Techn./Social				
T->ES	Subject	+	+++		
	Techn./Social				3
ES->T	Subject				
	Techn./Social				5
ES->FS	Subject				
	Techn./Social		11		

The table shows that weight is put on directly addressing both groups of students. However, it also shows that different modalities are chosen: on-campus students are addressed verbally and e-learning students are addresses via technology, and only the e-learning group has dialogues with him concerning technology and other social issues (e.g. writing in the chat 'We will take a break now for 5 minutes'). Harold's presence is divided into a bodily/verbal presence in the physical classroom and one that is based on technology and written words when in direct interaction with the e-learners. The teacher relates to the e-learning students via specific technology and multimodal language and during a specific time (during breaks), even if it makes his teaching in the physical classroom less smooth. Moreover, this separation makes the e-learning students chat with each other in order to seek help, and it seems that Harold links the e-learning group to the physical classroom and makes the former an appendix to the latter. Using this *appendixing* strategy, the majority of the time is centred on the interactions in the classroom just as all the questions concerning the subject matter likewise emerge from interactions here.

Generally, the teachers in the programme found it difficult to teach both groups at the same time, and many of them wished they were separated because they found that the two groups required different ways of communication and teaching. One teacher put it as follows:

'I'd prefer a separate e-learning class and a separate on-campus class. So you don't mix apples and oranges, but instead you could focus on 'now it's e-learning' and the interaction you can have with such a

class. Then it would be on their premises and not on those of the on-campus class. And vice versa' (Teacher interview, *Cathrine*).

Compared to the distancing strategy, the appendixing strategy also approaches the e-learning space as something that 'does not really belong' in face-to-face teaching, but while the distancing strategy focuses the attention on the physical space and almost ignores the e-learning space, the appendixing strategy links the e-learning space to the classroom. However, it does so through specific communication and technology and at a specific time, all of which differ from those used in 'the main room' (McNaughton et al., 2014). None of the strategies demands direct interaction from the e-learning students, but instead lets them participate in classroom teaching mainly by watching and listening to the lecture. As a consequence, the e-learners often appear more active in the chat with their fellow students.

However, a third strategy that emerged in the study in the physiotherapy programme, one that focussed on a continuous relation and interaction between the two groups of students and between several modalities and attention towards the camera at the same time. The section below will describe this last strategy.

'You just take a break too, back home!': Annexing strategy

The teacher *Allan* pays a lot of attention not only to the students in the classroom but also to the e-learning students via the camera and ensures it captures him all the time. He speaks directly to the e-learning students, saying, for instance, 'You, back home, you can just Google it'. He also shares his comments on the process in the classroom with the e-learners: 'You just take a break, back home, too'. During breaks, even if the exact words are not audible, one can hear that Allan speaks with the students in the classroom, and just before the break ends, he goes to the camera and resumes the chat by saying to the e-learners, 'I just told them that you can find a bone fracture by the use of a tuning fork…' During the three-hour lesson, Allan uses the videoconference software's arrow instead of pointing physically at something on his PowerPoint, which makes it easy to follow his lead for both groups of students.

The e-learning students are very active in the chat, and they contribute both socially and in terms of subject matter. Allan keeps an eye on the chat, and he verbally integrates the questions asked in the chat as a natural part of the lesson. Procedural information is reported the same way (e.g. when he is going to leave the camera, he says 'I'll just go get my coffee'). Allan uses a lot of humour when he teaches, and this apparently inspires the atmosphere both in the classroom on campus and among the e-learners: the chat is active and includes jokes and other content not only related to subject matter. One of the students writes the following at the end of the lesson: 'It's so nice to participate here even without speaking. It's like being there yourself ;o)'.

Based on the counting of interactions during the lesson, Table 3 shows that the majority of the subject matter questions—like in the two other strategies—is asked or answered by the on-campus students. However, in contrast to these strategies, it is also found that the teacher relates equally, and mainly verbally, to both groups of students.

Table 3
Interactions in 'Allan's' lessons. The + in this table indicates that the teacher talks a lot with the on-campus students during breaks; however, they are too far away from the microphones to be heard clearly on the video.

Agents	Matter	Language/cues during lesson		Language/cues during breaks	
		Verbal/body	Written/via technology	Verbal/body	Written/via technology
T->OS	Subject	20		+	
	Techn./Social	14		+	
OS->T	Subject	23		+	
	Techn./Social	9		+	
OS->FS	Subject				
	Techn./Social	1		+	
T->ES	Subject	9		2	
	Techn./Social	13	1	5	5
ES->T	Subject		10		4
	Techn./Social		10		21
ES->FS	Subject				
	Techn./Social		21		8

A lot of the questions and answers during the lesson involve both groups of students, and the e-learning students are more active than the on-campus ones, when all interactions are counted. The interaction activity thus spreads all over the table and points towards a strategy of an *annexing* of the e-learning space into the on-campus classroom. (The concept builds upon the Latin word *adnectere*, which means *join together*). Both groups of students are spoken to verbally, and the e-learners' comments and answers from the chat are integrated verbally in the classroom too. The annexing strategy encourages multimodal interactions relating to social, technical and subject matters, and thus the coupling of the e-learning space with the physical one clearly expands and changes the traditional teaching classroom.

A student compares the distancing and the annexing strategies as follows:

> *Majken*: '[Joe] needs someone to turn the camera on and off. Stuff like that…well, it's not much engagement and interest he shows us like that. Unlike 'Allan', you know. He really fights to give us a good lesson.'
> Anne-Mette: 'Yeah? How? ... How do you see that?'
> *Majken*: 'Umm, I think that the stuff he's made with *Wallwhisher* or what's the name… where you can go in and watch his videos, well, stuff like that…Then it's easier to sit at home and relate to...and I think he does a great job in having the lessons recorded, and saying, 'Let's take a break' and stuff like that…'

Many of the teachers found the blended videoconference setting *damn hard to teach in*, but their *fighting* and visible engagement in relation to the videoconference space clearly influenced the e-learning students' interactions and experiences of being included and present in the classroom teaching.

Conclusion and discussion

The e-learning students in all three teachers' lessons have the opportunity to interact only through questions and comments in the chat functionality in Adobe Connect and not in the same modality as the teacher, but this issue was not framed as a problem *per se* among the e-learning students. Correspondingly, previous research (Hampel & Stickler, 2012) finds that e-learners in videoconference teaching—where the e-learners do have access to the same modalities as the teacher—are oftentimes more actively engaged in the other modality than the teacher's, especially when matters other than subject matter are in question. Such research also found that the e-learners mainly discussed subject matters when the teacher distinctly encouraged them to do so.

In the present study, in was evident that the teachers' direct communication with the e-learners influenced their interactions to a great extent. However, a repeated attention towards technology and the camera (i.e. eye *contact* with the e-learning students), and a creation of a pleasant and congenial atmosphere also

encouraged interactions in both groups of students. Usually, questions asked in the classroom were understood as mainly addressing the on-campus students, maybe because the teacher naturally pays attention to and makes eye contact with the students in the room, and thus he/she expresses expectations of answers from the present students. Moreover, in conversations in general where there are more than two interlocutors, it is not always unambiguously clear whether the personal pronoun 'you' includes all group members or excludes some of them (Gupta, Niekrasz, Purver, & Jurafsky, 2007) (e.g. 'You, the girls, stay in here, and you, the boys, go outside'). Thus, in all three examples of teaching in videoconference settings, it was found that the different strategies' use of for instance eye contact, attention towards technology, camera, chat and directly addressing the students (or lack thereof) created very different opportunities for participation, interaction, and experience of inclusion of the different groups of on-campus and e-learning students.

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Supporting the 'whole learning design life-cycle' through the pedagogical planner

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It is widely claimed that there is an urgent need for finding new methods and tools to support teacher education, so as to effectively foster their professional development and allow innovation to permeate the educational systems. The learning design research field (LD) can contribute to tackling this issue by providing methods and tools to support teachers in the delicate phases of designing and planning innovative educational activities, so as to target e-inclusion (special need students' necessities) through personalized learning actions. The paper illustrates an innovative tool called Pedagogical Planner (PP), which is able to support the three main phases of the learning design cycle, namely Conceptualization, Authoring, and Implementation. The LD tool has been used by teachers to support innovative and personalized educational interventions in the field of intangible cultural heritage education and has proved to present a number of advantages and innovative aspects in respect to other existing tools, which are discussed in the paper. The positive results obtained so far encourage adoption of the tool in teacher training contexts to support teachers in devising and planning innovative educational intervention when ICTs are to be integrated in traditional teaching/learning contexts in an inclusive logic, which also implies setting up personalized learning paths in order to ensure that no student is *left behind*.

Introduction

It is widely recognized that there is an evident gap between research and practice in the TEL (Technology Enhanced Learning) field, because what has been already investigated by the academic community and proved to be effective often finds barriers and obstacles in real educational contexts that prevent teachers from adoption of innovation in their daily practice. Among the barriers that prevent innovation to be adopted in real contexts, we could mention the lack of ICT infrastructures, the low level of teachers' digital competences, and the general complexity of managing innovative activities within educational systems originally conceived for transmissive approaches (Pelgrum, 2001; Bingimlas, 2009).

The complexity of rethinking the traditional lecture in such a way as to design and plan novel activities often keeps teachers far from these approaches; besides, nowadays the task of designing educational innovative educational actions is far more complicated, since the emerging concept of educational personalization and full e-inclusion of all students in mainstream education (UNESCO, 2005) has a multiplier effect on the number of learning paths to be designed: multiple educational paths need to be designed to reach each educational objective in order to meet the needs of each student (considering students' different abilities/disabilities and attitudes) (Ott, 2010).

The field of learning design (LD) is devoted to finding innovative and effective solutions to support teachers in the preparation of educational interventions, in sharing and re-using their own design solutions with colleagues, and in the delivery phase of their designs to students (Conole, 2012; Mor & Craft, 2012; Persico & Pozzi, 2015).

Obviously, there is no unique process for going from teachers' abstract learning design ideas to their delivery with actual students. The role of existing tools and methods in the LD field can be to support pedagogical reflection, to foster teachers' creativity in conceiving new educational solutions (possibly *adaptive* so as to meet, with slight but essential changes, the needs of *different* students), and to make their design knowledge explicit (and thus potentially sharable and reusable), along the whole process of going from design ideas to delivery (Muñoz-Cristóbal et al., 2012; Earp et al., 2013; Pozzi et al., 2015; Persico & Pozzi, 2015). Just to provide some examples, among the tools aimed at supporting the conceptualization of new activities, we can mention the Course Map (Conole, 2012), the 4SPPIces approach (Pérez-Sanagustín et al., 2012), and the 4Ts model (Pozzi & Persico, 2013) Persona Cards (Chacón-Perez et al., 2015).

Among the tools aimed to author the design, we can mention WebCollage (Villasclaras-Fernández et al., 2013), CADMOS (Katsamani & Retalis, 2012), OpenGLM, (De Liddo et al., 2011), LAMS (Dalziel, 2003), CeLS (Ronen et al., 2006), etc.

A more exhaustive overview of the existing tools, along with a discussion about their main characteristics, can be found in Prieto et al. (2013b).

In the paper, these same authors (Prieto et al., 2013b) acknowledge that the LD field is scattered and characterized by extreme diversity and complexity in terms of both technological and methodological solutions proposed. This often makes it extremely difficult for practitioners to find their way through tools and approaches (Persico et al., 2013; Pozzi et al., 2015b).

Such lack of integration and of a more comprehensive view on what exists has been acknowledged and partially addressed by the METIS project (http://www.metis-project.org) (recently funded under the LLP Programme), whose aim was to develop a single platform able to provide a unique access to a number of already existing LD tools.

Another weakness often pointed out when analysing the existing tools (Pozzi et al., 2015a) is their inability to support the whole design life-cycle, starting from the first steps of conceptualizing the design idea (defining the learning objectives, identifying the contents to be addressed, and choosing the most adequate pedagogical strategies), down to planning the flow of activities, associating the educational resources and tools to be used by students, and finally delivering the resulting design (being it a single activity or a whole course) to students through a Learning Management System (LMS).

In order to contribute to the field and fill in this latter gap, the present paper illustrates an additional tool, called the Pedagogical Planner (PP) (Bottino et al., 2008). One of the main assets of the PP (and its distinctive feature as compared to all the other tools) is its ability to support – alone – the whole design cycle in such a way that it allows a smoother and more organic design approach. This makes the PP unique in the LD research field, as it bridges and integrates all the main phases of the design process. From this point of view, the PP is a good candidate in teacher training contexts, where teachers often need to be supported in re-designing and/or re-planning their traditional teaching/learning activities in view of ICT integration.

In this paper, one particular instance of the PP is described as proposed within the i-Treasures project (Ott et al., 2015). The tool has been used by designers of innovative educational interventions in the field of intangible cultural heritage education. After discussing the tool, the paper provides preliminary data on experience of its use within the project, thus showing strong points and weaknesses of the PP and paving the way for further work in the field.

Context and background

As already mentioned, the instance of the PP described in this paper has been proposed and tested within the i-Treasures project (funded under the FP7). The project involves fostering innovation in the field of intangible cultural heritage education, that is, creating conditions for supporting the 'passing down' of rare and traditional artistic expressions (e.g. traditional dancing, singing) to new generations through the use of technologies. Thus, i-Treasures represents a genuine novelty in a field where educational practices are usually not yet well consolidated (Ott & Pozzi, 2011) and where technologies definitely represent a disruptive innovation (Ott et al., 2015). An exhaustive description of the project is out of the scope of this paper; here, it is enough to underline that in such a context, there is obviously a serious need of pedagogical reflections, and the learning design phase is essential to make the most of the available cutting-edge technologies, especially because most of them have never been used in these domains (Ott et al., 2015).

For this reason, within the project the PP has been proposed, the aim is to support the teachers/designers of pilot teaching/learning experiences in the various intangible cultural heritage domains addressed.

Teachers in i-Treasures need to be supported at the different stages of the design process and to reflect on the various elements at play and on the interactions between them, so as to ensure that these form a

coherent, manageable whole that responds effectively to learners' needs – insofar as this can be determined a priori (Jonassen et al., 1997).

The PP refers to the Learning Design Life-cycle model, described in Asensio-Pérez et al. (2014) and based on three main phases: Conceptualization, Authoring, and Implementation.
During the Conceptualization phase, educators make a rough design, define the learning objectives to be reached, the contents to be addressed, and consider the target population and the context. In the Authoring phase, detailed activities are planned and their flow is fixed; besides, teachers need to associate the related educational resources, etc., to each activity. In the final stage, during Implementation, LMS courses are created according to the design done in the previous phases. In the following sections, the paper illustrates how the PP is able to support the three phases of the cycle.

The PP

In this section, the PP is described as proposed and used within the i-Treasures project.

The PP is a scalable cross-browser web-based application developed in PHP, MySQL, and javascript. As already mentioned, it is intended to cover the three learning design phases. Consequently, the tool can be conceptually seen as subdivided into three areas (see Figure 1):

1. The Conceptualization area
2. The Authoring area
3. The Implementation area (which takes the form of the LMS).
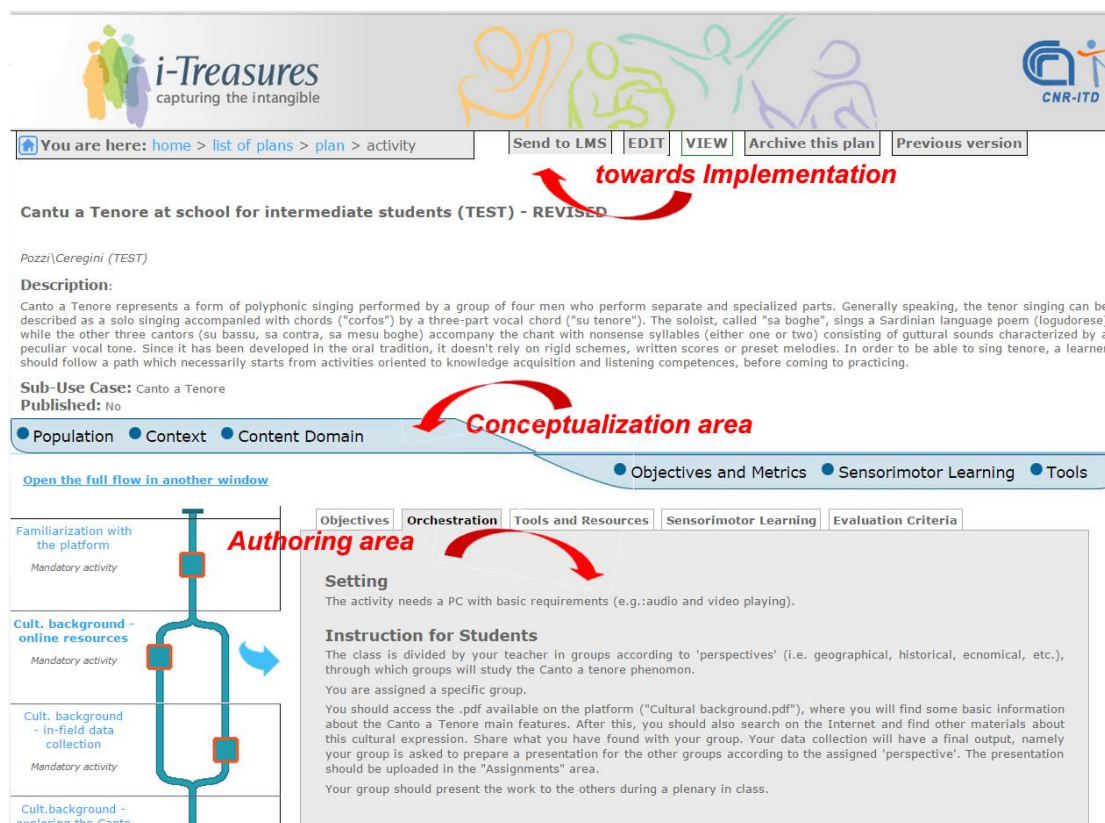
Figure 1 Areas of the PP

In the Conceptualization area (Figure 2), the designer is guided through the definition of a number of aspects, among which is

- the target *Population*: Here, the designer can reflect on and then make explicit the main characteristics of the population, their ages, their pre-requisites (if any), etc.

- The learning *Context*: Here, the designer can define the learning situation/environment where the educational intervention will be carried out. In particular, type of context, constraints (if any), and timing and setting are defined
- The *Content domain*: The designer defines the main aim of the intervention and builds a map of the content to be addressed (see Figure 2);
- The *Objectives and Metrics*: Here, the designer is supported in defining the main learning goals the intervention is meant to reach, as well as the criteria to monitor and evaluate the teaching/learning process (during and after the enactment);
- The *Tools*: Here, the designer can tentatively define the innovative tools and the features s/he is planning to use during the enactment phase with learners.

This Conceptualization area is where the teachers' reflection about inclusion issues should start; that is, in particular the PP tool helps them to decide *whether* and *to what extent* the activities should be differentiated according to the different students' needs.
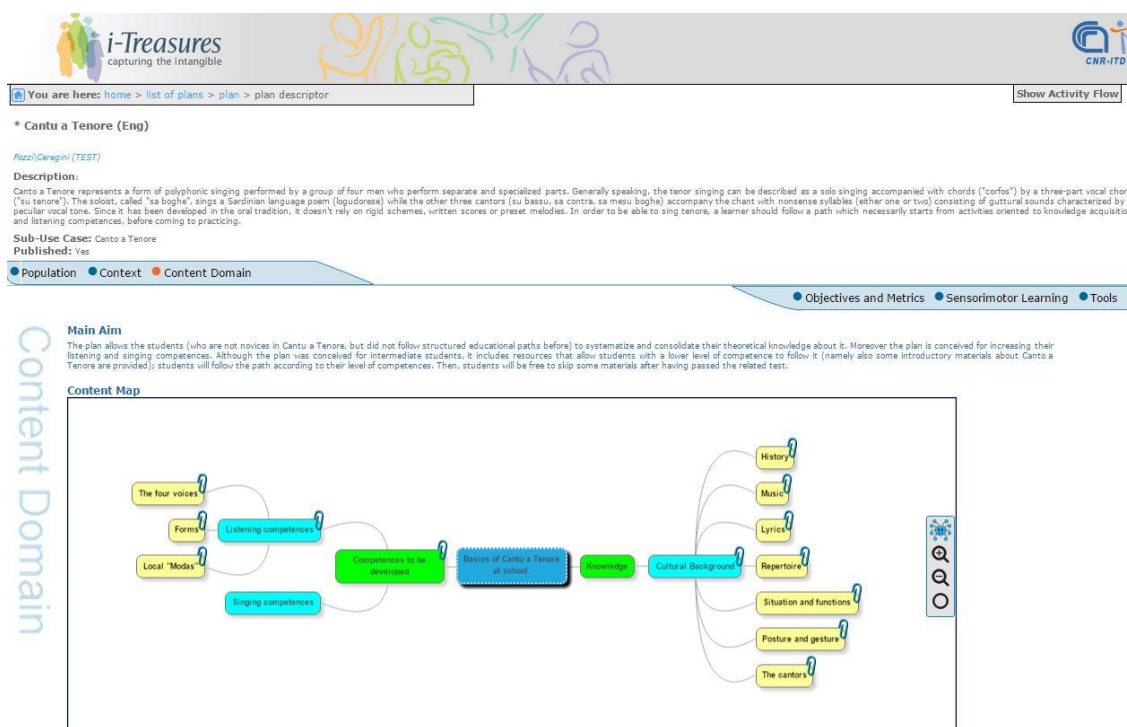
Figure 2 The Conceptualization area – Content domain

In the Authoring area of the PP (see Figure 3), the designer is supported in the definition of the activity flow – that is, the sequence of activities to be proposed to learners (left side of Figure 3) – which should then lead learners to reach the learning objectives. The tool allows the designer to use either mandatory or optional activities, each one having a different graphic representation in the flow. Besides, the activity flow can be sequential, random, or can include more than one way, so as to allow a certain degree of personalization in case one wants to propose different activities to different learners (or groups of learners) to reach the same set of objectives.

Figure 3 The Authoring area

In any case, each activity is designed in terms of Objectives (where specific learning objectives of the single activities are defined); Orchestration (where the required setting is described and the instructions for students are provided); Tools and Resources (educational resources and tools to be used by learners during the enactment phase are provided); and Evaluation Criteria (criteria to be adopted in order to evaluate the effectiveness of the activity are defined) (see right side of Figure 3).

Once the Conceptualization and the Authoring phases are completed, the PP is ready to support the Implementation phase (button 'Send to the LMS' in Figure 1), that is, the automatic configuration of the LMS. In i-Treasures, the LMS adopted is Chamilo (https://chamilo.org/): once the first two design phases are done, all the design knowledge contained in the PP is automatically migrated to Chamilo, where a new course is created, which contains all the basic information about the educational intervention (objectives, contents, etc.), as well as the activity flow, already filled in with the educational resources and tools provided by the designer in the previous phases (see Figure 4).

From a technical point of view, in order to allow the migration from the PP to the LMS, once the design is ready, an XML is produced. The XML document, conveniently encrypted, is then sent through a POST form to the LMS, which elaborates the request and uses the received information to create and properly populate a new course in Chamilo.

Figure 4 Implementation in the LMS

Discussion and conclusion

So far, the PP has been used by the teachers involved in the i-Treasures project to conceptualize, author, and implement pilot innovative interventions in various intangible cultural heritage contexts, as well as address a variety of different populations having different backgrounds, interests, and potentialities.

During the experience, we collected qualitative feedback from the teachers/users, thanks to a continuous dialogue with them during actual use, as well as through final individual interviews. The teachers have been positive regarding both ease of use and usefulness of the PP.

The tool has proven to adequately support the three main phases of the learning design process, thus providing full coverage of the whole learning design cycle. This is an innovative feature in the Technology Enhanced Learning field; even if other tools exist, usually these are able to bridge Authoring and Implementation (i.e. Prieto et al., 2013a) rather than Conceptualization, and managing the whole cycle within one single tool, remains – to our knowledge – a novelty.

Furthermore, the PP offers other advantages in respect to other existing tools: for example, it allows multiple forms of representations of the design knowledge (textual representations, as well as graphical representations, such as the content map and the activity flow). Representations in the LD field are one of the most debated topics and, allowing multiple representations, is certainly an asset of the PP (Pozzi et al., 2015), enhancing its flexibility.

Regarding the Conceptualization function, the PP embeds a *neutral* pedagogical approach; that is, it can be used to design any activity independently on the intended pedagogical models behind it; it thus well fits the need for differentiating educational interventions by offering not only a variety of different contents but also by envisaging the adoption of different educational approaches, strategies, and methods. This *neutral* approach is different from the one adopted by other tools, such as the 4Ts (Pozzi & Persico, 2013) or the 4SPPIces (Pérez-Sanagustín et al., 2012), which are exclusively intended to support the design of collaborative or problem-based learning activities respectively.

Furthermore, the PP has proved to be particularly easy to use, which is one of the most critical aspects often raised by teachers in similar experiences. For example, it has been recognized that the tool does not require any particular technological skills from the teacher to manage both the Authoring and the Implementation phase, which in other tools are far more complex and require high digital skills.

The ability of the tool to support the design of learning paths together with their *multiple variations* to accommodate differences in the target population needs has clearly emerged from the initial testing in the field of cultural heritage and suggests that the PP can be seen as a suitable tool for fostering personalization of learning interventions, which, actually, is a key aspect for supporting e-inclusion (Meyer, Müller, & Kubitschke, 2006).

All these positive features make the PP a good candidate as a tool to be used in teacher training contexts to support re-design of educational interventions by teachers who need to innovate their daily practices. As a matter of fact, experimentation in this direction has already started and other data will be soon made available to the scientific community.

Regarding the present drawback of the tool, we must acknowledge that the LMS used in i-Treasures for Implementation (i.e. Chamilo) is very user-friendly, but this is not the most popular LMS and it makes the PP not very much transferrable to other contexts, at least as far as Implementation is concerned. Nonetheless, this experience has proven the feasibility of the approach and it is already one of the developers' plans to develop the Implementation functions using other LMS (e.g. Moodle).

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When innovative instructional designs are too innovative: Lack of schema

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This paper presents a study of what happens when the innovation of an instructional design is too innovative. The study investigated an implementation process of a new instructional design in nursing education. The new instructional design should be a step away from a functionalist approach to learning, and it was developed to include, motivate and encourage students to engage in more situated learning processes. The course is infamous for low attendance and for demotivating the students. The new instructional design utilized teacher-produced video clips to qualify the students learning in preparation for the lessons and new pedagogical activities during lessons to make the learning process more situated. The video clips should also include more students for scaffolding the academic reading with video clips; however, the outcome was not as planned. The students did not recognize the video clips as a significant part of the preparation for the lessons, and therefore they were not prepared for the activities that the teacher had planned for the lessons. The paper dicsusses the students' lack of 'schema' and suggests ways of developing schemata to learn in a situated learning environment.

Introduction

The study presented in this paper was motivated by two factors: unmotivated students and an abundance of idle ICT in the classroom. Students are generally motivated by what seems applicable in their future profession and unmotivated to engage in academic activities that they regard as being on the periphery of the nursing practice (Huffman & Huffman, 2012). This study was carried out in a course on *Organization, administration and management* (6th semester, programme for Nursing) that suffers from low attendance and poor evaluations. The students generally regard the course as digressing into areas of low immediate interest to them. They feel excluded due to the organisation of the course and the teaching principles utilized in the course. They do not regard the course as a part of their professional identity formation process, hence there has been low attendance and low motivation. The course is a part of a module also involving acute and critical illness. The students perceive the two parts of the module as incoherent and contrasting in the sense that acute and critical illness is at the core of their budding nursing identity, and organization, administration and management is not. The teachers at the nursing college claim that the course on organization, administration and management could benefit from placement later in the programme; however, it is not within the power of this study to reorganise the entire programme. The reason that the nursing teachers suggest placing the course later in the programme is that by that time, the students have experienced the need for knowledge of organization, administration and management. Thus, there are two organisational issues beyond our control that affected the results in this study: the academic context of the course and the placement in the programme progression. Organization, administration and management is a growing part of the obligations of a nurse; however, it is not regarded as a part of the nurse's core identity. To overcome these challenges, the teacher and her action research group have developed an instructional design that is less functionalist and more situated. The aim is to steer away from a teleological 'means-ends' logic and move in the direction of a more deontological causal logic. The instructional design was an attempt to create a bridge between functionalism (Welch, 1985) and situated learning (Lave & Wenger, 1991).

Research design

The investigation in this paper was done through a critical realist lens. This means that we asked the ontological question: 'if this knowledge is obtainable of the world, what world is it, then'? This is a reciprocal relation to the epistemological question: 'how is knowledge of the world possible' (Elder-Vass, 2007; Bhaskar, 2008; Corson, 1991; Collier, 1994)? This implies that we should conduct a retroductivist

investigation into the data of the study to identify the causal mechanisms that cause the events that we see in reality (Peirce, 1998). The research of a critical realist is similar to the work of a detective in the sense that the researcher is recreating the traces and evidence of the event that has happened to determine which actors and mechanisms caused the event (McEvoy & Richards, 2003). The purpose of using a critical realist approach is that it is a good approach for looking beyond the immediately visible facts and concentrating on what may have caused the visible facts in the *event*. The aim of critical realist research is to understand how to change the research object for the better.

The instructional design that generated the *event* for the critical realist investigation in this study was developed in an action research cycle. The cycle was a quest for emancipation through inquiry and reflection (Lewin, 1946; Adelman, 1993). The cycle begun by identifying and pinpointing the problems (lack of motivation, exclusion and idle ICT) that were common, tacit knowledge amongst the nursing teachers but were not articulated. Then, an instructional design to improve motivation and enhance the use of ICT was developed. This resulted in a redefinition of the relay between preparation and lesson. It was inspired by *flipped classroom* studies in other nursing colleges (Schwartz, 2014) and the more general notion of utilizing video instead of F2F lecturing. The reason behind this was that the students said (in a preliminary survey) that they experienced more acknowledgment of learning from supervision than form lecturing. The aim was to create a situated learning environment in which the students would be motivated by collaborating in the activities and not only by the risk of failing the exam (Lave & Wenger, 1991). The activities included role-playing, teacher-produced video clips, real life cases, etc. The instructional design eliminated all F2F lectures. Instead, the presentation of academic content was done through teacher-produced videos. The purpose of the videos was to support the students' preparation for lessons in conjunction with reading and other activities.

The instructional design was created on the basis, interviews, focus groups and observations. The data collection was based on how the new instructional design worked in practice. The data was analysed, and there were major issues with the new instructional design (Niels Bech, et al., 2014). For the second run of the course, the teacher made a few adjustments to the instructional design, and the data showed that some of the issues were eliminated. Finally, the results of the study led to these conclusions:

1. An island of *situatedness* (the course) in a sea of functionalism (the programme in general) requires considerable explanation and attention
2. The students need time to figure out how to learn in a situated, learner-centred context
3. The students need guidance to learn how to centre themselves in their own learning process

On the basis of these concluding comments on the instructional design, the critical realist investigation began. The interviews, field notes, focus groups and surveys were reviewed to generate a deeper understanding of why the instructional design was not an immediate success.

Lack of schemata

We used the Kantian notion of *Schema* to understand what is needed to learn in new circumstances (Radford, 2005). For this paper, we used Kant's three types of *schema*: empirical, pure sense and transcendental schema. Generally, the notion of *schema* is a cognitive framework for understanding and interpreting information. It is related to language through metaphors and stereotypes in what Lakoff and Johnson called *image schemas* (Lakoff & Johnson, 2008; Lakoff, 1990). Furthermore, it is related to *shared repertoire* in Wenger and Laves theory on *Communities of Practice* (Wenger, 1998).
The schema describes the cognitive competence to interpret information through metaphors in language, through stereotypes in behaviour and through *shared repertoires* in collaboration. The Kantian tripartition of the schema divides the schema into empirical, sensuous and transcendent schemata (Johnson, 2005).

- An empirical schema is an empirical concept that many perceive in a similar way.
- A pure sensuous schema describes the ability to think systematic abstract thoughts of concrete matters. It describes the abstract system of understanding the invisible complexity of things that appear simple (geometry: triangle, circle).
- Pure concepts of understanding refer to schemas coming from within and affecting understanding of what is experienced (intuition, for example).

The schema is a diagram for understanding the organisation of the event. In this case, the teacher's schema is somewhat expressed in the syllabus, and the actual experience of learning is the sense experience. The schema expressed in the syllabus is at best an empirical concept:
'Formal deduction removed from all empirical content, however, Kant argued, cannot yield knowledge. The question then was to explain how abstract concepts relate to their concrete content. In an important sense, the Critique of Pure Reason is an attempt to achieve this goal and the schema, in fact, was Kant's answer' (Radford, 2005; p. 147).

The syllabus is an abstract concept created through the teacher's deduction of prior experiences in relation to the outcome of new circles of reflection. The teacher reasoned that '*priming* an academic subject to the students is important. Letting students watch a video before lectures will *prime* the students' memories and make room for more motivating activities that seem more meaningful to the students'.

This deductive approach to reasoning was, unintendedly, used by the teachers when developing the instructional design. The design process was *passive* so to speak; it did not involve empiric experience. It was solely built on the theoretical deduction of an alleged relation between video, role-playing and motivation. Even though the syllabus gave instructions of how to use the videos, it did not mention why. Hence, the students did not have a clear idea of what purpose the videos served. The students were used to reading syllabi, and they had a fixed impression of what teaching meant; therefore, when bearing elements are changed, the students prior schema does not seem to fit the new design.

Analysis

This *passive* approach to developing instructional designs may be the causal mechanism that triggered the displacement between the teachers' expectations of how the students would engage in learning within the new instructional design and how the students actually reacted in the real *event*, the lesson. In Louis Radford's article *The Semiotics of Schema* (Radford, 2005), the schema is described as a vehicle for understanding that requires active interaction between information and the learner: 'The schema entails of an individual who, to acquire knowledge, has to become active' (Radford, 2005; p. 147). The schema is like a catalyst in chemistry, a substance that makes the process happen in a certain way without actually including itself in the process: '…in Kant's theory of knowledge, the schema exhibits or unveils its concepts – it does not produce it' (Radford, 2005; p. 147). If the schema is not present, the concept remains undisclosed or even uncommunicated.

The teacher stated that her intentions with the action research cycle were to create an instructional design that:

- Bridged functionalist and situated approaches to learning.
- Created an environment of 'concrete labour' that focuses on the intersection between theory and practice.
- Reformatted the teacher role to become closer to the learning processes work-groups.
- Made her (the teacher) part of the students' learning process more involved.
- Made her (the teacher) part of the lectures non-interchangeable with technology.

These intentions were only communicated somewhat in the syllabus and not at all during the lessons.

The syllabus was presented on the campus LMS as a resource webpage containing all relevant information about the course (Figure 1):

Figure 1: Webpage containing information of courses

The introductory text refers to *flipped classroom* and other teaching principles/methodologies that the teachers sought to utilise in the course, and it also refers to the official curriculum for the course. These references are not that useful to the students. It would presumably have been more fruitful to align the expectations and demands of how to actually take the course.

The students in the focus group stated:

>   Student 1: 'I just logon, get the PowerPoints and logout again'.

The student tried to assimilate to the new instructional design by maintaining or recreating the instructional design that she is accustomed to in the new instructional design.

>   Student 2: 'If there are any notifications, somebody copies it and posts it on Facebook'.

The student illustrates a common tendency, which is that LMS is marginalized in favour of social media. The teacher's efforts to utilise LMS functionality to improve her instructional design proved to be in vain.

>   Student 3: 'We lack a connecting thread—we put something on the LMS, and we get feedback or comments—that never happens'.

The students wish for more online interaction and feedback. Connecting to LMS without getting feedback seems redundant and almost provoking to them.

>   Student 4: 'When posting a question on the Facebook group, you just know that 60 people will see it, and somebody will give an answer'.

The students used the rhizomatic, ahierarchical nature of networks in social media, which is in direct opposition to the arborescent, hierarchical organisation of the LMS. This notion is interesting in the sense that the intention of the instructional design was to produce a map of possible routes to learning and not a path to follow. The intentions of the instructional design were not communicated clearly or understood by the students in either case. It seems as though both the students and the teacher wanted the same thing: a plateau of intensity in a rhizomatic network of learning (Deleuze & Guattari, 1987); however, they did not quite communicate with each other in terms of how to construct the plateau.

The syllabus is very well-organised, and it presents the resources and content of the course very clearly; however, it is done in a functionalist way in the sense that one element has a specific function, and it is a means to achieve a specific goal from the curriculum. The different elements are not situated in the intended context. The syllabus centres its focus first and foremost on content and second on form. It does not describe what the students are expected to do.

According to Biggs, the teacher is in the process of 'obtaining an armoury of teaching skills' (Biggs & Tang, 2011; p. 19), which is moving from level 1 to level 2 in Biggs and Tang's levels of recognising

one's role and obligation as a teacher towards the students' learning needs. The levels could be described as follows (Biggs & Tang, 2011, pp. 17-20):

1. Is concerned with what the students are: lazy, unprepared, good, creative etc. Teaching revolves around content, and possibilities are limited because the teacher is fixating on what the students are. Teaching style: lecturing. Technology: PowerPoint.
2. Is concerned with what the students do in relation to teaching: make videos, cooperate, appear active, participate etc. Teaching revolves around form and activities, and the possibilities are unlimited. Anything could be a learning resource. Teaching style: facilitator. Technology: any.
3. Is concerned with how and what the student is learning: heutagogic study skills, feedback, content channels, alignment etc. Teaching revolves around a synthesis of content, form and learning skills. Teaching style is problem-based, reflective and relational.

In the interviews and in the first action research cycle, the teacher expressed a desire to move away from blaming the students for poor attendance and low motivation and to instead take on the challenge of changing her teaching to develop a new, more inclusive way of teaching the curriculum for the course. Now, she would be moving to level 2, and she would be the one to blame for any unsuccessful evaluation of the course, according to Biggs. The intentions with the new instructional design were to centre the student in his/her own learning process and decrease the teachers' experience of the students being at the periphery of their own learning process. In the teacher's opinion, the students only immersed themselves in the learning process if the content was relevant for exams or for immediate use in a basic understanding of the nursing practice. The teacher's shift in teaching principles could be visualised in a model used to describe learning in an *Open Source Learning Stream* (Kjærgaard & Sorensen, 2014) (Figure 2) (Kjærgaard, 2015).
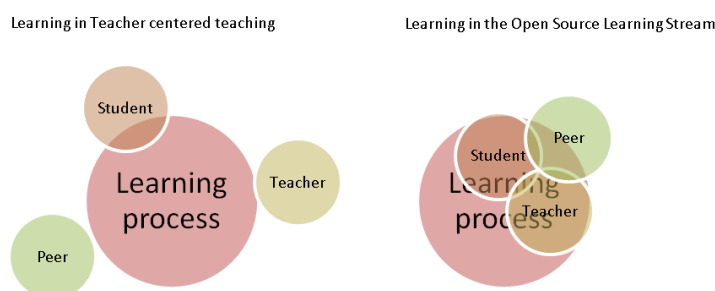
Figure 2: Open Source Learning Stream

The model shows how students relate to learning in a teacher-centred lesson and how they relate to learning in an Open Source Learning Stream (shared learning process in a synchronous stream of learning). In the teacher-centred lesson, they mostly off-load (Salomon, 1997) throughout the lesson; they do not really engage in cognition. Off-loading is the process of documenting the lesson in a system that is not proved to work without the purpose of later cognition:

> 'What would we say of individuals who off-load some of their cognitive processing onto a computerized expert system without having learned to provide it with appropriate inputs or to read its outputs properly, without having learned to doubt the system's accuracy or without mastering the skill needed to weight the alternatives it provides' (Salomon, 1997; p. 127)?

The computerised system could be LMS or note-taking in PowerPoint, which is very common for these students. They off-load the overload of information that the lecture provides into systems that they may not be capable of operating properly. In the Open Source Learning Stream, it is quite different because off-loading and cognition become one and the same in the learner's route from a legitimate peripheral participant to a member of a community of practice (Lave & Wenger, 1991).

The teacher wanted to establish a situation in which the students would be forced to take centre stage in their own learning process. The video clips should solve the problem with unreflected off-loading because the video clips created the opportunity to take some of the stress of the synchronous learning situation that lecturing creates in the sense that the students now had the opportunity to revisit the teacher's presentation of processed academic content in a cognitive progression.
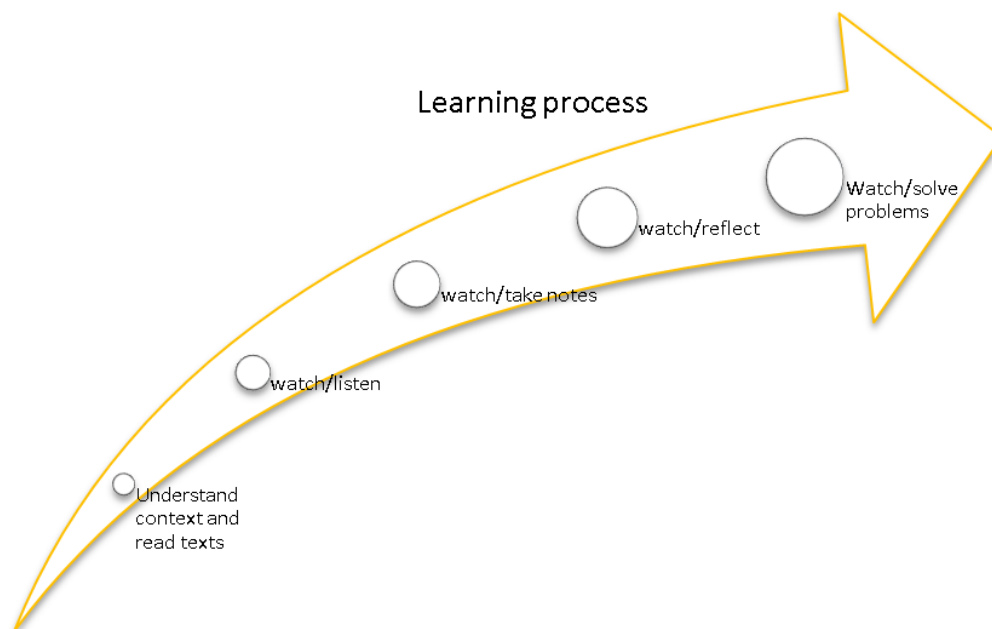
Figure 3: Learning Process

The new lessons had no forward momentum; there were no lectures tracing the route of the lesson, which meant that the students/groups had to generate momentum in the learning process themselves.

Findings

The students were expected to lack schemata, but the interesting finding is that the teacher actually also lacked schemata. She also had to determine how to operate the new instructional design. During the action learning cycles leading up to the design process, she was influenced by the other members of the research group. She was new to many of the suggestions in the action research conferences, which meant that she was to an extent assimilating her own practice to the new design without fully adapting the principles of the new design. This led to a discrepancy between her expectations of what the new design could bring to her teaching and what actually happened. In the interviews, the students stated:

- 'I just gave up reading those 70 pages–I was thrilled watching the videos'. Videos were a substitution for reading, which is an unwanted side effect that calls for reconsidering how the videos should support the students' preparation for lessons.
- 'We don't need more literature. We just need a connection between what the teacher says in the video and the texts'.
- 'They [the teachers] just mention all those theories and models. What we need to learn them is explanations, examples and generally elaborations of what is already in the text'. Videos do not bring the putative quality to the preparation that the teacher intended.
- 'In the video, you just saw the PowerPoint. I need to see who it speaking'.

The students relied on a phatic connection between the video clips and the teacher.

The second run was better than the first, and the third run was a success. This means that the teacher's own schema building was just as important as the students' schema building.

The teacher stated:

> 'The change that I have made from the 2nd to the 3rd time is that I have tried to make the relations between all of the elements in the course more obvious. I referred systematically to the work that the students did the day before and asked them to consider what they learned in the next day's lessons. Last, I reinforced the theme by trying to get the students to draw on the knowledge they have acquired through the process by asking them to substantiate their responses/reflections with theory'.

She also said:

> 'Moreover, I can mention that after the third time, I have become more familiar with this way of working and have an overview of all the details/elements, which I didn't have the first time'.

The findings suggest that there are quite a few considerations in implementing instructional designs created through action research. The findings also suggest that a radical change in a teaching principle requires a substantial intersection of understanding between teachers and students.

Conclusion

Action research as a developmental model in teaching has shown a few downsides. The students felt excluded and bewildered. It would have been beneficial to include the students in the action research process. The aim of the new instructional design was to include more students and to motivate participation. It would have been fruitful to involve the students in the process of designing the course.

The instructional design lacks elements of schemata building. The lack of schema as a conceptual catalyst results in misconceptions of how to engage in the instructional design. The syllabus presented was an agenda for the lessons and a functionalist resource collection. The situated activities that should motivate and include the students were presented as functionalist, teleological 'school assignments' and not as situated problem-based cases, even though they were in fact both situated and problem-based.

The students had already established an Open Source Learning Stream on Facebook. The students said that the campus LMS is useless and lacks feedback from teachers and that Facebook always delivers feedback from peers. This limbo between LMS and social media is not new, and a proper solution does not lie in a new 'perfect' system but rather in the individual. If the learner/group takes centre stage in the learning process, then a 'perfect' system is not that important. A combination of systems, including social media and LMS, has proven to be fruitful in other studies. An added benefit is that when the students are involved in the selection of digital tools, then they will have to analyse and discuss the affordances of the digital tools in the actual context. While analysing digital tools, the students would engage in a shared meta-learning process that would sharpen their perception of how digital tools can enhance learning processes.

The study also showed a few pitfalls, such as the students using the videos as short-cuts for easier preparation for the lessons. This is positive if the alternative is no preparation, but in an ideal context, it is negative because the videos only deal with the summary of the texts. It also shows the importance of making relations between videos, texts, context and activities. The study shows that the videos should:

- Contain instructions on how to use other resources in relation to the videos.
- Contain footage of the teacher presenting the video.
- Elaborate on the content of the texts.
- Not paraphrase texts or other resources.
- Not make texts redundant.
- Be approximately 10-15 minutes in length.
- Contain articulation of the intersection between video, text and activities.
- Be personal to the teacher.
- Be accompanied by activities that necessitate all resources for preparation (test).

The study also shows the importance of developing the students' understanding of how they learn and which digital tools are helpful and in what ways. The implementation of a new instructional design should address meta-learning as a part of the new design. Inclusion also involves inclusion in the process of designing the lessons. The teacher is the theoretical expert and the specialist in nursing practice, and the students are in the process of becoming nurses. Within the intersection between the two positions, students and teacher share the desire of acquiring new skills, competences and a higher reflective level. The conclusion of the study is that if the teacher does not address this in her reflections on how to design her teaching, the shift between a functionalist approach and a situated approach is difficult.

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E-learning in dialogical practice – ethical implications and the practice of digital-based constructive feedback

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Constructive feedback as a dialogical practice and learning process

Is it possible to understand learning as a dialogical practice? Does this practice have ethical implications? If the answer is yes, how is it possible to put an ethical dialogical learning process into practice? To discuss these questions is one of the main goals of this article. Learning processes can be analysed as a dialogue. This argument is founded on the premise that learning is a deeply intersubjective experience. When learning can be analysed in terms of intersubjective communication, it overlaps with dialogue as social practice, for example, when Kelly (2014) defines dialogues as '(…) a style of communication that is constructive, reflective, and oriented towards fostering understanding and building relationships' (2014, p. 51).

Despite different approaches to gaining a theoretical understanding of dialogue, and the complexity of dialogue as research object, a provisional definition of dialogue is provided. This definition should be used to highlight the similarities/overlap between *dialogue* and *learning* as intersubjective communication practices. To provide such an analysis, it is important to understand the ethical dimensions of communication and dialogical practice.

Ethics and communication

One (and maybe the most important) task of ethical consideration is the consideration of communication: ethics can be regarded as the branch of philosophy which tries to answer questions according to which rules, norms, values people should arrange actions, their relation to others, and their own lives. Ethics are therefore acknowledged as a 'practical philosophy', because it discusses concrete actions, their moral implications etc. (contrary to logic, epistemology and metaphysics, *cf*. Copp, 2006). From this point of view, ethics defines/describes communication (how to act) while ethical considerations describe/define rules/norms for such a (social-) interaction (respectively communication). Communication can be considered as a basal factor of social life as it signifies social (inter-) action and constitutes in such a way a performative 'communion' (community). Communication acts as a foundation for values which are thematized and actualized in ethical considerations (for a more detailed discussion of the principles of ethics, *cf*. Newton, 2013, p. 23).

Usually, all-day life is orientated on customs, conventions, and rites. One might not be necessarily aware of this worldview – but this worldview manifests itself in actions which are guided by norms, values, ethical conceptions and considerations which pre-structure actions and therewith communication. When these practices do not guarantee the maintenance of the social order, relationships, etc., a process of *re-reflecting of the customs* is needed. While ethical reflections are believed to emerge first in times of changes and crises, ethical considerations could emerge first during times of changes and crises as well (*cf*. Critchley, 2008, p. 38).

To simplify, ethical considerations traditionally stress the responsibility of the individual towards his/her social relations. For example, Copp formulates typical normative ethical questions – 'What kind of actions are right or wrong? What kind of person should one be?' (Copp, 2006, p. 18) – which point to the social dimension of ethics.

One crucial question of ethical discussions is thus the question of how the individual as a subject can relate him/herself to the environment in an ethical way (this question implicitly defines what being ethical actually means). This relation has to be performed via communication processes. From this point of view, ethics discusses value-based communication processes. Within this context, dialogue as an ethical concept becomes relevant (for a more detailed overview of applied ethics *cf*. Nykanen, Ole, & Zeller, 2013).

Essential features of a dialogue

Dialogue can be conceptualized as a communication process in which the interlocutors confer with each other in a tolerant, rational, and open-minded manner. To fulfil these requirements, a dialogue has to fulfil the criteria of three validity claims: Truth, rightness, and truthfulness.

These validity claims are made by the protagonist when s/he engages in proper dialogue: an utterance is used to refer to something in the world (truth), establish legitimate intersubjective relations (rightness), and express intentions (truthfulness). This understanding of dialogue is oriented towards the concept of communicative action developed by Habermas. Habermas stresses the rationally based and tolerant structure of communicative action (Habermas, 1984):

> 'This approach is coined by the intention to provide a strategy ... how actors in a society could reach a common understanding. And ... how this actors could be enabled to coordinate rational and consensus based cooperate actions' (Habermas, 1984, p. 86).

Fundamental to this strategy is dialogical interaction, which ensures an open-minded and equal exchange of opinions, ideas, and worldviews. According to these goals, Habermas defines the basic structure of such an interaction as an interaction where every interlocutor has equal rights:

> 'Only if there is a symmetrical distribution of the opportunities for all possible participants to choose and perform speech acts does the structure of communication itself produce no constraints. Not only are dialogue roles then universally interchangeable, but there is in effect also an equality of opportunities to take these roles, that is to perform speech acts' (Habermas, 2001, p. 98).

From this point of view, a dialogue can be considered challenging: 'Challenging because engaging in dialogue entails trusting others with personal experiences and reflections' (Kelly, 2014, p. 58). A dialogue without an open-minded relation and without the trust that the other individual is open minded as well would not be a dialogue. If the precondition of a mutual open-minded recognition of valid knowledge can be discursively produced, the claim to truth may be tested/ evaluated through discourses in which the parties deliberately discusses the truth of a matter on equal terms. Normative rightness may be tested through discourses about what ought to be the norm. This value-oriented dimension of dialogical practice has been formulated by Kelly (2014):

> 'Dialogue, by its nature, is a type of conversation that challenges people to enhance their understanding of themselves and others by sharing and reflecting on deeply held beliefs and values' (Kelly, 2014, p. 55).

This challenging dimension of dialogically based communication draws on a long tradition that was started by Socrates. Socrates expressed the challenging impact of dialogical practice in a sociopolitical dimension when he stated,

> 'For if you kill me you will not easily find another like me, who, if I may use such a ludicrous figure of speech, am a sort of a gadfly, given to the State by the God; and the State is like a great and noble steed who is tardy in his motions owing to his very size, and requires to be stirred into life. I am that gadfly which God has given the State, and all day long and in all places am always fastening upon you, arousing and persuading and reproaching you. (…) I dare say that you may feel irritated at being suddenly awakened when you are caught napping; and you may think that if you were to strike me dead (…) then you would sleep on the remainder of your lives, unless God in his care of you gives you another gadfly' (Plato, 1899, p. 25).

A dialogue has the potential to challenge conventionalized thinking patterns, call certainties into question, and re-think traditional principles and established worldviews.

Via the acceptance of diversity, it is possible to enter into a tolerant dialogue with other narrations – as long as an interlocutor considers the dialog partner's understanding and experience of reality as

equivalent to his own: a dialogue may challenge conventionalized perspectives on phenomena and thus provide new perspectives on these phenomena. A dialogue enables posing a critical challenge to all prefigured and seemingly indisputable meanings.

This tolerant and open-minded challenging of all prefigured and seemingly indisputable meanings can be considered as the ethical dimension of the dialogue.

From this point of view, a rationally based, tolerant, and open-minded dialogue helps us to gain new perspectives on the world, discover new (world-) views, and thus construct new knowledge. The dialogically based production/construction of new knowledge through the adoption of new perspectives can also be theorized as learning. Dialogically based learning is thus also ethical learning.

What is learning? The communicative dimension of learning

There are many different approaches towards developing an appropriate understanding of learning, and a generally accepted definition of learning does not exist. One possibility to define learning is to define it as a process in which the learning individual acquires knowledge and a meaningful understanding of the world (for an epistemological understanding of knowledge *cf.* Williamson 2000).

The learning individual transfers information (or the stimulus) – data/ facts – into knowledge, that is, a meaningful understanding of data and facts:

> 'A stimulus is a stimulus only to the extent that it is significant, and it becomes significant only to the extent that there is a structure which permits its assimilation, a structure which can integrate this stimulus but which at the same time sets off the response' (Piaget, 1964, p. 182).

Learning could be viewed as an individual task: every single learner learns for him/herself and individually transfers information into knowledge.

However, it is also possible to understand learning processes as a specific form of an infinite dialogue. This aspect will be explained by analysing the communication structure of learning according to the three leading learning theories: 'Behaviorism, cognitivism, and constructivism are the three broad learning theories most often utilized in the creation of instructional environments' (Siemens, 2005, p. 3).

In each of these approaches, learning can be understood as a communicative practice between the learner and his/her environment (for a more detailed overview of learning theories *cf.* Illeris 2002). The way in which communication is organized and performed can be considered the main difference between the three leading learning theories.

Behaviouristic conceptions see the learning individual in a fairly passive role: The learning individual receives stimuli and develops stable reactions. The manifestation of these stable reactions can be considered the learning effect. Typical behaviourist strategies like the concept of positive reinforcement can be seen as a specific kind of communication practice. The positive feedback of a desired action fosters the desired behaviour. Behaviouristically oriented communication strategies aim to establish the intended behaviour: 'A person learning to drive a car responds to the verbal behaviour of the person sitting beside him; he starts, stops, shifts, signals, and so on when told to do so. (…) Much of education is instruction in verbal behaviour. The student is told how to 'use words' rather how to use an accelerator; he told how to behave' (Skinner, 2011, p. 134). From this point of view, communication practice in behaviouristically oriented conceptions is asymmetrical and thus not dialogical, at least when an essential feature of a dialogue is the <u>principle of equality</u> of all participants (even between teacher and learner).

As in behaviouristic approaches, cognitivistic conceptions tend to cast the learning individual in a passive and receptive role: The relationship between teacher and learner – the communication partners – is again asymmetrical: The learning individual receives information from the teacher and is to transfer it into knowledge: 'It requires a sensitive teacher to distinguish an intuitive mistake – an interesting wrong leap – from a stupid or ignorant mistake, and it requires a teacher who can give approval and correction simultaneously to the intuitive student' (Bruner, 2009, p. 68). The epistemological orientation of behaviourism and cognitivism stresses the logical structure of the world. This logical world structure is to

be internalized by the learning individual. The learning process has to be arranged in such a way as to enable the individual to acquire the objectively correct knowledge. In this sense, learning is normative. Learning results can be identified as right or wrong: it is important that the learner produces the 'right' knowledge. The teacher, as a communication partner, has to ensure that the learning individual receives this normative right knowledge. From this point of view, behaviourism and cognitivism deal with an (more or less explicitly) asymmetrical communication structure: the teacher must guide the learner so that the learner can acquire the right knowledge. Due to their asymmetrical communicative orientation, behaviourism and cognitivism operate through a non-dialogical communication structure.

Constructivistic conceptions re-define this epistemological approach. The learning individual does not adopt normative, predefined objective knowledge. Rather, the learning individual gives significance to the world. The way in which the learning individual gives meaning to the world or its structures can be considered the learning process. Social-constructivist approaches understand the process of giving meaning to the world as a social process. Knowledge is not predefined content which the learning individual has to internalize. Knowledge can be viewed as collective negotiation processes. From this point of view, social-constructivist approaches are dialogically based. Social-constructivist approaches stress the social dynamic in the course of epistemological processes (Gergen, 1994). The production of knowledge is not an auto-referential process of a single learning individual but an intersubjectively based epistemological process: 'It is also important to realize that this continuous refashioning of meaning is not under any one person's control. Even within a dyad the voices of other relationships continuously intrude. And as we enter directly into dialogue with others, so can the emerging patterns of coordination change all that once seemed clear and apparent' (Gergen, 1999, p. 146).

Valid knowledge is produced in dialogical interaction/through a dialogical exchange of perspectives. Dialogical communication processes have a crucial significance: dialogical communication enables an intersubjective, mutual understanding of each other and in consequence of the world.

According to Gergen, social constructionism as an epistemological metatheory: '(...) would remove knowledge from the data-driven and/or the cognitively necessitated domains and place it in the hands of people in relationship. Scientific formulations would not on this account be the result of an impersonal application of decontextualized, methodological rules, but the responsibility of persons in active, communal interchange' (Gergen, 1985, p. 272).

Social-constructivist approaches point out that learning should take place within dialogically oriented learning groups. Within such social-constructivist learning groups, a common understanding of learning content could be achieved (organizational knowledge):

> 'While knowledge is often thought to be the property of individuals, a great deal of knowledge is both produced and held collectively. Such knowledge is readily generated when people work together in tightly knit groups known as 'communities of practice' (...) organizational knowledge is inevitably heavily social in character' (Antonelli, 2000, p. 91).

Meaning is produced within a collective understanding process regarding data and facts. In other words, individual knowledge and individual perspectives on an object are shared (*distributed knowledge*) and discussed. The production of common knowledge is the result. This collective and constructive process of knowledge production can be described as a co-construction process (Sutter, 2009). This would mean that construction processes can be understood as social achievements. This view holds that knowledge is produced in a collective dialogical activity. Didactical challenges arise from this socioconstructivist approach: By which strategies is it possible to establish dialogically based communication structures in learning processes? In pedagogical terms, the consequence is that one has to establish a communication strategy which ensures social negotiation of the meaning of data and facts. This negotiation process is – at least according to social-constructivist approaches – dialogically orientated and thus an ethical task.

From a pedagogical point of view, one might now ask, how it is possible to establish a dialogue in the context of a social-constructivist pedagogical strategy. One pedagogical tool is constructive feedback. Constructive feedback appears to be an appropriate strategy to ensure dialogical communication within social-constructivist teaching and learning scenarios (Ovando, 1994). Constructive feedback can be characterized as a didactical tool to enable a collective knowledge production within a systematized and

value-oriented communication process. Feedback is constructive if it is based on an open, tolerant exchange of information. This point of view sees constructive feedback as an offer, and a contribution to the experience of common knowledge production. A significant difference between oral and written feedback lies in the nonverbal and paraverbal dimensions which do not exist in written constructivist feedback. (Where is no spoken word, there is no prosody). Therefore, the concrete formulation has a significant meaning within written constructive feedback. This article refers to written constructive feedback. This offer to an open-minded exchange of knowledge constructions ('worldviews') can be considered as an ethical offer because it offers a value-based communication process. Following social-constructivist approaches via open minded, collective (i.e. dialogical) communication, valid knowledge can be produced: According to social-constructivist ideas, a meaningful interpretation of the world is accepted when it is coherent and based on evident, intersubjectively accepted axioms. The fulfilment of these two conditions can be considered the target state. Constructive feedback thus has to evaluate whether the argumentation/ the developed knowledge is coherent and based on transparent, intersubjectively accepted axioms.

The model of constructive feedback originates from cybernetics, a research area which concentrates on, among other themes, control, and regularization processes. The feedback is an information-based answer/check-back signal which places the actual state and the target state into a relationship. In the context of common knowledge construction in teaching-learning settings, feedback points to the relationship between the already acquired knowledge and the target state 'What should be learned? What remains to be learned?' According to its aims, constructive feedback also possesses a cognitive and motivational dimension (Krause, 2007).

The cognitive function of constructive feedback is tasked with revealing possible gaps in the constructed knowledge, pointing out discontinuities in argument, logical mistakes, etc. Without this cognitive function, the learning individual could not validate his/her knowledge. In this sense, the role of the cognitive function is to provide information about the logical coherence of the knowledge production process (the systematization/ categorization of data and facts) and thus focus on factual aspects.

The motivational dimension of constructive feedback focuses on the emotional disposition of the partner in dialogue: in contrast to cognitivism, constructivist positions stress the individual and emotional experience of knowledge construction (Siebert, 2005). Knowledge is individually experienced. If the emotional dimension possesses a central importance, this has the pedagogical consequence that the motivational disposition of each learner has to be appropriate. The fit between the individual knowledge of the single learner and the environment is produced and validated within intersubjective acts of mutual – i.e. dialogical – understanding processes: Can other people comprehend my interpretation of the world, my systematization/categorization of data and facts?

This interplay between individual construction of knowledge structures and social negotiations of the meaning of data and facts is also an emotional process. From a pedagogical point of view, the emotional dimension of feedback should be used to develop a 'positive reinforcing' effect: this reinforcing function of constructive feedback has to support the motivational disposition of the partner in dialogue. (Here, the partner can make use of the fact that criticisms are more easily accepted when a positive valuation has previously been formulated, *cf*. Schaible & Jacobs, 1975).

Taking a constructivist view, the partner in dialogue has to make it plain that the formulated point of criticism has been made from a subjective and not an objective/ normative perspective. This subjective view has to be evaluated within in a collective negotiation process.

Implementing constructive feedback appropriately requires attention to the cognitive and motivational functions of feedback. The meaning of these two functions derives partly from a constructivist understanding of knowledge production. As already outlined, social-constructivist approaches define knowledge as the understanding, categorization, and meaningful systematization of data and facts (here, constructivist approaches build on cognitivist structural models). Constructive feedback can be understood as a tool which evaluates, in dialogical interaction, how facts and data are systematized, ordered, and categorized by the learning individual: In which way are the data and facts put in relation to each other? Is this produced knowledge helpful when interacting with the environment?

The systematization process of data and facts, or the meaningful interpretation of the world, can be conceptualized as a collective construction of knowledge: a meaningful interpretation of data and facts requires them to be put in a meaningful relation to each other. This relationship can viewed as representing structures of knowledge. The constructed relationship produces a meaningful interpretation of the world. New data and facts can be inserted into pre-existing structures of knowledge (Piaget, 1985). These pre-existing knowledge can be re-structured/modified by introducing new data and facts:

> 'In other words, learning is possible if you base the more complex structure on simpler structures, that is, when there is a natural relationship and development of structures and not simply an external reinforcement' (Piaget, 1964, p. 184)

The learner, in the course of his socialization, receives new stimuli – knowledge subsequently changes constantly and is submitted to an infinite series of alterations. Pedagogical practice has to ensure that the learning individual can develop schemes/structures of knowledge through dialogical interaction (Salonen, Vauras, & Efklides, 2005). The teacher's task is to manage the learning activities of the learner according to dialogical practices. In other words, the main task for the learner is to transfer information (the individual data and facts) into the already existing structures of knowledge by dialogical interaction/social constructivist negotiation processes.

From theory to practice: Online-based communication strategies for constructive feedback

The project *e-Didaktik & e-Science* as a sub-project of the *FLiF* teachingproject (Forschungsbasiertes Lernen im Fokus/ research-based learning in focus) at Carl von Ossietzky University, Oldenburg (Germany), has the online-based constructive feedback strategy developed, evaluated, and implemented in various courses. The FLiF project aims to improve the quality of inquiry-based teaching practice at the whole university. Among others, the constructive feedback forms part of training courses for teachers and students. One important objective is that students should take on more responsibility in the course of knowledge production and become agents in the dialogical process of knowledge validation (this dialogical process of knowledge validation is of central importance in inquiry-based learning processes).

To develop appropriate dialogical strategies, the participants address within the trainings the following questions:

1. For what purpose is constructive feedback to be formulated? In other words, 'What is constructive feedback meant to achieve for you and your learning group?' and 'Which verbalizations are adequate for this purpose?' The participants therefore have to formulate targets and develop adequate verbalization strategies.
2. How might constructive feedback be organized (e.g. which subcategories are important)?
3. By which verbalization strategies can the equality of the partners in dialogue be ensured?
4. Which verbal strategy could be implemented; for example, should the indicative or the conditional mode be employed in formulation?
5. From which perspective – omniscient observer versus first-person – should feedback be formulated?
6. By which verbalization can a critical/evaluative relationship to one's own positions be indicated?

These questions are orientated by Bhattarai, who formulated *principles of constructive feedback* (Bhattarai, 2007).

An up-to-date implementation of constructive feedback is faced with constantly changing media. With changing media, the increasing significance of the internet, and its participatory dimensions, dialogical learning must adapt to these changes. This is why the *e-Diaktik & e-Science* project stresses dialogical and online-based e-Learning.

Web 2.0 and e-learning 2.0 as a space for dialogical and online-based e-learning

The implementation of constructive feedback faces constantly changing media. With the development of the so-called web 2.0, the possibilities for online-based interaction have increased. The web 2.0 – the

concept coined by Stephen Downes (2005) – emphasises the importance of dialogical interaction. UGC (User Generated Content) technology permits the user to produce internet content and shape their space within the internet in the course of interaction processes: the user can produce an interpretation of the world through blogs, wikis, and podcasts. The possibilities of web 2.0 technology mean that the user can – at least potentially – enter into a dialogue with other users online. In other words, the Wikipedia concept of collaborative validation of articles requires a partner in dialogue. The individual can then become part of a collective process of knowledge creation. E-learning can employ the dialogical, online-based orientation of the web 2.0. So-called e-learning 2.0 uses the collaborative dimensions of the web 2.0 for online-based learning processes. E-Learning 2.0 in turn empowers the learner to become more dialogically productive in e-learning-scenarios (Martin & Noakes, 2012). The *e-learner 2.0* is not only a recipient of media content but produces media content by dialogical interaction, as part of the learning process – for example, when wiki articles are discussed. The implementation of dialogue-based (e-) learning must therefore employ web 2.0 technologies.

Collaborative writing: A good practice example for higher education

The following best practice example is located within the field of higher education and uses web 2.0 tools to implement online-based constructive feedback. As stated previously, the Carl von Ossietzky Universität Oldenburg supports inquiry-based learning. The following best practice example therefore combines elements of contemporary e-learning (i.e. e-learning 2.0) with elements of inquiry-based learning in higher education (Kergel, 2014). Within inquiry-based learning processes, the students should act like researchers: developing research questions and a study outline, collecting and interpreting data, and communicating the results. According to the dialogical structure of scientific inquiry, every step must be dialogically embedded. It is for this reason that constructive feedback has been implemented within various IBL courses at the Carl von Ossietzky Universität Oldenburg.

As an example of how constructive feedback can be used in an online-based learning scenario, the course 'Das Ich und das Netz – subjektorientiertes e-Learning in Theorie und Praxis' (The I and the net – subject-orientated e-learning in theory and practice) will be introduced. This course is structured as an online-based learning scenario which enables students to provide constructive feedback online with web 2.0 tools. The course uses a learning platform which has been developed to combine elements of inquiry-based learning and e-learning 2.0, and which can be used as a tool to achieve constructive online-based feedback. The learning platform is based on WordPress, the world's most popular blogging system (Heidkamp & Kergel, 2014).

Figure 1 This illustration depicts the so-called *Seminarblog*, a WordPress-based learning platform which provides a space for online-based constructive feedback.

Within this pilot course, students are divided into three research teams. Each research team is tasked with producing an essay. The three research teams are asked to

- Develop their own research question for the essay and thus find their own essay topic
- Develop a structure for the essay
- Write the essay

Figure 1 This illustration depicts the so-called *Seminarblog*, a WordPress-based learning platform which provides a space for online-based constructive feedback.

Each of these tasks is accompanied by constructive peer feedback from another research team. The results of each stage (developing a research question, developing a structure for the essay, and writing the essay) have been uploaded to the learning platform. The constructive feedback on each stage has also been uploaded to the internet platform. Additionally, the students are asked to use online tools such as Google Drive or Etherpad for their collaborative writing process. These web 2.0 tools enable synchronous writing (simulcasting) on one document. After a research team has received
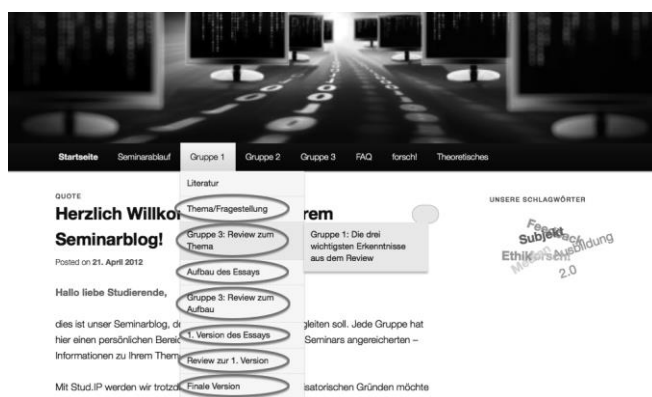
constructive feedback, the research team is asked to list the three main points of the review. This strategy secures a dialogical, online-based interaction between the reviewer and author.

The dialogical production structure turns the essay into a collaborative result. Reviewer and authors collaborate online-based interaction to ensure the quality of the essay during the different stages – from the initial research question to the final version of the written essay.

A further advantage of this online-based, dialogically structured learning scenario is that each student experiences the roles of reviewer and recipient of constructive feedback. As simultaneous recipients and reviewers, the students hone the process of constructive feedback from different points of view.

Figure 2 This Illustration depicts the organization of the review structure, which ensures constructive online-based feedback.

Providing work results and adjusting them to the recommendations of feedback and formulating constructive feedback for each stage of work, requires a high degree of self-regulated learning and independently organized learning processes. The main tasks of the teacher consist in organizing and structuring the on-going constructive feedback process.

Results of the evaluation

A formative evaluation was carried out for the whole length of the course. The evaluation was essentially designed as a process of formative data collection: Using semi-standardized *open questions* (questions which can be answered without prefigured, implied, or explicitly presented choices), students were asked how they experienced the collaborative work process in its different stages (the evaluation design is orientated at the model of 'theoretically grounded evaluation' by Dalsgaard (2005). This evaluation process was accompanied by exploratory interviews with a single student. The results of the exploratory interviews allowed the semi-standardized questions of the evaluation sheets to be adjusted to the needs/perspectives of the students. The evaluation questions thereby thematize the self-awareness of the individual learner within a collaborative e-learning process based on constructive feedback. Using such a strategy, it is possible to reconstruct the dynamics of a dialogically based e-learning process.

The main results are listed in a synoptic overview:

All students appreciated the requirement to provide feedback because... 'One is forced to think about the work of the other students'. In response to the question of whether they would prefer to give constructive feedback within a group or alone, all students preferred to provide constructive feedback in a group: 'The reason is that the collaborative feedback provided a more profound understanding of the work to be reviewed'. Receiving feedback put the students in a position to '(...) understand one's own work more deeply and sharpen and structure it (...)'. To '(...) receive feedback helps to better locate one's own work (...)'. However, formulating constructive feedback appropriately, particularly critical points, was experienced as a challenge: 'To put critical points in a friendly way is quite hard'.

The significant degree of self-regulation and independent organization was mostly experienced as a *relief* – '(...) one is usually forced into very pre-structured courses in Bachelor's as well as Master's studies. The organization process can be complicated but encourages more active participation in the course'. The dimension of intrinsic motivation as an effect of required independent organization overlaps with the intrinsic motivation resulting from the requirement to choose the essay topic: the process of

learning/knowledge creation was experienced as more *deep and profound* due to the freely chosen essay topic: '*I can apply myself more actively because I can write about things which I am interested in*'.

Finally, students feel appreciated and respected as dialogue partners because the feedback testifies to the relevance of their position as being worthy of statement: '(...) somebody was really interested in my/ our work'.

Summary

The reasoning and the evaluation results which were presented in this article can be summarized as follows:

- One crucial question of ethical discussions is the question of how the individual as subject can relate himself/herself to the environment in an ethical way. The relation has to be performed via communication processes. From this point of view, ethics discuss value-based communication processes. Within this context, dialogue as an ethical concept becomes relevant.
- Dialogue can be conceptualized as a communication process in which the interlocutors confer to each other in a tolerant, rationally based, and open-minded manner. To fulfil these requirements, a dialogue has to fulfil the criteria of three validity claims: Truth, rightness, and truthfulness. Such an understanding of the dialogue shows an overlap with social-constructivist concepts of learning.
- Social-constructivist approaches point out that learning should take place within dialogically oriented learning groups. Within such social-constructivist learning groups, a common understanding of learning content could be achieved.
- The constructive feedback in turn can be characterized as a didactical tool to enable a collective knowledge production within a systematized and value-oriented communication process.
- Via e-learning 2.0 strategies, it is get possible to realize a digital-based constructive feedback and extend the possibilities of learner-centred self-determined e-learning or blended learning.

The first evaluation results show that digital-based constructive feedback supports the unfolding of a communication structure according to the theory of Habermas's concept of communicative action. Thus, constructive digital-based feedback can be considered as a strategy of ethical learning in practice.

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Teaching arts and crafts in an online environment

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Online and blended learning approaches are changing the educational system. Experiments in how to teach in these new environments have been undertaken by teachers, resulting in new teaching methods using different models of blended learning. Traditionally, arts and craftss have been taught in a studio-classroom, but now, more arts and craftss classes are taught online or using different blended learning models. This paper discusses enquiries as to what type of teaching methods students in an arts and craftss course perceive as most suitable for online face-to-face teaching. The students were taking a course in arts and crafts within teacher education at Authors University College. The blended learning-model utilizes both studio-classroom and online face-to-face teaching. The research is presented using a case example from one of the online course activities along with two online surveys. The results indicate that most of the students found theoretical subjects to be best suited for an online face-to-face classroom and that practical subjects are best taught in the studio-classroom. In addition, a number of the students found practical and theoretical introductions suitable for an online classroom.

Introduction

Today's educational system is being revolutionised by different online and blended learning (BL) models. Authors University College (AUC) in Country has recently established several BL courses within the Faculty of Teacher Education and Sport. One of these courses is a 30 credit course in arts and crafts for in-service teachers and teacher students. The purpose was to investigate how students in a newly formed BL course in arts and crafts experienced and perceived the online portion of their course in Teacher Education in Country and what teaching methods they found suitable for the online face-to-face teaching of arts and crafts. Most of the teachers in art subjects at AUC mainly teach traditional theoretical lectures online and leave the more activity based teaching for the traditional studio-classroom. One of the reasons for this is insufficient experience with face-to-face online teaching.

Identifying effective teaching methods for these BL courses is required. Many teachers experiment with how to teach different courses in these new online environments using different models of BL that have emerged. This new mode of learning and teaching are new to most academic staff since they have had no experience in online or BL learning during their own education (Maskal, Dziuban, & Hartsman, 2012). It is therefore believed that most teachers in higher education mainly learn to teach through observing others (apprenticeship) in their disciplines, so they mainly teach as they themselves have been taught (Gregory & Salmon, 2013; Garcia, Arias, Murri, & Serna, 2010). Experimentation on how to teach different subjects online is therefore a necessity. Also, when both teachers and students are new to BL, it is essential to evaluate and reflect on the learning activity and learning situations to provide everyone involved with an opportunity to give feedback and to revise the way a course is taught (Maskal, Dziuban, & Hartsman, 2012; Brew, 2008). The students participating in the arts and crafts course at AUC were teacher students who would be teaching in primary education, and it can be assumed that they may, to some extent, follow our examples of online teaching methods should they later have to teach in such an environment themselves.

Many definitions have been given for blended, hybrid or mixed learning. BL combines personal interaction from traditional classrooms with online education (Picciano, 2009). Sharma (2010) presented *a combination of face-to-face and online teaching* as the classic definition of the term BL in which face-to-face is understood as classroom teaching and the online part of the course usually involves a Virtual Learning Environment (VLE). This is the definition nearest to how the courses at AUC with BL are designed. Our design in BL is a combination of *face-to-face on-campus teaching* and *live face-to-face online teaching* using the web conferencing software Adobe Connect (live online lectures) and the *VLE* using Fronter.

BL was originally used in the corporate world to educate workers without requiring them to leave their workplace and was originally partly adopted as a cost-saving measure (Sharma, 2010). For the students in

this course, which included adult students with jobs who were often long distances from Campus, it is of course a benefit to be able to attend class from a computer at home. The aims of our BL courses are a combination of increasing students' activities outside the face-to-face classroom, a more learning focused education and the need to meet students' needs. In addition, AUC's mantra of having a close relation between students and staff influenced the choice of BL.

The research found on BL reported positive results in terms of student satisfaction, better learning outcomes, more student engagement, pedagogical richness, flexibility and cost-effectiveness (Afacan, 2015; Graham, 2004; Salmon, 2011). In their study on student perceptions of study quality in a part-time and distributed Teacher Training Program Levels 1-7, Sviggum and Sollid (2015) found that the students evaluated studio-classroom lectures significantly higher (M=1.7, Likert scale from 1 Very high to 6 Very low) than face-to-face online lectures in Adobe Connect (M=2.7). They also found that the students evaluated their teachers professional competence as better (M=1.6) than their digital competence (M=2.7); however, little research was found on BL in arts and crafts education and especially in the combination of face-to-face learning both online and in the traditional classroom.

When teaching a BL course in an art subject, it is easy to divide the course into theoretical lectures when teaching in the online classroom and using practical workshops in the traditional studio-classroom. The problem is that it may pacify the students, as they will be listeners and not active in their own learning, contradicting the purpose and benefits reported from BL research (Afacan, 2015). Dziuban, Moskal, Kramer and Thompson (2013) reported that students in online learning environments 'feel more actively involved in their learning and that they feel technologically empowered to learn beyond what they experience in the typical classroom environment' (p. 1-2). If this is the case, teaching methods for the online face-to-face classroom that promote student activity should be used. In addition, BL can enhance arts and crafts courses (Bender & Vredevogd, 2006; Afacan, 2015), especially since the studio-classroom teaching practised at AUC is already rich in its learning and teaching methods, which is beneficial.

The BL courses Arts and Crafts 1 Levels 1-7 are based on the curriculum for the subject arts and crafts in the Country primary school. The course aims to provide an academic and didactic basis for teaching arts and crafts in primary school, and the students will qualify to teach arts and crafts from year one to seven. The structure of the course was six two-day seminars at the university-college and five two and a half hour online lectures and workshops spread over one academic year. The course had twenty-four students.

As mentioned, AUC uses the Adobe Connect (AC) web conferencing software. This offers opportunities for different teaching methods in a live virtual classroom. In addition, Fronter is used for course materials and information, and students can contact teachers outside of planned online or classroom activities via email.

Teaching of arts and crafts at AUC

Teaching practical and creative activities using different materials in the studio-classroom has required courses to date to be tied to one place, meaning that the students came to campus for their lectures and studio-classroom activities. With the new model of BL, the objective is to provide the students with more flexible teaching activities while maintaining or even improving the quality of the course. The teachers of this type of class do not look upon face-to-face online teaching as a substitute for ordinary classroom teaching, but they try to make the teaching an extension of the activity in the traditional studio-classroom. The reasons for choosing BL as a model of teaching for this arts and crafts class was to give the students additional instruction while improving flexibility, as mentioned.

Art and crafts teaching is based on studio-classroom thinking with traditional methods, such as apprenticeship and practical workshops. The teaching methods used are centred on interactions between the student, the environment and the teacher. The characteristics of the studio classroom model presented are few lectures, individual or group work, activities that emphasize cooperative learning and students' own responsibility for his or her learning. The teachers' roles in the studio-classroom in addition to lectures are to demonstrate techniques, observe, intervene, provide feedback and suggestions or ask questions (Hetland, 2007).

The learning situations are realistic, and the students construct their own knowledge through practical and cooperative learning methods. There is also a strong emphasis of constructing knowledge and developing skills and attitudes through working with different materials, such as clay and textiles. The training of teachers in arts and crafts is often drawn on the students' own experience in which students engaging in active methods and a collaborative way of working and sharing of experiences are all important elements. In addition, there is a great emphasis on reflection and learning by doing (Dewey, 1934).

As mentioned, the purpose was to conduct enquiries as to what type of teaching methods students perceived as most suitable for online face-to-face teaching. We also wanted to determine if there were any correlations between what they perceived as good teaching methods online and good technical quality and teaching methods that they have had experience with. The investigations were narrowed down to three questions:

- How do the students in a BL course experience a chosen online activity?
- What type of teaching methods do the students find to be appropriate for arts and crafts education?
- How do the students perceive quality in different aspects of the online teaching they have participated in within this course?

Methods of enquiry

The research was undertaken in an arts and crafts course during the academic year 2014-15 in western Country. The 24 students were a mix of in-service teachers and teacher students, including both part-time distant learning students and on-campus students. About 50% of the students had been using Adobe Connect for live online lectures in their studies before this course and had also taken part in the research on perceived quality in BL (Author, 2015). This arts and crafts research is presented using a case example from one of the course activities. Multiple methods were used for collecting data, including notes from the case example, observations, two questionnaires and reflections from the teacher.

The case example was chosen since this was an activity normally undertaken in a face-to-face studio-classroom, and it was also a topic that easily could be adapted to an online classroom environment. Through the case example, the study presents and addresses some of the challenges and opportunities of online activities in arts and crafts teaching.

The observations and reflections from the teacher were related to the case example only and were mainly used to clarify and add to the answers we received in the questionnaires. It was also important to obtain the teachers' reflections on the strengths and weaknesses of the course and the case example, as this would provide another dimension to the findings and to the following discussion. Also, the teachers were seen as the primary motivators for revision (Brew, 2008), which is a result of this study.

We used two questionnaires to obtain the answers from the students. Questionnaire A (QA), an online questionnaire using Quest Back, was related to all online portions of the course, and the students replied anonymously. Questionnaire B (QB), which was directly related to the case example, was not anonymous. In QB, the students were only asked questions related to the specific activity. The students also had the opportunity to give feedback on the structure of the activity and on their experience.

For analysing the data from QA, we used IBM SPSS Statistics for the descriptive analysis and cross-tabulation. For the scores in the QA, a 6-point Likert scale from 1-Very high to 6-Very low was used. The scores were then divided into three groups, 1-2 High, 3-4 Medium and 5-6 Low.

Groves, Fowler Jr., Couper, Lepowski, Singer, and Tourangeau (2009) wrote about the cognitive processes in answering survey questions and explained it with a four-step model with comprehension of the question, retrieval of information, judgement and estimation and reporting an answer at the end (p. 218-227). All of our questions concerned the students' perception of online face-to-face-teaching in arts and crafts, and there was limited room for misinterpretation. A consistency analysis of two of the questions was also conducted to validate the answers of the questionnaire. The students were to mark two opposite statements on a Likert scale from 1, totally agree, to 6, disagree. In Figure 1, it can be seen that

there is a high negative and significant correlation. The high correlation of these two questions suggests that the students have read the questions thoroughly and answered sincerely and as best they could.

Pearson Correlation	Online teaching in Adobe Connect has been a part of my study for years	Sig. (2-tailed)	N
This is the first course I have attended that uses Adobe Connect for online teaching	-,975**	0	14

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 1

How to fold a paper plane? A case example

For the online activity described in this case example, the topic was 'How to create good instructions for an arts and crafts activity'. Twelve of the twenty-four students participated in this workshop. The aim of the activity was to give the students experience in what is needed for giving someone else instructions and also to provide a practical example of the tacit knowledge often found in practical subjects.

The workshop started with an introduction to the topic given as a short lecture. After the introduction, the students were divided into six pairs. In their online breakout room, the teacher had placed a photograph of an origami object, such as a plane, a boat or a box, along with a link to a YouTube video on how to make the object. To make it more interesting, the instruction video was in a language the students did not understand. They were also given a written task: 'Make instructions on how to create the object in the photograph. The instructions must be so clear that someone else can easily create the same origami object. Do not include what type of origami object the instructions are for'.

The students were given thirty minutes for this task. In the virtual group room, the students could communicate by webcam, sound and text (chat and notepad). For producing their instructions, they could use different software or use different functions in AC, such as whiteboard or notepad. One of the students had a problem with the sound, so the group opted for using chat as a way of communicating in addition to the webcam. Also, one of the students in group five had problems with the Internet connection, which resulted in one of the students having to solve the task mainly on her own. The observations of the group activity, as written in the field notes, state that the students found the activity and task engaging and that they had little problems in completing the task. Most of the groups watched the video and folded the object according to the instructions given on the video before writing their own instructions. One of the students in group one knew how to fold the object that was presented and chose to instruct the other students using the webcam instead of viewing the YouTube video.

After they finished, the instructions were given to another group, and they were given the next task: 'Follow the instructions and create the origami object. Write down any problems in the instructions. Choose one person to present the object and give short feedback on the instructions'.

After they finished the second task, each group presented their object to the rest of the class and gave feedback on the instructions they were given. Group five had technical problems, resulting in one of the students having to solve the task on her own.

Findings

At the end of the online activity, ten of the twelve students answered one Likert scale question and two open ended questions for QB. Before answering the questions, they were given instructions to relate the questions to the organisation of the online activity. They were instructed not to allow technical problems, such as problems with sound, affect their replies.

On the Likert scale question 'how did you experience this online activity', five students replied they had a poor experience with the activity. Only one student said it was a very good activity. The rest, four students, replied that it was 'okay'. When asked to report on what was good about the activity, four of the students answered that the online face-to-face teaching had been practical as well as theoretical, and three

of these students had given question one a low score. Five replied that they found the subject relevant and interesting, and five reported that working and discussing in groups was good. In other words, they liked the practical aspect of the online teaching activity.

For question three, the students were asked to write down what was not good about the activity. Five of the students wrote they had nothing to report, and two of these students gave question one the lowest score. Of these, one student had reported problems with the sound, one felt it had not been efficient enough, while the other three mentioned organisational issues. Even though the students were told not to let the technical problems affect their replies, it seems that some of the students did not consider this when they gave their reply.

In questionnaire QA, regarding all online parts of their BL course, the students were also given Likert scale questions along with open-ended questions. They were asked to rate different teaching methods and topics based on how they found these suited for online teaching in arts and crafts. The topics were:

1. Theoretical and didactical lectures, such as art history, creativity and art in the local community.
2. Introduction to a blog as a tool for reflection.
3. Introduction to a vlog as a digital tool for reflection.
4. Introduction to subjects such as bookbinding, collage, printmaking and drawing.
5. Practical and theoretical subjects, such as making instructions.
6. Practical work with subjects, such as colour theory and painting, drawing exercises and bookbinding.
7. Group work with theoretical subjects.
8. Group work with practical subjects.
9. One-on-one tutorials for assignments.

For analysis purposes, the topics were divided into three main teaching categories:

1. Lectures in which the teacher is active and the students are mostly passive (topic one).
2. Practical work in which both students and teachers are active (topic six and eight).
3. Theoretical and practical work in which both students and teachers are active (topic two, three, four, five, seven and nine).

Based on the replies, not surprisingly, eleven out of fourteen students found topics in teaching Category A, lectures, suitable for online arts and crafts teaching; however, for the other two teaching categories, they replied differently. In Category B, practical work, 57% of the students rated this as not suitable for online arts and crafts teaching. The rest of the students rated it as slightly suited, and only one student found practical work suitable. In the last group, where both practical and theoretical teaching methods were combined, 58% of the students were positive. The only topic that had a high rating towards the negative was topic four, 'Introduction to subjects such as bookbinding, collage, printmaking and drawing'. This is interesting because 79% of the students rated topic five positive. This topic uses the same teaching method listed in topic four but is more specific. It was also the only practical and theoretical online teaching method and subject they had experience with except lectures.

In QA, questions were asked regarding how the students experienced the technical parts of the live online lectures and how they regarded themselves in using technology for educational purposes. For the questions Q3.4, Q4.6 and Q4.4 in Figure 2, there is a comparison of how students in the earlier mentioned study on student perception of study quality in a part-time and distributed Teacher Training Program, Level 1-7 (Sviggum & Sollid, 2015), have answered (Figure 3). A total of 50% of the students in the arts and crafts class have also taken part in this larger study.
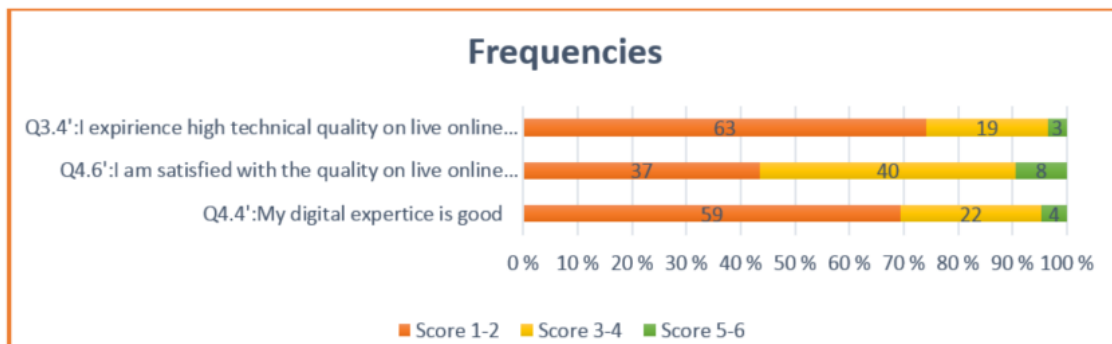
Figure 2 Frequencies from the study on student perception of study quality in a part-time and distributed Teacher Training Program (TTP), Level 1-7, first year of study 2012-13. N=85
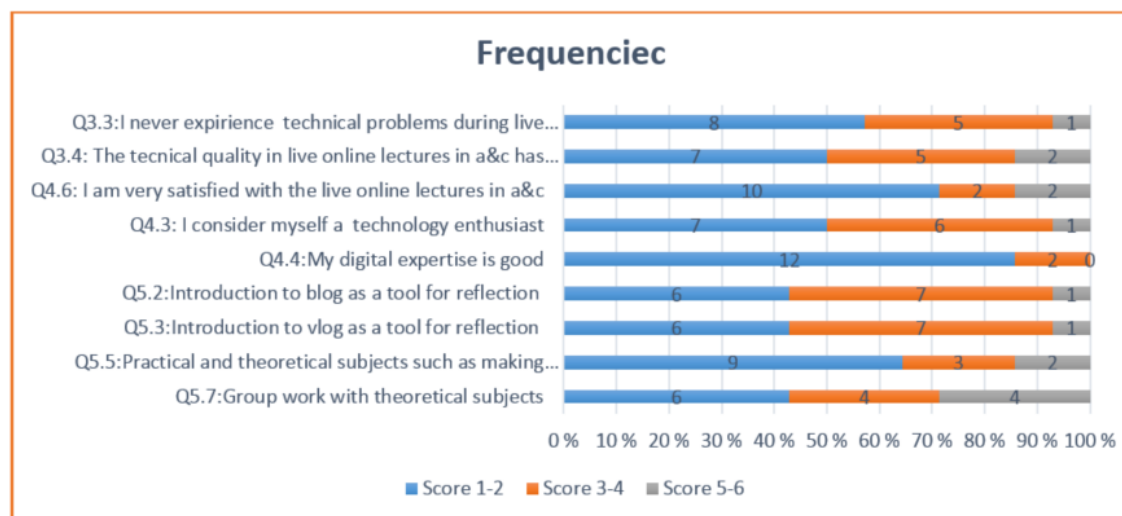
Table 3 Frequencies QA N=14

Based on this comparison, it can be seen that 50% of the students in the arts and crafts class were satisfied with the technical quality, while almost 75% of the TTP students reported the same (Q3.4). This is likely due to the low number of respondents, but since it has been shown that the students tend to be less satisfied with the lecture if they experience technical difficulties, this issue must be taken seriously. Regarding how satisfied they were with the live online lectures (Q4.6), about 45% of the TTP students are satisfied (score 1-2), while as much as 71% of the arts and crafts students answered the same. The TTP students answered the questions at the end of their first year when teaching live online was new to the school and the teachers. They also had different subjects with different teachers who had little experience. We will investigate further to determine whether the teaching methods of arts and crafts teachers are the factor of success and determine whether it can be transferred to other subjects. Further evaluation and reflection on the learning activity could prompt modifications to teaching online (Maskal, Dziuban, & Hartsman, 2012).

It can also be seen that the digital confidence among the students has grown (Q4.4) from about 70% to 85% when assessing themselves as having good or very good digital expertise, which is a natural but still gratifying development.

Table 1
Correlations QA

Pearson Correlation	Q3.3	Q3.4	Q4.6	Q4.3	Q4.4	Q5.2	Q5.3	Q5.5	Q5.7
Q3.3:I never experience technical problems during live online lectures	1								
Q3.4: Technical quality in live online lectures in art and craft has been very good	,576*	1							
Q4.6: I am very satisfied with the live online lectures in art and craft	0,322	,882**	1						
Q4.3: I consider myself a technology enthusiast	,556*	,566*	0,506	1					
Q4.4:My digital expertise is good	,671**	,587*	0,482	,724**	1				
Q5.2:Introduction to blog as a tool for reflection	0,291	,653*	,790**	,720**	0,471	1			
Q5.3:Introduction to vlog as a tool for reflection	0,138	,555*	,753**	0,527	0,445	,891**	1		
Q5.5:Practical and theoretical subjects such as making instructions	0,385	,739**	,702**	,841**	0,468	,865**	,628*	1	
Q5.7:Group work with theoretical subjects	0,229	,745**	,691**	0,207	0,173	0,472	0,378	0,486	1
* Correlation is significant at the 0.05 level (2-tailed).									
** Correlation is significant at the 0.01 level (2-tailed).									

When examining table 4 of the correlations between some of the questions in QA, what was already mentioned can be seen. There is a strong correlation between technical quality in live online lectures (Q3.4) and how satisfied the students were with the lectures (Q4.6). It can also be seen that there is a strong correlation between both the technical quality (Q3.4) and the students' technological enthusiasm (Q4.3) and how they find different topics suitable for live online lectures (Q5.2, Q5.3, Q5.5 and Q5.7). Improvements in the technical quality and making the students enthusiastic about using technology will therefore be important work tasks for students to positively perceive live online lectures.

Conclusion

Our findings show that the students were positive about the online teaching methods they experienced. When asked to rate different teaching methods normally found in the arts and crafts studio classroom, they rated familiar methods as suitable for online teaching, while unfamiliar topics and general categories were rated more negatively.

The active teaching methods used in the case example were preferred by the students when asked directly what was good about the online face-to-face activity. This is promising, as student activities enrich their education, which is good for student learning. By further developing the arts and crafts course, we may be able to create an online learning environment in which students are actively involved as Dziuban, Moskal, Kramer and Thompson (2013) reported in their research since this is in line with our aims for the BL courses.

The research presented here is microscopic, but it suggests that students found the teaching methods they experienced in the experiment to be more appropriate for arts and crafts education and that they found methods that are both theoretical and practical to be suitable for the online classroom. Also, we found students who perceived themselves as more digitally competent who had no problems with technical issues to be more positive towards practical subjects being taught online.

Our study indicates that more experimentation with teaching methods in arts and crafts is needed. If it is believed that teachers use their own experience to choose teaching methods, then they should have more variation in the methods they experience. We also suggest that students become more digitally competent and that technical problems be reduced. Our study indicates that if students are more confident using the technology, it can also make them more open to practical subjects, especially in combination with

theoretical subjects, being taught online. If this is the case, the online face-to-face portions of an arts and crafts course can be an active learning experience for students; however, we recommend additional experimentation with practical teaching methods along with more student feedback and continuous revisions to the way the course is taught.

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Whose rules: Dialogue in online spaces

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Using online communication platforms to support and extend classroom dialogue seems like a convenient and engaging activity. It gives students an opportunity to connect, think, reflect, and especially to those students who may be a bit shyer in class there is less pressure and more time to think and respond. However, the rules for dialogue and talk that apply when teachers and students talk together in class are not the same in online spaces. We are presenting examples from a study involving 13-year old students from Denmark and New Zealand when they were using Moodle and Padlet. We show that rules seem to morph from the face-to-face to the online where some old rules stay, such as that you should reply when asked, while others change such as what is acceptable behaviour when making a joking comment online.

Introduction

Today's schools are increasingly infused with a variety of digital platforms that allow that students and their teachers expand the conversations they are having in class to go beyond the restrictions of the classroom wall or school timetables. Online discussion forums, blogs, and other virtual spaces provide new spaces for having dialogue or posting one's own creations to share with others. However, the normal ground rules of how to interact change in such circumstances. Writings are semi-public and semi-permanent, and that means that conversations that are taking place in such environments require at least some adaptation from the in-class code of conduct. In this presentation, we exemplify our interest in these conditions by looking at two specific communication platforms that are frequently used by primary and secondary schools: Moodle and Padlet (or formally known as Wallwisher). We are contrasting the two technologies because of the different architecture they are using but also because they are sharing similar principles of visualizing and keeping thoughts and ideas of a community in a virtual space. Carey Jewitt (2006) highlights that the different technologies that are being utilized may be using different modes and that this shapes the type of messages that are being produced. Moving classroom dialogue and conversations into online environments changes not only the medium of dialogue but also the rules on how to interact. The structure of the text, how it is organized and perhaps supported through hyperlinks or whether it includes visual formats (still or video) also dictates specific rules. We will begin our discussion by briefly sketching what we have learned from the literature on classroom dialogue and rules before exploring what this means in the two specific online environments.

From face to face dialogue to online communication in class

Most communication occurs face-to-face, in casual and/or formal settings, each one setting certain parameters that frame the conditions for the talk. In the case of classroom talk the frame is set by the subject, the dialogue partners (teacher or student) and by the formalities of talk. For instance, teachers may use very particular ways of starting dialogue with their students, maybe by avoiding leading questions to encourage a certain kind of communication. Importantly, face-to-face dialogues make use of more than talk: body language and the emphasis put on words or utterances when talking are part of conversations regulate the nature of this kind of communication (Goodwin, 1981). Much has been reported and researched on the topic of classroom talk or more specifically, productive collaborative talk. Often these have drawn on sociocultural theories, for example by Vygotsky (1962, 1978) to advocate how to develop and set up environments that promote talk while the thinkings of philosophers like Bakhtin (1999) have highlighted the socio-cultural nature of dialogue and discourse.

Notably Neil Mercer and colleagues have over many years produced highly insightful knowledge on the role of teacher-student or student-student talk (for example, Mercer, Wegerif, & Dawes, 1999; Mercer, 2000; Mercer, Dawes, & Staarman 2009). With his interest in educational outcomes and the connections to talk, Mercer coined the term 'inter-think' thus highlighting the possibilities for use of language to create spaces that allow students to interact and think together. This means that teacher-student communication, should be cohesive, and contribute to the temporal organization of educational

experience to develop students understanding of a subject (Mercer, Dawes, & Staarman, 2009; Alexander, 2008). What these works have in common is that they discuss the conditions for the talk. Mercer (2000), Lambirth (2006) and others refer here to the 'ground rules' of talk and explain that they "are essential for facilitating effective oral communication" (Lambirth, 2006; p. 59).

When dialogue moves into online formats a transformation of practices occurs that allow for the negotiation of new meanings. While the face-to-face environments in classrooms can be described as being collaborative and spontaneous, online spaces tend to be more reflective and considerate (Garrison & Vaughan, 2008). Face-to-face supports the interpersonal, social and non-verbal communication while online discussions are not restricted to real time or geographical locations, only by having access to the Internet (Meyer, 2003) and they support flexibility of having access and responding and giving time and space to read, think and reflect (Garrison & Vaughan, 2008; Hill & Koh, 2004).

Online contributions can be made in text image but also on video. Many times however dialogue is a text-based communication and allows a teacher and the other students including the one who posted a comment or left a message to examine these further and expand on and produce potentially richer discussions (Goodyear, 2000). There is evidence that, online communication allows students who may be shy in the face-to-face dialogue to participate more as the online space reduces traces of gender, physical appearance, ethnicity or speech (Dutton, Dutton, & Perry, 2002) and there are reports of students claiming the effects of online being the ability of having time to reflect and collaborate to benefiting from a remote community and not having to learn alone (Harasim, 2000; Swan & Shea, 2005). What is important to note is, that school use of online space is typically a blending of face-to-face and online environments, and that means that the rules of communicating and having a dialogue change or adapt.

Changing rules for working in online dialogue spaces

New or changing environments for classroom collaboration legitimize the negotiation for new dialogue practices (Otrel-Cass, Khoo, & Cowie, 2014). The face-to-face environment supports the interpersonal, social and non-verbal communication cues (Meyer, 2003) while the online environment offers flexibility for reading, thinking and reflection (Garrison & Vaughan, 2008).

Dialogical teaching that is pedagogy that foregrounds how the anticipation of the other dialogue partner fosters thoughtful communication suggests that both teachers and students, need to be aware of what good discussion (or talk) requires, and what kind of ground rules set the arena for good discussions. Differences in interpretation on how to conduct oneself and how to use online platforms is not necessarily a universally accepted norm and here we find the term 'interpretive flexibility' useful that refers to the fact that "different actors interpret technological artifacts differently" (Escobar et al., 1994; p. 2012) as well as different modes that emphasize and foreground different meanings (Jewitt, 2006).

For this reason, it is important not to generalize but be specific about the kinds of online tools that are being studied. In this presentation, we are focusing on two platforms, namely, Moodle and Padlet. Moodle, an online Learning Management System (LMS), that is typically adopted by an organization, such as a school, and provides users with the possibility to take part in group discussions, upload information including assignments, conduct quizzes, create wikis, and announce events through news or the calendar (www.moodle.org). Teachers often 'furnish' this environment with a selection of activities where students can work individually, in pairs, groups or whole class. In contrast Padlet (www.Padlet.com), that was formally also known as Wallwisher is a free Web 2.0 online notice board. Individuals or groups can leave notes that are time and date stamped and can do this either by revealing their identity or staying anonymous. To access a notice board or wall contributors just need to receive the URL uniquely assigned to whoever started the wall. Invitees can then view the contributions left by others, leave their own thoughts or posts as stand-alone statements or respond to others. Different to Moodle, a Padlet does not support easily string discussions and when many posts are being left it is difficult to figure out exactly if and when someone responded directly to someone else. It is easy just to post and make a statement on Padlet while the usual discussion formats on Moodle dictate a format where one person asks a question and others will respond to it. The implication of the two different formats are that, they have different temporal qualities and this impacts on the rules and nature of dialogue because "for people to be able to interact in a meaningful way in events, they have to interpret and recognise the

context as a particular 'situation type', and subsequently, they have to make their interpretations known to their co-participants in the event" (Staarmann, 2009; p. 80 citing Wells, 1999).

Two platforms- two examples

For the purpose of this presentation, we will be using examples from a classroom-based study with 13 year-old students from two upper primary school classes (Denmark) and one lower secondary school (New Zealand) from the larger data set of the 2-year NILSS project (Networked Science Inquiry: An investigation in junior secondary science classrooms) (Otrel-Cass, Khoo, & Cowie, 2011). We refer to examples where teachers used Moodle to prompt class discussions while students were asked to set up Padlets themselves and in groups to collaborate with a group in the other country and exchange or post brief questions, share or respond to ideas. Data was collected from having access to the online platforms, as well as from classroom based video-recorded observations, as well as from interviews with teachers and students.

Padlet – negotiating temporality

Students in Denmark and New Zealand were using Padlets to talk to each other about their investigations about space. It was up to the groups to identify the focus of their topic and they used Padlet to connect to students from the 'other' hemisphere to compare observations or ask questions. The biggest challenge in this collaboration was the management of school semesters and school terms that were out of sync. When the Danish students started their investigation, the New Zealand students still had a week of holiday. So when the Danish students were ready and very interested to hear from the students in New Zealand through the Padlet the New Zealand students hadn't really started, so the Danish students grew impatient and disappointed. In an interview one of the Danish girls, Lena, said:

> I do not understand why they don't reply. We have been waiting so long now and have not heard anything.

The New Zealand students, who had started later, expressed a similar sentiment. The Danish students posted statements, sometimes supported by multimedia (images or links to websites) most times they left posts with questions. They were the questions they had selected to investigate but sometimes included also specific questions to the students in New Zealand, such as can you see a sun eclipse in New Zealand/Denmark.

The following Figure 1 is an example from such a conversation. The Danish student posts were from Cyrus (6 posts) all posted at the start of their investigation, Emil (4 posts) also left all of his posts at the start. Sam from New Zealand also posted six times, but he replied to questions and asked the Danish students questions but never got a response. However, his posts were left 14 and 16 days after the Danish children had left their posts online and Sebastian from New Zealand only posted once but replied 15 days after a question was left on the Padlet.

Figure 1 Padlet discussion

While the Padlet gives the visual impression of a community that had come together, it becomes clear after more careful examination that this was not necessarily the case. When Sam asked what language he should be using he clearly tried to have a dialogue with the Danish children. His question was not answered and he posted both in Danish and in English. He introduced himself but didn't receive an introduction from anyone else contributing to the Padlet. We observed similar disjointed attempts to collaborate, sometimes the New Zealand students replied to the questions the Danish students left and only in a few cases was evident that the Danish children responded to the New Zealanders.

One such case was when Cecilie one of the Danish students left a message saying:

> Hej guys, you have answered the wrong question. We wanted you to answer the question on the website. The questions are attached on the bottom.

And Jason replies on the same day:

> Hi guys, we can't access your attachment so can you please post the website on your wall. Thanks.

However, no further posting were left by Cecilie or the other students in her group in response.

New/old rules - trusting others in Moodle

In the NILSS project, Moodle was used primarily to facilitate forum discussions. Typically the teacher posted questions at the start of the week and his students responded in and out of class time. The following discussion was a typical conversation that was initially started by the teacher and students had read and considered the comments left by others before posting a response.

> Teacher: […] How does the energy that the particles have in a solid such as a turbine compare with the amount of energy the liquid particles would have?
> Jenny: Energy we have comes from all sorts of matter like what Aiden said bout the water going through turbines creating energy. All energy comes or gets transported through some sort of matter.
> Karen: yea I agree. Everything can have energy (potential energy), like Aiden said, energy is made from water (liquid) and turbines (solid), but that is only if we want it to.

In an interview at a later stage, we showed Karen the Moodle posts and asked her about it and she said:

> In this example I was confused because I didn't really understand how energy was put into matter cause our teacher said that matter was everything but I sort of thought that, not everything has energy but has the potential to have energy, so I got a bit confused with that one but then after reading a few of them [discussion posts] it helped me to understand a bit better and that way I was learning from my other classmates that were in the same classroom with me hearing what the teacher had said. So we were learning from each other without asking the teacher.

Reading other students' comments helped to reflect and find validation of one's own thoughts in other students' posts.

We observed the class also when they started a Moodle discussion while they were still in class. One of the students posted a silly comment that had nothing to do with the discussion but would be the equivalent to a non-threatening and casual, but inappropriate remark students would make from time to time to each other in class.

This post was immediately picked up by one of the other students who turned around and said:

> Don't you know that you cannot leave such messages on Moodle it stays on Moodle and is stupid. You shouldn't write things like that.

The student here regulated the behaviour of the other student, pointing out what was appropriate or inappropriate behaviour. She was aware of the permanency of leaving a comment. It almost seemed like a warning to the student that messages like these could get him into trouble. What was also interesting was that the teacher did not intervene but later told us that he was happy, that the students also took responsibility and control of how to behave in Moodle.

Discussion

The dialogue between individuals belonging to a class community can create shared knowledge and lay the foundations for future educational activities (Mercer, 1994). Online architecture, class community expectations and existing ground rules shape how and what kinds of rules are used when interactions are online. In the examples we shared here we started with the ground rule of receiving an answer when you belong to an educationally framed community and how this can be challenged when timely responses are not given or only given late. The architecture of Padlet did not easily identify whose post was first especially if students posted at the same time. Temporal disjoints in the posts made students feel frustrated about this activity. The rules in Moodle were shaped by having a teacher start a discussion forum and the students trusting and relying on other people's posts and then, building their own argument on it. They were acutely aware that their contributions were visible and permanent and they applied regulatory measures when they identified someone in the community who violated this rule. This is what Staarman (2009) refers to as being challenging moving from implicit to explicit rules. She writes that "underlying ground often rules remain implicit, both for teachers and students, and they are seldom explicitly negotiated in the classroom" (p. 79). Only in the last scenario we presented did one student act very specifically on the rules that applied when talking online. In all other scenarios, these rules stayed hidden and subdued. It seems important when teachers and their students utilize communication platforms that they need to talk in more detail about how the different environments and modes impact on how communication and dialogue can take place technology in schools. It is not enough to assume that familiarity with the functionality of the communication platform suffices.

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The relocation of learning: New educational spaces

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This study conducted a general and comparative analysis of how university students use mobile digital devices for educational purposes in various places and spaces both inside and outside university facilities in Spain and Latin America. We have implemented the study through a descriptive and quantitative methodology. The results show that educational use of mobile digital devices in the Hispanic world concentrates on the use of smartphones and tablets inside university facilities; primarily in college cafeterias, corridors, classrooms, and libraries.

A new situation in university learning

Technology has revolutionized modern life and its presence is now prominent in universities. The evolution of mobile devices has been rapid and global, but there has been no pause to reflect on the systematic integration of such devices in education. These resources seem to churn out new applications daily, and open up numerous possibilities in education, as well as energizing inclusive and socializing actions in people with special needs. The education of citizens, as we have previously discussed (Vázquez Cano, Sevillano-García, & Méndez Pérez, 2011; p. 183), needs to focus closely on the acquisition of the knowledge required for making decisions when using technological objects and processes, resolving problems related to this usage, as well as on how to use them to boost our capacity to act with and employ these devices in the search for and procurement of better quality education. Teachers must acquire a higher order of skills and competences to enable them to construct learning communities that are genuinely inclusive (Sevillano-García & Vázquez-Cano, 2015; p. 316). The rapid evolution of computer technologies goes hand-in-hand with their widespread usage, in particular, those mobile devices that have become an indispensable part of our everyday lives. The Research Centre for Anxiety Disorders reports (Peraita, 2014; p. 47) that young people between 18 and 30 claim that they cannot live without their mobile phones. This should be a wake-up call for educators to develop paths, strategies and content to integrate the mobile phone in students' academic lives in an appropriate way. The complexity, variety and evolutionary dynamism of these devices have made it difficult to make a clear analysis of the effects that this device could have on learning. The presence of the mobile phone in education is undeniable, although we still need a proper analysis of its evolution and a description of the technological and educational potential of the new developments in portable software and hardware. The result is that learning can now take place anywhere and at any time outside the traditional classroom setting (Sevillano-García & Vázquez Cano, 2015; p. 349).

Many academic professionals and experts state that permanent innovation is the paradigm that characterizes the changes needed in higher education. Students need to be trained for a digital future that is already here. Technology enables us to be in different places at the same time. The concept of ubiquity comes with profound technological convergence between all media, and the coexistence of the real with the virtual worlds; availability of information anytime, anywhere, with any device. This type of interaction between devices and social media necessarily alters the way we experience the world and how we teach. The dimensions of ubiquitous learning seem to be continuity in time and contextual interrelations, which help close the space-time divide. We are witnessing a revolution in the processes, content, agents, resources and spaces in teaching and learning. Aspects of this new learning include exploration, discussion, argumentation, collaboration and reflection. Ubiquitous education centers on how to make maximum use of the enormous quantity of information at our fingertips, and the potential for using it anytime and anywhere. The greatest thing about this phenomenon is the potential for learning anywhere and in any context; learning that takes place from and within any kind of setting. Some authors state that virtual tools now enable anybody to produce and disseminate information, so, the act of education can occur where and when the learner wants. Mobile learning is a field of research and educational practice that is rapidly developing. However, there is still too little theoretical and conceptual work available to help us explain the complex relationship between the characteristics of this rapid technological evolution, which has on occasions been revolutionary, its potential for education and learning, as well as its integration into the daily lives of users. The anthropological dimension in the

correlation of learning types between opportunities, desires and capacities is situated in the development of the competence of self-organization and autonomy in the process of learning which, when it concerns ubiquitous learning, involves sufficient training and empowerment to make students aware of the potential of mobile devices and of how to choose the most relevant content and strategies. Learning through mobile devices is regulated by a triangular relationship of cultural practices, social structures and the action of students in the educational process.

Method

Main objective: To identify current trends and spaces among young university students in their use of mobile phones and laptops in education; the most popular types of learning and usage. Sample: An intercontinental sample of 875 university students distributed as follows:

Table 1
Sample participants

University	Country	Nº. students
Complutense	Spain	21
Vigo	Spain	46
Oviedo	Spain	169
Granada	Spain	77
UNED	Spain	108
Otto-Friedrich-Universität Bamberg, Bamberg	Germany	19
Freie Universität Bozen, Brixen	Germany	21
Universidad del Libertador Bernardo O´Higgins, Santiago de Chile	Chile	98
Universidad Nacional Hermilio Valdizán, Huánuco.	Peru	42
Universidad de Cartagena Fundación Universitaria Tecnológico de Comfenalco de Cartagena.	Colombia	110
Universidad Pública de Panamá	Panama	29
Universidad Veracruzana, Xalapa	Mexico	105
Spanish		Non-Spanish
451		424
Sample total: 875		

A questionnaire, designed and validated by experts and consisting of open and closed questions, was sent out to professors at the universities that participated in the sample. We formulated questions that most closely related to the stated aims of the study. The questionnaire was officially registered with Spain's Ministry of Economy and Competitiveness, after translation into English and German; it has been used in various countries, China included. Trademark Register Title Nº 3.502.443. Date of Approval: 24 July 2014. Trademark: MAUDIMO. Class 41. Education, Training and Cultural Activities. Validated and patented questionnaire Importance, reasons and effects of the use of mobile devices on university learning. Cronbach's Alpha for the overall scale: 0.920. When analyzing the responses for the various categories, which ranged from *never, rarely* to *often* and *always*, we opted for the *often* response to the variable, as it was the most representative and best reflected the trend.

Results and interpretation

New locations for learning

Table 2
The most popular locations for learning

	Faculty cafeteria		Corridors		Classrooms		Libary	
	Laptop	Mobile phone	Laptop	Mobile phone	Laptop	Mobile phone	Laptop	Mobile phone
Spain	5.0	20.7	23.2	6.1	14.4	20.1	18.3	16.4
Italy	5.9	6.3	38.9	5.9	22.2	47.1	14.3	13.3
Germany	2.3	29.3	35.3	2.1	11.8	52.9	23.5	29.4
Chile	2.8	24.4	38.6	1.5	14.1	25.0	20.6	13.1
Peru	6.7	22.9	38.2	2.2	17.9	30.8	13.3	17.1
Colombia	22.7	31.2	40.4	13.7	17.4	-	19.0	34.6
Panama	7.1	31.0	35.7	3.6	12.5	42.9	14.6	6.3
Mexico	6.1	23.7	31.3	12.2	29.1	25.3	16.7	9.2

The table shows the most popular places for studying within the academic institution, with students using devices that enable them to be mobile without the need to be connected. The laptop is not widely used in the cafeteria compared to the mobile phone, except in Colombia, where is reached 22.7%, just short of 31.2% for mobiles among students of that nation. Mobile phones were used far more extensively in this setting, except by Italians, at 6.3%. On the other hand corridors, which often have chairs and tables, saw more laptop use than mobiles. Colombians much preferred this place for laptop use, but they also used their mobiles their too (40.4% to 13.7 %). The authors of this study have visited the university sampled and can testify to its wide corridors and available furniture to sit and work on. The classroom is a space widely used by students with their laptops and mobiles. Germany, with 52.9%, and Italy with 47.1%, stand out for mobile phone, and that latter, at 22.2%, for laptop use in this setting. The library does not see extensive laptop or mobile phone use for learning, except among Germans, at 52.9% and Colombia at 53.6% for both instruments combined, respectively, with the laptop preferred to the mobile phone. The settings where mobiles were used varied and depended on circumstances; the students polled stated that they use their mobiles wherever they need to use them at the time, circumstances permitting, while the laptop was mainly used at home, at university or anywhere with a WiFi signal (protocol 445).

Table 3
Other places where students use laptops and mobile phones for study

	Leisure and entertainment settings		At home		Transport: on the bus, metro, train	
	Laptop	Mobile phone	Laptop	Mobile phone	Laptop	Mobile phone
Spain	6.3	26.1	23.7	22.9	2.7	27.6
Italy	4.1	31.3	50.0	37.5	7.1	40.7
Germany	3.2	17.6	38.9	44.4	1.0	47.1
Chile	5.6	47.6	6.9	11.9	1.0	14.3
Peru	10.7	32.4	30.0	47.1	3.7	40.0
Colombia	21.8	29.9	30.8	34.8	1.2	10.0
Panama	9.1	32.0	19.2	38.5	1.1	22.7
Mexico	14.0	31.6	29.4	28.6	0.4	28.6

The spaces where education does not traditionally occur, such as in leisure settings, at home or when using transport, can now be used to increase the time and opportunities for learning thanks to portable devices. Overall, the mobile phone is the favorite instrument for use in transit, with Germany at 47.1%, Italy 40.7%, and Peru 40.0%. Typically, a Spanish student living on the outskirts of Madrid who has to commute to university every day finds that the smartphone is the ideal tool for work and entertainment. Laptop use for academic purposes is rare on trains and in the metro when compared within the class or at

home (protocol 149); and mobile phone usage is prominent in leisure spaces, with Chile scoring highest at 47.6%.

Use of Mobile Devices for Academic Work

Use of mobile devices for producing academic work and for studying

Table 4
Studying with digital devices

	Laptop	Mobile phone
Spain	21.3	7.1
Italy	36.8	3.3
Germany	11.1	1.4
Chile	15.3	5.1
Peru	10.5.	18.4
Colombia	21.5	11.9
Panama	14.3.	4.2
Mexico	21.4	6.1

	Laptop	Mobile phone
Spain	30.2	15.9
Italy	31.6	21.4
Germany	33.3	11.8
Chile	27.1	17.3
Peru	23.1	14.3
Colombia	36.1	22.1
Panama	28.6	21.1
Mexico	38.2	18.2

The laptop is more widely used for producing academic work. A typical comment was that laptops are used for practical work and exercises when inside the university building (protocol 341), especially in Italy with 36.8%. Except in Peru and Colombia, the *often* response to mobile phone use in this context is rare. Panama is noteworthy for 82.1% who always stated for laptop use at university, and all countries scored high in this category except Italy, with 57.9%. With mobile phones, *always* tends to be lower than for laptops in this context. Spain scores lowest, at 0.4%, for mobile phone use for academic work at the university, and this is related to the high cost of Internet connection. Students in Colombia, Italy, and Panama most often use their mobiles for studying but always at lower rates than for laptops, which is often used for studying by a high number of the students polled, in Mexico in particular at 38.2%. A typical remark is from students who use their class notes and subject material gathered on their laptops in order to study, occasionally on the mobile phone too, which is often complemented by information found on the internet to resolve doubts or for further study (protocol 62). Germany is significant in that 66.6% stated that they *always* use their laptops for this purpose. This piece of data yields a frequency of use of 100% between *often* and *always*. Another comment was from a student who uses the laptop at home to search for information needed for work in class, or for writing up notes previously written by hand (protocol 199).

Table 5
Searching for information related to the university and exchanging notes

	Laptop	Mobile phone
Spain	34.3	6.9
Italy	38.9	8.3
Germany	23.5	11.8
Chile	28.2	18.5
Peru	25.0	25.7
Colombia	28.3	33.8
Panama	36.0	20.0
Mexico	33.3	21.7

	Laptop	Mobile phone
Spain	32.7	4.7
Italy	31.6	6.5
Germany	17.6	5.9
Chile	37.8	13.8
Peru	15.4	23.7
Colombia	26.5	18.4
Panama	8.3	27.3
Mexico	28.7	11.2

The search for university-related information, referring to grants, qualifications, exams, and notes, is frequently done by laptop by all those polled. One student stated that he/she sometimes used the mobile phone to compile information since it is quick and easy with certain apps (protocol 92). Using the laptop for such tasks was most frequent in Italy, 38.9%, and Spain, 34.3%, while Colombia and Peru stood out for mobile phone use in this category, 33.8% and 25.7% respectively. Chile, with 52.4%, and Colombia,

at 40.6 %, were where the laptop was *always* used whereas mobile phone usage scored high for *never* or *rarely*, except in Germany, 11.8% for both response categories, Peru, 47.3%, Italy, 42.8%, and Spain 35.5%. Laptop use for exchanging notes was most frequent in Chile, Spain and Italy. Using the mobile phone for this task was significant in Panama, 27.3% compared to 8.3% for the laptop, and in Peru, 23.7%. One student said he/she used the mobile phone to read and send notes shared between classmates and teachers, and for emergencies related to academic work; always connected and ready to be consulted even when in *silence* mode (protocol 100). This function was always higher for mobiles than for laptops (15.4%). The highest scores for *always* in terms of laptop use for exchanging notes are found in Chile, 42.7%, and in Colombia, 39.2%. The responses *never* or *rarely* in terms of note-swapping via the mobile phone are highest in Germany, 94.1%, Italy, 92.3%, and Spain, 83.3%. Such scores could indicate that competitiveness between students makes them reluctant to share their class notes.

Table 6

Producing group work

	Laptop	Mobile phone
Spain	17.9	1.5
Italy	50.0	3.0
Germany	27.8	2.1
Chile	21.3	3.0
Peru	13.5	8.1
Colombia	19.0	9.0
Panama	16.7	18.2
Mexico	23.8	5.4

Working in collaboration with other students has long been deemed an enriching academic experience, but this activity is rarely carried out on the mobile phone and not yet extensively on the laptop. However, the latter is widely used for this task in Italy, 50.0%, and Germany, 27.8%. One student stated that he/she uses the laptop at home as it is more comfortable than the mobile phone for group work, and it is easier to read and search for material on this device (protocol 146). The *never* or *rarely* categories are high in all countries for mobile phone use for group work, especially in Peru, 45.9% for both, and in Spain, 43.5%. Another student said that he/she uses the mobile to arrange to meet faculty colleagues to do their group tasks together, as well as for exchanging information (protocol 80). Yet another student stated that the laptop gave them the freedom to move around, to gather class notes at university, and carry out group projects without being restricted to single space. This student uses his/her laptop to read the press, complete course notes, to remain informed about course work, and download class notes and general information on the university's virtual campus (protocol 3).

Table 7

Contingency table

Laptop usage in university learning	Country (Spanish and non-Spanish samples disaggregated)								
	Spain	Italy	Colombia	Panama	Germany	Peru	Mexico	Chile	Total
Never	1.6%	100.0%	3.0%	3.6%	33.3%	22.5%	1.0%	3.5%	4.0%
Rarely	1.6%		1.0%		16.7%	7.5%	2.9%	2.4%	2.3%
Often	1.3%		5.0%	7.1%	25.0%	7.5%	2.9%	7.1%	3.8%
A lot	9.5%		13.0%	14.3%	25.0%	12.5%	16.7%	14.1%	12.3%
Always	86.0%	100.0%	78.0%	75.0%		50.0%	76.5%	72.9%	77.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Contingency table

Mobile phone usage in university learning	Country (Spanish and non-Spanish samples disaggregated)								
	Spain	Italy	Colombia	Panama	Germany	Peru	Mexico	Chile	Total
Never	24.8%	100.0%	8.4%	10.7%	62.5%	21.1%	11.7%	16.0%	19.6%
Rarely	22.8%		11.6%	7.1%	31.3%	15.8%	21.4%	3.7%	17.8%
Often	24.8%		18.9%	3.6%	6.3%	10.5%	25.2%	21.0%	21.4%
A lot	17.4%		27.4%	35.7%		18.4%	22.3%	28.4%	21.2%
Always	10.3%	100.0%	33.7%	42.9%		34.2%	19.4%	30.9%	19.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Discussion and conclusions

We believe that these results necessitate urgent action on three counts: firstly, telecoms companies should reduce rates for students who have, by definition, low purchasing power, especially in those countries where the mobile device is almost the only tool available for accessing knowledge since books are in scarce supply and are expensive. This would also help close the digital divide and enable the new portable ubiquitous technologies to be put to the service of education and learning. We have taken the great leap forward into the digital universe but access continues to be limited by high Internet connection costs, use, and maintenance; in addition, better technology is needed to increase battery power in order to extend the autonomy of such devices.

Secondly, university professors need to provide students with more curricular content online and not just academic information. Although the swapping of class notes and works is a frequent and useful student activity, it would be better to provide them with a broader range of academic information regarding the digitalized resources available in all pertinent areas of knowledge so that students can access it from their mobile devices. In this new digital setting, we cannot allow those huge repositories of information to fossilize due to teachers' ignorance of their existence, or their lack of time, training or interest. The Erasmus organization, for example, is designing a huge multilingual portal that encompasses the more than 4,000 institutions linked to it in order to disseminate massive open online courses with the idea of interconnecting knowledge, research and the transfer of results between universities, in which the ubiquitous, mobile and audiovisual format will be one of its priorities (Vázquez Cano. 2013: 90). We believe it is essential to design a system of analysis for the production and exploitation of resources which can be accessed via mobile devices such as the phone and laptop, which are increasingly visible in the social and academic life of students, teachers and higher education institutions such as universities. These new media urgently require new forms of organization, representation, and codification of reality, making it necessary to develop elements for critical analysis and the training of students in such a way that enables them to utilize that information in a correct and proper way (Sevillano García, 2014; p. 297).

This means that institutions, teachers, and education managers need to improve continuously educational processes, contents and the formats these contents are offered in, as well as the forms of interaction and collaborative work for enhancing inclusion. Understanding the pattern of connection in relation to the space and place where students connect their mobile digital devices for educational purposes can be leveraged to develop context-sensitive activities that enrich the learning experience and set the context for theoretical contents with resources such as augmented reality or crowdsourcing on the web. The possibilities are many and diverse, depending on the type of studies and subjects involved, although the challenges are also considerable, such as, the privacy of communications, teacher training, investment in technological infrastructures and upgrading systems to advanced technical-educational designs related to society's current social and professional reality.

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A systematic review and meta-analysis of teachers' development of digital literacy

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Teachers' development of digital literacy (DL) is gaining importance with the increase in the integration and adoption of information and communication technologies in educational contexts. The focus has been predominantly on students and not much on teachers, who require greater attention due to rapid transformation of both school systems and digital systems' applications. The goal of this systematic literature review is to draw attention of researchers, policy-makers, and practitioners associated with education systems for considering 'digital literacy for the professional development of teachers' as an agenda for the transformation at both individual level and organizational level. Applying the methodology elaborated by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, 16 peer-reviewed articles were selected. Constant-comparative method was used for the qualitative analysis. This paper reports on three main categories: (a) definition of digital literacy, (b) development of digital literacy of pre-service and in-service teachers and (c) models for the development and evaluation of digital literacy. The general definitions of DL include the elements of technical, cognitive, and social aspects. The circumstances and conditions in relation to both pre-service and in-service teachers can help to create a culture that develops DL. Existing DL models can be adopted in teacher education programs and schools and can thus be verified.

Introduction

In this digital age, digital literacy (DL) is described as a 'survival skill' (Eshet-Alkalai, 2004), without which citizens cannot acquire knowledge and skills necessary for life in the 21st century (Martin & Grudziecki, 2006). With the increased integration and adoption of digital technologies in the contexts of both formal and informal learning environments, teachers' development process in relation to the concept of DL requires greater attention. The discussion on DL concept might be claimed to have taken off with the publication of Paul Gilster's 'Digital Literacy' book (Gilster, 1997). Some scholars have indicated that the concept of DL has been coined at different times or context, discontinued, and diffused through different networks' paths (Almås & Krumsvik, 2007; Bawden, 2008). Therefore, the concept of DL is broad and understanding the DL development process of teachers is a challenge. It is substantiated by significant number of scholars that DL competence has a significant impact on teachers' and students' development in the society that is increasingly adopting digital technologies (Almås & Krumsvik, 2007; Bawden, 2008).

An overview on the discussion of the DL gives the impression that most of the existing literature mainly focuses on students' development of this skill and that teachers' DL is a peripheral issue (Hall, Atkins, & Fraser, 2014; p. 5). This imbalance must be taken into consideration. Almås and Krumsvik identify DL as the major challenge in Norwegian primary schools as there is '[...] highly digitally confident students [...] and [there is] a lack of digitally literate teachers' (Almås & Krumsvik, 2007). In this situation, Almås and Krumsvik (2007, p. 173) recommended that teachers must have DL to handle their teaching, instruction, and assessment. It is also believed that the security of teachers' proficiency in DL will provide more opportunities for pupils to develop their DL (Pianfetti, 2001). From a globalization perspective, Spring (2008, p. 338) argued that it is in public schools that students are prepared for lifelong learning, as required by the rapidly changing technology in a global economy. DL should be seen as a part or even as a prerequisite for lifelong learning. Due to the lack of focus on the DL of the teachers in educational contexts, this paper aims to contribute to a state-of-the-art study on teachers' development of DL. This

study conducts a systematic literature review and a meta-analysis of the relevant literature dealing with teachers' development of DL.

The goal of this study is to draw attention of researchers, policy-makers, and practitioners associated with education systems, and to consider 'digital literacy for the professional development of teachers' as an agenda for the transformation at both individual level and organizational level. This paper explores and introduces the themes and topics emphasized in the existing literature dealing with teachers' DL. The educational institutions and teachers are expected to gain understanding about the definition of DL, barriers to the development of DL, and how to evaluate their own DL.

The paper contains three main sections. The Methodology section discusses the process of identification, inclusion, and analyses of articles. Then, their main categories of themes are reported as part of qualitative analysis and synthesis, followed by a meta-analysis. Finally, the Discussion section includes reflection and identification of the scope of future work.

Methodology

This study applies the methodology elaborated by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, & Altman, 2009). A systematic literature review is defined as

> A systematic, explicit, [comprehensive] and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners. (Okoli & Schabram, 2010).

The PRISMA statement is an evidence-based minimum set of items, which includes a 27-item checklist and a four-phase flow diagram (Figure 1). This paper strictly adheres to the flow diagram as a methodology but does not rigorously comply with the checklist, primarily due to the space-quality trade-off associated with the page limit of a conference article as opposed to a report.
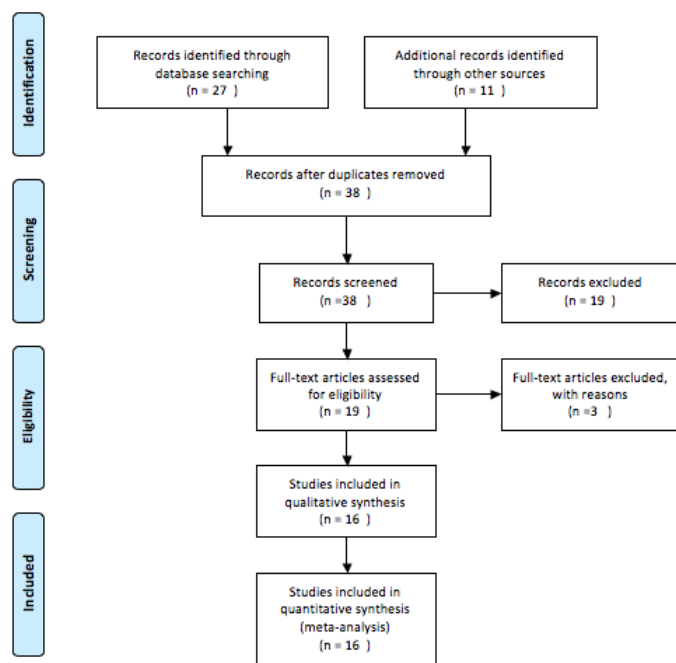
Figure 1 PRISMA Flow Diagram (Moher et al., 2009)

Three databases were selected and searched through EBSCO host. They are as follows: Academic Search Premier, The Education Resources Information Center (ERIC) and Teacher Reference Center. Searches were conducted on the abstracts of peer-reviewed articles, during 19/09/2014 to 23/09/2014, using different combinations of the following keywords and synonyms: develop* digital literacy, teacher*,

instructor*, educator*, tutor*, competence* and skill*. To focus on a context and thereby to reduce the number of papers returned, school* and classrooms* were included. After the removal of duplicates, the abstracts of 27 articles were rigorously assessed and the full-texts of the articles were considered for screening.

The criterion for further exclusion was determined by answering the question, does this study deal with the digital literacy of teachers? With this query, 19 of 27 articles were excluded due to their research focus on children/pupils' development of DL and lack of focus on teachers' DL. At this stage, seven articles were included for the qualitative analysis and meta-analysis. It is worthwhile to reflect on two points on the search and selection/rejection phases on this topic. First, at the search phase, it was difficult to separate the literature that deal with teachers only. Second, publications emphasizing teachers' DL constitute less than 26% (7 of 27) of the articles published on the DL of teachers and students.

A forward reference-chain was explored by looking for relevant literature that cited the seven selected articles, and a backward reference-chain was explored by screening the lists of references included in the seven articles. First, searching the titles in Google Scholar, the articles that cited the selected articles were identified and screened. The search, selection, and exclusion process was done using the same focus questions that were used in the previous stage. Second, by searching titles occurring in the lists of the seven selected papers' references and by considering articles that occurred during database searches, more articles were screened, and 11 additional unique articles were considered. Later, 2 of these full-text articles were excluded.

Constant-comparative method (Hewitt-Taylor, 2001) is used for the qualitative analysis and synthesis, which includes 14 peer-reviewed journal articles and 2 project reports. Based on the meta-data of source databases, it was not possible to verify whether the two reports are peer-reviewed.

Qualitative Synthesis and Meta-Analysis

This section is divided into three sub-sections: (a) an overview of the articles, (b) a qualitative synthesis, and (c) a quantitative analysis or meta-analysis.

Overview of the articles

The articles that were included in the selection process are shown in Table 1 and Table 2. Table 1 contains the articles that were selected through database screening, and Table 2 presents the articles identified through screening the references of the selected articles. The tables provide an overview of the articles' focus, methods, research goals, and categories.

Table 1
Overview of the seven articles identified through database screening

Author (Year), & Title	Context & Focus	Methods	Research goals	Relevant themes
1. Burnett (2011), Pre-Service teachers' digital literacy practices: Exploring contingency in identity and digital literacy in and out of educational contexts	United Kingdom. Student teachers	Interviews	Digital practices and identity in pre-service teachers' lives.	DL and personal identity. Developing learning communities.
2. Pianfetti (2001), Focus on research: Teachers and technology: digital literacy through professional development	USA. Teachers	Argument with the use of secondary data and literature.	Exploring the relationship between DL and the professional development of teachers in technology	Definitions of DL. The need for teachers' DL. The challenges of preparing educators for teaching in the 21st century.

3. Martin & Grudziecki (2006), DigEuLit: Concepts and tools for digital literacy development	Europe. Teachers and students	Conceptual research	Defining DL, and developing a framework and tools for DL development in European context.	Definition of DL. Framework for developing teacher's DL. DL and identity.
4. Almås & Krumsvik (2007), Digitally literate teachers in leading edge schools in Norway	Norway. Teachers	Case study with interviews	An analysis on how DL is implemented in leading edge schools by digitally literate teachers in the new curriculum.	Definition of DL. DL model. Management's involvement and teachers' DL enhancement.
5. Krumsvik (2009), Situated learning in the network society and the digitised school	Norway. Teachers	Theoretical research – use of relevant theories	Can situated learning and DL create new approaches in educational Practices? Where to reflect in new assessment forms?	Definition of the DL. Developing communities of practice. Developing DL in teacher education.
6. Wan Ng (2011), Why digital literacy is important for science teaching and learning,	Sydney, Australia. Teachers and students	Conceptual research	Defining DL and discussing why DL is important for science teaching and learning, and the implications for teachers.	Definition of DL. DL: a technical, cognitive, and social competence. Implications for teachers. Digital natives – lacking the cognitive and social aspects.
7. Gruszczynska, Merchant, & Pountney (2013), Digital futures in teacher education: Exploring open approaches towards digital literacy	Sheffield, England. Student teachers	Report of findings from the project	Embedding Open Educational Resources (OER) practice in teacher education for the development of DL	Developing DL in the context of school and teacher education. Inadequate views of DL in schools.

Table 2.
Overview of the nine articles identified through forward and backward reference chaining

Author (Year), & Title	Context & Focus	Methodology	Research goals	Relevant themes / categories
1. Ala-Mutka (2011), Mapping Digital Competence: Towards a Conceptual Understanding	Europe. DL as a whole	Presentation of the conceptual discussion in the literature on digital competence.	Reviewing and mapping different concepts and understandings relating to digital competence.	Definition of DL. Components of Digital Competence (DC): knowledge, skills, and attitudes.
2. Collier, Foley, Moguel, & Barnard (2013), Write for your life: Developing digital literacies and writing pedagogy in teacher education	California, United States. Student teachers	Interview and survey	Two courses with 45 teacher students, integrating writing pedagogy and technology in the contents of teacher education courses.	Designing an online community for the development of DL. Developing DL through writing.
3. Erstad (2007), The fifth basic skill	Norway. Primary	Conceptual analysis using	Problematizing – the ability to use digital	Five dimensions of digital

(translated from Norwegian)	school (Nursery or class 0-10)	empirical research results	tools is considered as a basic skill, and the role of school education.	competence (DL)
4. Eshet-Alkalai (2004), Digital literacy: A conceptual framework for survival skills in the digital era	Israel. Adult students and pupils	Interviews	Proposing a holistic refined conceptual framework for DL.	Conceptual framework of DL. Framework for the development and evaluation of DL.
5. Hall, Atkins, & Fraser (2014), Defining a self-evaluation DL framework for secondary educators: the DigiLit Leicester project	Leicester, United Kingdom.\n\nTeachers	Review of the existing frameworks of DL.	Demonstrate how the critique of existing digital literacy frameworks enabled a self-evaluation framework for practitioners to be developed.	Definition of DL. Analysis of existing DL frameworks. Devise and implement DigiLit Leicester framework.
6. Jimoyiannis & Gravani (2011), Exploring adult digital literacy using learners' and educators' perceptions and experiences: The case of the second chance schools in Greece	Greece. Generally focus on adults	Case study using Interviews	To shed light on adult DL using learners' and educators' experiences and perceptions at Second Chance Schools, a project in Greece aiming to combat social exclusion through education.	Framework for understanding DL. Barriers to DL. Attitudes towards the enhancement of DL.
7. Jordan (2012), Bringing video into the mainstream: Recommendations for enhancing peer feedback and reflection.	University of the Arts London, England. In-service student teachers (2-20 years' experience)	Video recordings of peer-feedback, presentations, personal experience, and feedback interviews	Discusses the benefits and challenges of video as a tool for supporting and enhancing peer feedback and reflection.	The embedded use of video in professional development courses can help to develop the digital literacy of teaching staff.
8. Merchant (2009), Literacy in virtual worlds	Sheffield, England. Teachers and primary school students	Case study of a 3D virtual world: Field notes, in-world interviews and observations	An analysis of pupil and teacher perspectives on the use of DL and its relationship to conventional classroom literacy routines, and use these to trace the potential and inherently disruptive nature of such work.	Teachers need of time for experimentation and professional development; Development of DL through technology-rich environments
9. (Wan Ng, 2012), Can we teach digital natives digital literacy?	Sydney, Australia.\n\nStudent teachers or pre-service teachers	Mixed method	*Digital nativeness* of undergraduate students of by investigating their knowledge about educational technologies and the ease with which they learn to make use of unfamiliar technologies.	Conceptual framework of DL Dimensions of DL: Cognitive, technical, and social-emotional.

Qualitative synthesis

This section presents the main themes that were collected from the selected articles focusing on the issue of teachers and the development of their DL.

Definition of digital literacy
DL is a relatively new concept, and most of the articles do attempt to define it. There is not so much disagreement about how DL is defined, but there are differences in how the term is adopted as part of the work of various articles. Most of these definitions are general, but a few researchers are trying to narrow down the definition to emphasize on teachers (Almås & Krumsvik, 2007; Hall et al., 2014; Krumsvik, 2009). The general definitions contain elements of technical, cognitive, and social aspects of the DL, while the narrow definitions focus on the pedagogical knowledge. Almas & Krumsvik's definition is an example of this:

'Digital literacy for in-service teachers is the ability to use digital artefacts as an integrated part of their pedagogical content knowledge and be aware of what implications this has for teaching, learning strategies and building aspects' (Almås & Krumsvik, 2007; p. 487).

This definition focuses on the technical (*ability to use*) and cognitive (Pedagogic knowledge and awareness) aspects. Such definitions lack focus on the social aspect of DL. In addition to the above definition, Hall and Atkins et al. (2014, p. 4) point to the teachers' *attitude* (position), which is part of the learning aspect, and argues that it is a fundamental prerequisite for other aspects. They also emphasize the teacher's critical thinking – why, how, and when technology contributes to student learning. Krumsvik (2009) emphasized critical thinking when he, two years after the above definition, changed it from 'pedagogical content knowledge' to 'pedagogic-didactic judgment', taking into account the teacher's assessment of digital tools for teaching. This change may be due to the large number of digital tools that teachers have to decide from. Therefore, teachers need a better understanding of tools to evaluate these tools. This concept will evolve with new challenges.

Development of teachers' digital literacy
Trained teachers begin their profession with a desired level of knowledge on content and pedagogy, but lack the DL because of a lack of dedicated time to develop such competence through education and training (Ng, 2011; p. 30). For an effective development of DL to take place, the pre-requisites include some social and spatial conditions (Ng, 2011). In addition to time, there must be a culture of recognition and mutual respect from both the management and employees (Jimoyiannis & Gravani, 2011, p. 225; Pianfetti, 2001, p. 258). Support from management in the form of technical support and access to resources is also required to create good conditions for DL development (Almås & Krumsvik, 2007, p. 491; Wang & Ng, 2011, p. 21). The strengthening of technology-rich events provides good conditions for natural integration of technology into the everyday life of teachers. This natural integration also allows teachers to experiment and create opportunity for reflection on how digital technologies can be incorporated into the classroom (Merchant, 2009; p. 54). Furthermore, by creating practice environments or *collective scaffolding* (Krumsvik, 2009; p. 175). 175) DL can also be developed through shared activities that are closely related to everyday life, and provide the possibility of carrying out the concept of *learning by doing* and *learning through interaction* (Almås & Krumsvik, 2007, p. 482; Burnett, 2011, p. 447; Collier et al., 2013, p. 265).

There is strong emphasis on student teacher's (or pre-service) development of digital literacy. Based on the focus on the reviewed literature, there is slightly higher focus on student teachers (31%) compared to DL of practicing teachers (25%). This trend appears desirable as Haugerud suggests, '[…] there is an explicit need to investigate how student teachers develop their understanding of teaching in a technology-saturated environment' (2011, p. 227).

Broadly, it can be stated that the literature on the development of teachers of the DL is written in the very circumstances (i.e. in-service, pre-service, school, early childhood, etc.) that make the DL development a more natural process for the teachers.

Models for the development and evaluation of digital literacy
Martin and Grudziecki (2006, p. 255) present a model that can be used for self-reflection on and evaluation of DL of individuals by looking at the DL in three levels, where the bottom layer includes the most basic elements and involves higher complexities at the higher levels. The model can be used as self-reflection and assessment of individuals' DL.
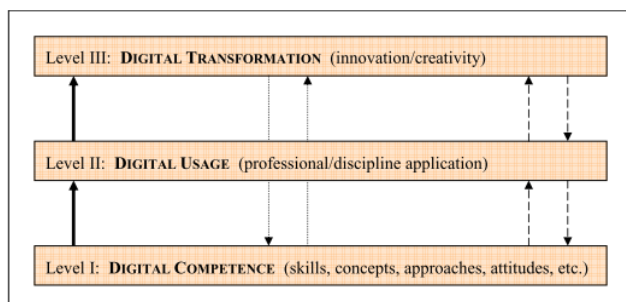
Figure 1 Model for self-reflection on and evaluation of DL of individuals (Martin & Grudziecki, 2006; p. 255)

Erstad (2007, p. 48) presents five dimensions of DL and shows the practices of DL that take place in a school context. These are (a) proficiency in use, (b) ICT as a private field of knowledge, (c) ICT in subjects, (d) ICT and learning strategies, and (e) cultural competence or perception towards the digital. These dimensions can also be put into Ng's (2012) dimensions to see DL as a balance across the three dimensions: technical, cognitive and socioemotional. These two models can be used for implementing an education that develops DL and for the evaluation and development of teachers' own DL skills.
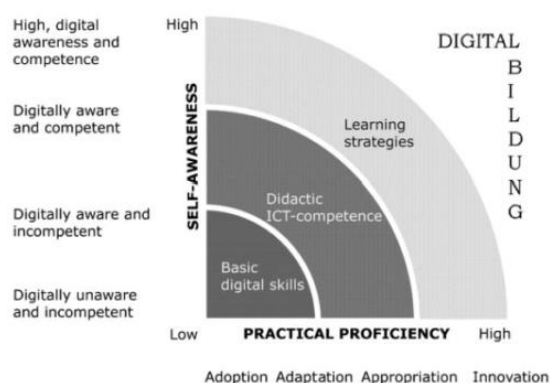
Figure 2 Five dimensions of digital literacy (Almås & Krumsvik, 2007; p. 485)

Alma & Krumsvik (2007; p. 485) developed a detailed model aimed directly at the development of teachers' DL (see Figure 2). The model is based on what they see as the four levels of DL, develops in proportion to the development of teachers' practical IT skills and self-awareness in the practical situation: (a) basic digital skills, (b) didactic ICT-competence, (c) learning strategies, and (d) digital formation. It is also an attempt to sensitize teachers' 'tacit knowledge' (p. 486).

Meta-Analysis

The geographical distribution of the articles shows that there is a clear tendency to focus on the DL in Europe than elsewhere. 69 per cent of the articles (11 of 16) deal with a European context. One possible reason can be EU's agenda, set forth in the year 2000, on the globalization discourse by drawing attention to the DL related term *lifelong learning*, which was regarded as necessary for citizens to keep up with changing work demands and technologies (Spring, 2008; p. 339). Of these 11 articles, 5 (45%) are from the UK, 3 (27%) from Norway and 2 (18%) focused on a general European context. Among the rest, there are two articles from Australia, both of which have the same author, and two from the United States.

An overview of the articles shows that 31 per cent focus on student teachers, 25 per cent on practicing or in-service teachers, and 18 per cent on in-service teachers and students simultaneously. Altogether, in-

service teachers' DL is considered in 43 per cent of the articles. The remaining 26 per cent has a more general focus. There is a clear tendency to focus on student teachers in the newer articles. In Table 2, the five articles that focus on student teachers are all from 2011–2014.
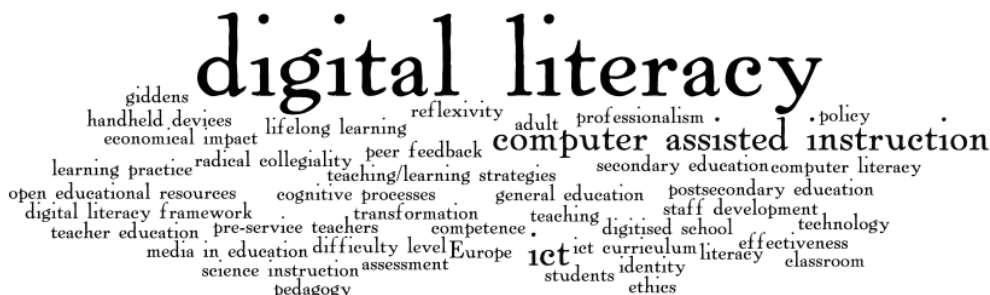
Figure 3 Word cloud using keywords of articles

12 of the 16 selected articles specified keywords, the word could (generated using wordle.net) in Figure 3 shows that the most frequent keywords are *digital literacy*, *computer assisted learning*, and *ICT*. With the few key words, it is not possible to look at a specific trend. However, it is interpreted that the keywords emphasize on the macro level, for example, *economic impact*, *policy*, and *Europe*.

Discussion and scope of future work

In this review, three main themes of digital literacy of schoolteachers were chosen to for qualitative synthesis.

First, the general definitions of DL include the elements of technical, cognitive, and social aspects. However, the social aspect is not sufficiently present in the definitions dealing with teachers. Considering how social media and Web 2.0 technologies have transformed schools in the recent years, there is a need for re-defining the term with the social networking aspects. Hall et al. (2014), however, has included the social aspect of the definition.

Second, regarding the findings on teachers' development of DL, we expected explicit guidelines on how teachers should develop their DL. The articles discussed the circumstances and conditions that can help to create a culture that develops DL. This may allude to a social-constructivist understanding of the evolution of DL, where learning and development takes place in a social context through interactions. 'Cultural conditioning in school develops DL of teachers' is a hypothesis that should be researched further. Furthermore, the development of teachers' DL is constrained due to the following barriers: lack of dedicated training time for DL, lack of a culture of recognition for IT-pedagogy integration competence, lack of support from management for both access to resources and technical support. In situ technology-rich events for *collective scaffolding*, *learning by doing*, and *learning through interaction* are expected to solve these barriers.

Third, the DL models (Almås & Krumsvik, 2007; Erstad, 2007; Martin & Grudziecki, 2006) show that DL development and evaluation process involves complex combinations of competence dimensions and stages. There is ample scope for empirical testing and validation of these models in situated context, and long-term diffusion of innovations study might be required for sufficient understanding and improvement of these models (Khalid, 2014).

The meta-analysis part on only 16 articles possibly shows hypothetical trends. However, these hypotheses can be considered in other studies for testing. Therefore, meta-analysis is seen as a prelude to further investigations of these generating trends. A review on teachers' digital *competence* is a related concept that should also be reviewed to contribute to the scope of this paper.

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Is there a second-level divide in students' internet skills? – A cross-country analysis of Denmark & India

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The concept of a digital divide has moved beyond only physical disparities in technology usage and now also encompasses issues impeding access such as human social, cultural, and psychological barriers that affect the usage of existing available technologies. This paper focuses on students' insufficient skill levels in making the best use of available Internet technology, discussing students in higher education in scenarios in Denmark and India. The paper emphasizes the reflective and conceptual issues which the students face in retrieving information from the Internet, which result in a second-level divide. Through a cross-national comparison, the paper hopes to contribute to the literature through experiences of students in the two countries, providing researchers with insights into the digital divide. This divide in Internet skills is illuminated from different perspectives in the context of two countries with contrasting socioeconomic environments, ICT development and network connectivity. The paper provides insights into how different types of literacy skills influence students' successful access to relevant online learning and knowledge retrieval.

Introduction

The opportunities offered by technology in education can transform pedagogy, enabling improved and engaging learning experiences for learners (UNESCO, 2011). It is impossible to imagine learning scenarios in the future that are not supported in one way or another by ICT (Assar, Amrani, & Watson, 2010). Digital literacy thus has become a prerequisite for students of this generation. To use technology and produce new knowledge capabilities has become a fundamental 21st-century skill. Out of all ICTs, the Internet is a powerful tool which has brought dramatic changes in learning scenarios to institutions around the world. However, like any other technology, access to and the usage of the Internet is also not equally distributed across the globe and is context-specific, causing a digital divide. But this digital divide should not be considered merely with respect to access defined in terms of a computer connected with the Internet. What is also important to consider is the efficient usage of the available access, which produces disparities in usage, bringing about a second level of division. The concept of the digital divide has evolved along with information technologies (Ji & Skoric, 2013). One of the major elements that contributes to a digital divide in Internet usage is insufficient skill in using the Internet itself (Hargittai, 2006; van Deursen & van Dijk, 2009, 2010a). A large portion of the world's population lack the requisite skills to take full advantage of the opportunities and economic growth the Internet can provide (World Economic Forum, 2015). Those who fail to find relevant information online are at a disadvantage, while for the digitally literate, finding relevant information from the increasing amount of information relating to daily life is quick and easy (van Deursen & van Dijk, 2010a).

This paper particularly focuses on students' or the younger generation's Internet skills in successfully retrieving information. The younger generation are considered Internet experts or digital natives (Prensky, 2001), as they are a highly Internet-connected or wired group, which may prompt the assumption that disparities regarding Internet usage are not relevant among this group (Correa, 2010; Hope Cheong, 2008). While students from developing economies are at a disadvantage with respect to adequate Internet skills due to inadequate access (Purushothaman, 2013), what is interesting is that even in economies with high internet penetration access, younger students are not always successful in finding online content and services that are easy to access and use (Correa, 2010; Livingstone & Helsper, 2010). Online media are ubiquitous, and disruptive technologies can affect knowledge sharing; this may also come at the expense of deeper learning. Disruptive technologies are also difficult to navigate, and literacy skills can be difficult to learn and use.

This paper discusses scenarios where students lack skills in effectively using the Internet from two countrywide perspectives, those of Denmark and India. Denmark ranks first on the ICT development index, and India ranks 137th in the world (ITU, 2014). The countries differ in their socioeconomic

characteristics, which may be reflected in their different levels of ICT development, network infrastructure and connectivity and may cause disparities in ICT access and usage between the countries. In terms of total population, India is one of the world's least connected countries, compared to Denmark, where 95% of the population uses the Internet, with a highly developed ICT infrastructure (ITU, 2014). In terms of the networked readiness index, Denmark ranks at 15, and India ranks only at 89 (World Economic Forum, 2015). This paper examines the differing skill levels of students, taking into consideration the network connectivity and Internet access of the students in both countries. Both countries provide interesting scenarios, where India represents an emerging knowledge economy, with infrastructural and connectivity issues still making access a challenge for its students. On the other hand, Denmark represents a highly developed economy where infrastructure and access are no longer issues for online access for students, giving these students an enormous advantage over those in India.

Indian context

The research was done at the University of Calicut in Southern India with a group of twelve female master's students in a study on how to empower female users through their learning to use the Internet. The study was an intervention-oriented ethnographic action research project to address the second-order digital divide. The adopted research methods involved a future workshop, Internet training based on Bloom's digital taxonomy and action research workshops. In terms of computer ownership and Internet access, only three students in the group owned a personal computer at home, and only two of the three had an Internet connection. None of the students in the group owned a laptop. The objective of the research was not about making the students experts in searching and retrieving information, as the content available on the Internet is dynamic and will change and become irrelevant with time; rather, the aim was to provide an understanding of the process involved in getting accurate information, developing reflective and critical thinking skills and learning by doing, which are lifelong learning skills. The data discussed in this paper are from a questionnaire, informal interviews, brainstorming in future workshops and a reflection session in action research workshops.

A lack of knowledge and skills in using the available Internet access certainly represented a barrier for the students in the study. They were master's students, and educational level was therefore not an issue which hindered their access. Nor was access out of reach, even though they did not own computers with Internet access, as they had the opportunity either to use three different Internet cafés within 100 meters of their department or to use the university Internet centre. However, it was discovered that even though they had the opportunity to access the Internet, most of the students did not have the requisite knowledge to make use of the available access.

The questionnaire data revealed that for nine of the students, not knowing how to get connected to the Internet was a barrier to using it. In the research context, *getting connected* is understood on a very basic level as the knowledge of how to use a web browser, which Dimaggio et al., (2004) call the "recipe knowledge about how to log on" (p. 32. Most of the students did not know the names of the different web browsers and even lacked the knowledge of how to click the mouse and get connected. For the students in this research context, the slow connection caused unpleasant experiences when they did attempt to use the Internet, thereby affecting their Internet learning skills. Internet speed came up as a barrier to using the Internet through statements in the future workshop such as "slow speed," "slow Internet speed" and "waste of time because of slow speed." When users' online experience is less gratifying because of slow connection speed, they might go online less, which would affect their information retrieval skills (Dimaggio et al., 2004). For example, Deepa, one of the students, reflected on the Internet experience with respect to why no one in the group was using the university Internet centre, as "most of them have slow speed…it's very slow." The speed of the Internet connection determines a person's inclination to use the Internet (Hargittai, 2006; Johnson, 2010). This was clearly the case, since even though the students had the scope for accessing the Internet from the university Internet centre and nearby Internet cafes, they often gave up on an Internet search and did not make further attempts, affecting their information retrieval skills.

The students faced considerable difficulty in finding relevant information from the abundance of resources available through the Internet, a difficulty which was observed in the Internet training and action research workshops. Some of the students' reflections from the action research workshops show how the students lacked sufficient skill in taking information from the Internet. In the first action research

workshop, one of the students, Tahira, explained her Internet usage experience of searching for the female population of India, as follows:

> I went to Internet Explorer; through a Google search, I typed "female population of India."
> I got many options through the search, and got confused which was the correct information
> to be taken. Searched again and again…got a lot of information on population, which was
> general, but didn't get any specific information on female population, and we searched
> again.

Tahira's reflection shows a lack of knowledge and skills to take the correct information from the search results through the search query the students used. When they typed the keywords "female population of India," the search gave many results. Their confusion made them search again, which resulted in another list of search results which did not provide the specific information they were looking for. Tahira's reflection validates what is stated by Iske, Klein, Kutscher and Otto (2008), that the diverse paths of navigation and usage options on the Internet can make users too confused to obtain the required information. Identifying key organization, acting on the planned search and not getting disoriented are elements of an efficient web search (Edwards & Bruce, 2002; van Deursen & van Dijk, 2010b). It was seen that most of the students, like Tahira, had a disadvantage in identifying key organization to act on the research, and they became disoriented when the search provided innumerable results.

This was supported by Mubeena's statement in the reflection section, when she described the Internet search experience that she and Shalina, another student in the group, shared:

> We were confused which one to take…even though all information is there we are not able
> to take the information…so for a lot of time there was this doubt…we know everything is
> there…but we do not know how to take it fast…We selected one site where it stated "first
> woman prime minster"…we clicked on that…we got her name…but we did not get much
> details about her…we did not know what to do…we went back and forth again.

When Mubeena and Shalini were searching for information on the first woman prime minister in India, the search query gave numerous results that made them doubt what the correct information to take was. The disorientation in taking the correct information is clearly demonstrated in Mubeena's reflection. This reflection illustrates that surfing from one hyperlink to another will not bring optimal results, and specific navigation and browsing skills are required to find the most relevant information (Savolainen, 2002).

Another student, Soumya, stated the following:

> I know the basics about the Internet. Like Deepa, I face difficulties in searching for
> information for seminar topics. I know the information is there, but I'm not able to
> download it. The other day, we were looking for some information about scholarships. We
> could see there are a lot of scholarships; we're not able to download what we wanted. I
> know only some basics.

Thus, retrieving information can be challenging for students even though they have scope for access and usage. An Internet search can provide an inconceivable volume of information with many links and resources which are unstructured, making the results look chaotic (Edwards & Bruce, 2002; Hargittai, 2006; Lazonder, 2000). Students faced difficulties with search queries and often got confused by the search results and from trying to identify correct sources of information. Defining the information problem and taking the right action to reach a goal to get the information is a strategic Internet skill (van Deursen & van Dijk, 2010b). Out of the twelve students, ten of them did not have strategic Internet skills.

While a lack of adequate skills can be related to limited access in developing countries, affecting learning opportunities to use the Internet, it is also a problem in developed economies with high Internet penetration rates. High Internet adoption in countries does not mean that students are experts in digital skills, as variation does exist in young people's Internet problem-solving and expertise among those who already possess the skills (Hope Cheong, 2008). The following section takes the example of Denmark, which ranks number one in the world on the ICT development index (ITU, 2014).

Danish context

A narrative case study was conducted among undergraduate radiography and teaching students at University College North (UCN) in Denmark. The research addressed students' orientation in blended learning environments. The data collection consisted of one survey and three focus group interviews collected over a period of two years. The survey data revealed that all teaching students and 94% of radiography students owned laptops, between 10% and 20% had stationary personal computers and all had Internet access. Furthermore, the survey illustrated that all students used social media daily or more than once a week. The students were also using the college's learning management system several times a week or daily, to gain knowledge on educational matters.

Despite their accessibility to media and the Internet, these students' familiarity with these systems was based more on leisure activities and social networking than on academic activities. The students experienced problems when they searched for evidence-based research and theories. The habits and patterns they had developed using the Internet for social and leisure activities seemed to limit their online retrieval skills and literacy search when it came to academic activities. For instance, students explained that notifications and habits from using the Internet were disruptive for their study-oriented searches. Some of the consequences were a limitation of focus and distractions while doing online search. Some teaching students expressed their problems as follows:

> Well, it is the Internet-flow. When you search for literature you fall into something and then get to read about it, and all of a sudden you end up on YouTube where you look at a cat playing the guitar…It runs as a huge reflection process when you are online, because all the time there will be new windows and new messages and everything it runs just in such a great hotchpotch, so you never have 100% focus. (Dau & Ryberg, 2014)

The statement illustrates how the students are unstructured and interrupted in their searching process, lacking efficient focus in retrieving the information. Thereby, their use of Internet is experienced as chaotic (Edwards & Bruce, 2002; Hargittai, 2006; Lazonder, 2000). The impact of disturbances and disruptions is also emphasized by Rose (2010), who argues that the consequence of "continuous partial attention" might lead to poor study performance. Foroughi, Werner, Nelson & Boehm-Davis (2014) also stress that interruptions have a negative impact on the quality of work. Disruptions seem to make thinking more superficial, with consequences for the quality of one's performance (Rosen, Carrier, & Cheever, 2013). Students' use of disruptive mobile online devices may also be the cause of superficial knowledge among students (Wallace, Clark, & White, 2012).

UCN students' online navigation and browsing often misled them, and their finding of the most relevant information was hampered by other possibilities and habits. It was evident that the students' navigation skills, required to find the most relevant information (Savolainen, 2002), were limited by their prior usage of the Internet for entertainment, amusement and various other pastimes. So despite the fact that Danish students have the requisite Internet skills and to some extent can be regarded as digital natives, having access to Internet resources on different mobile devices, their Internet literacy skills are at the same time limited and may not be that efficient in retrieving academic literature and information.

Many of the interviewed students stated that when they searched for literature, they used Google instead of content-specific research databases or even Google Scholar, despite the fact that all students had been introduced to more evidence-based databases. In their search process, their validation of the selected literature was primarily limited to the title of the author and in some cases was afterwards confirmed by instructors in internship practice or by lectures at UCN. A radiography student said, "Then you can go in and Google it…Google is the road to knowledge…If I looked something up on Google, then I went and talked to the other professionals to discuss if it was valid." This statement reveals that students may have an idealized view of how a search on Google can give them access to valid knowledge. To some extent, this is true, but it is also false, as much information is not authentic or is not valid. Thus the students seem to lack the literacy skills to conduct structured and relevant searches for evidence-based literature, which may affect their learning. Their path of navigation seems be linked to their prior use of the Internet.

However, it was seen in the study that students did gain some domain-specific knowledge on how to use Danish content-specific databases. For instance, radiography students became familiar with the use of the

health care sectors database, PRI (procedures, guidelines and instructions – regional healthcare database), in their period of internship. A teaching student made use of the Danish teacher association's homepage while she prepared for lessons in an internship period at a municipal school (Dau, 2015b). This usage of practice-relevant databases illustrates that students are more engaged in the use of information retrieval when it is professionally oriented and when it is used in internships, that is, when ICT has a real practical applicability in professional practice.

Discussion & conclusion

While it is easy to assume that Internet skills are equally distributed among the young because of the Internet's availability, that is not the case in reality. The younger generation might be more exposed to the digital world, but that does not mean that they are experts in retrieving information from the Internet. Unless adequate attention is given to address online skills in the students' Internet usage, the gap between the haves and have nots will only deepen and widen further. Youngsters having sufficient skills to use the Internet will discover more opportunities, thereby moving farther ahead in the digital world than those who lack the skills to make use of the available access.

In India, a developing country, the students' lack of sufficient skills in retrieving information from the Internet were due to a multiple interplay of factors. The student group discussed all came from modest backgrounds, reflected in the ownership of computers and Internet connections. The lack of ownership was a problem which affected their learning to use the Internet. However, what was also reflected was that the students did not even make use of the available opportunities in the form of Internet cafes and the university's Internet centre due to a lack of adequate skills. The connection speed of the Internet was also a barrier affecting their Internet skills. The connection speed influenced the students' Internet usage, as they often gave up Internet searches, leaving in frustration and thereby affecting their information retrieval skills. Most of the students became disoriented and struggled to identify the key organization related to the search results and to act on the planned search. The students did not have the strategic Internet skills to take advantage of the available access to the best of their ability. The study in the Indian context also demonstrates that the availability of an Internet-connected computer is of no use if the students lack the necessary skills to access and retrieve information.

This study also shows that retrieving information from the Internet is often challenging for students in countries with high Internet penetration rates, even though these students are considered tech savvy and a highly wired group. It is often assumed that the more Internet experience a person has, the more successful he or she is in acquiring information. However, this is not always the case, as the Internet experiences at the same time create habits that are difficult to leave behind. Because of these experiences, the Internet is disruptive and is sometimes a misleading resource, and the disadvantages of disruptive navigation can result in superficial knowledge. In some cases, however, students' ability to do structured research is based on its practical applicability in the professional practice of which they are members. Therefore, initiatives such as monitoring of students' online orientation, continuous evaluation and new initiatives must be taken into consideration. At UCN, this has resulted in new research investigating how to make students more self-directed and self-regulated in their online study activities outside the campus, making the students themselves a part of the design process (Dau, Falk, & Jensen, 2014).

This paper argues that those who lack sophisticated search skills are at a disadvantage even if they have a means of Internet access. Strategies and plans must be devised by educational institutions to improve the online skills of students, depending on the degree to which the technology is used in the curriculum. In an Indian context, the issue of addressing skills should begin with providing the basic infrastructure. Consideration should be given to providing sufficient Internet skills or information retrieval skills to allow the students to make use of the available Internet access. Educational institutions should also integrate more ICT-related teaching methodologies into the curriculum to prepare students for the emerging knowledge economy so they can take advantage of the opportunities provided by the digital world. In Denmark, this is being addressed in programs at the University College and in its curriculums, for example, by the use of different ICT tools in face-to-face lessons and by the implementation of a blended learning environment and distributed online learning.

The digital divide also separates wealthier students from poor ones, although this will be a temporary phenomenon, because the expenses of digital media and Internet access will become affordable for

everyone. However, an upcoming divide seems to be related to students who are taught by technology-savvy teachers and those who are not (Peng, Su, Chou, & Tsai, 2009). Therefore, the challenge is both to develop competence among teachers and to establish learning environments that support students' literacy skills and guide their online navigation.

Based on the findings in this study, we suggest that more cross-national research be carried out in relation to students' Internet skills, online navigation and Internet literacy orientation. The findings from this study illustrate what needs to be taken into consideration in countries with both low and highly developed ICT infrastructures. These insights can be highly valuable, in that countries with a high number of ICT resources can learn from those with fewer resources, as they can compare students' difficulties with online navigation to the difficulties their own students experience in adding new technology resources and environments. Similarly, countries with a population having a low number of digital resources can benefit from countries where the students have experiences of highly developed ICT resources, as they can take the constraints of this development into account before these constraints result in unintended consequences. They can be prepared in advance for problems before Internet-based technologies are implemented. The digital divide between young populations in different countries must be addressed through more collaborative research, bridging knowledge between people and countries.

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Online communication in a higher education EFL course: The role of student and teacher activity in student retention

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Student retention is a key concern for online educational institutions and course administrators because if students complete courses, they are more likely to go on and do more courses. While qualitative studies have been carried out to examine how student satisfaction and perceived learning affect retention (Berge & Huang, 2004; Bolliger, 2004), this study took a quantitative approach and explored how the level of activity in the online classroom Forum affects student retention; that is, the likelihood that students complete and pass this particular course and also possibly continue working towards their degree in the same institution. More specifically, this study aimed to investigate the relationship between the amount of one-to-many written communication in online classrooms and the retention of students throughout one-semester courses in a fully online intermediate English as a foreign language course. The findings confirm the hypothesis that increased levels of student activity and a more dynamic online classroom are beneficial in terms of course completion. However, the increased presence of the teacher in the same communication spaces did not contribute to predicting either student retention or dropout rate.

Background

The motivation for the current study is twofold. First, it aimed to improve course design in order to increase student retention, and second, to understand the role of the teacher by identifying where her time could be most effectively spent. It was anticipated that the increased activity of both the teacher and the learners in the main classroom Forum was likely to have a positive impact on course completion; a more active classroom is likely to lead to an increased sense of community among learners, thereby increasing motivation to continue and complete the course (Dawson, 2006). The course studied has a task-based continuous assessment approach, and as a result, fail rates tend to be extremely low due to the fact that before reaching the point of failing, students tend to drop out during the course. The present exploratory study seeks to provide empirical data that shows the impact of the amount of student and teacher activity in the main classroom Forum on course completion. The study took classroom data related to student and teacher activity over a period of four semesters from the two main communication areas in the classrooms that are used throughout the course. It should be noted that there are other communication areas in the classrooms that are only used for parts of the course which have been excluded from this study, including areas where communication is one-to-one, in small groups or involves different configurations of communication dynamics.

Literature Review

The phenomenon of student retention, or dropout, has been extensively studied from different angles. A large body of studies has focused on the reasons for student dropout. Berge and Huang (2004) asserted that dropout in online learning contexts is higher than in traditional contexts. Schertzer and Schertzer (2003) referred to students' increased consumer-orientedness which is leading to increased levels of dropout rate and thus requires institutions to develop strategies to minimise this. Research on student retention has often been qualitative, for example, via student satisfaction questionnaires. Bolliger (2004) found that student satisfaction is affected by instructor variables, technical issues and interactivity. Braxton, Shaw Sullivan and Johnson (1997) (as cited in Herbert, 2006) identified the student's sense of belonging as a key factor in retention in online contexts. Herbert (2006; p. 3) pointed out that online students need to "feel connected with course, its instructor and fellow classmates." This corresponds to what Roberts and Styron (2010) have referred to as "social connectedness," which they found was a key factor in retention, proposing smaller "learning communities" as a solution to help develop student identity and ensure lower dropout rates. Along similar lines, Rodríguez-Ardura and Meseguer-Artola (2014) investigated the reasons behind students' continuance intention, finding that students' feelings of isolation can be a factor behind dropout. They asserted that perceived ease of use and usefulness of technology must be considered in online contexts. They also considered flow theory to understand

students' intrinsic motivation for continuance intention. However, their affirmation that feelings of presence are prerequisites for the construction of understanding is particularly relevant to this study; presence occurs "in the awareness of instructors and other users belonging to the learning community; in the relationships built within this particular virtual environment; and in the appreciation, generation, and exchange of knowledge by collaborative ways."

From the interactive perspective, Dawson (2006) studied how online forum discussion interactions indicate student community and discovered "how teaching practices are influencing community development" (p. 499). Dawson then raises the question of quantity or quality, pointing out that "Forums exhibiting a high volume of communication traffic do not necessarily equate to the establishment of a strong sense of community" (p. 505). However, Dawson also admits that "the degree of social interplay between students, and students and teaching staff, is an influencing factor in facilitating community development." Garrison and Cleveland-Innes referred to literature relating teaching presence to perceived learning, which most likely affects student retention; if students feel they are not learning, they are more likely to drop out. However, they referred to Picciano (2002), pointing out that interaction and presence are not the same thing. They also cited Garrison, Anderson and Archer's (2001) observation that "the quantity of interaction does not reflect the quality of the discourse" (p. 135). This issue is addressed in the Limitations section below.

Finally, from the conceptual perspective, Grau-Valldosera and Minguillón (2014) considered that a lot of the research on student retention/dropout has focused on the reasons for dropout. However, they aimed to put forward a proper definition of "dropout" and identify a profile for the students who drop out in order to introduce interventions for students who are identified as being more at risk. They outlined different definitions of dropout and pointed out that in online higher education, a key question for defining dropout is how many *breaks* students can take before being considered to have dropped out. They also noted the high dropout levels during the first semester due to the dichotomy between student expectations and the course (in terms of support, materials, methodology etc.), with the implication that if students succeed in the first semester, they are more likely to go on to take more courses. In the context of the present study, which looks at individual course completion and pass rate, Roberts and Styron (2010) pointed out that measuring retention for individual courses is challenging because a decision must be taken as to how much of the course should be completed to count as retention. Berge and Huang's (2004) definition of retention is useful in this regard: "Retention is continued student participation in a learning event to completion, which in higher education could be a course, program, institution, or system" (Roberts & Styron, 2010; p. 3). In this study, we refer to retention and dropout in the context of course completion; these were analysed across different classrooms in an obligatory university subject in relation to how much activity there was in two online communication areas on the part of the students and on the part of the teacher. The focus is on interaction in terms of one-to-many written communication in the two main communication areas in the classroom; Garrison and Cleveland-Innes (2010) provided a useful justification for this approach when they asserted that, "Interaction is seen as central to an educational experience and is a primary focus in the study of online learning" (p. 133).

Research question

Given the issues addressed in previous research and the findings obtained, this study addressed the following research question:

What is the relationship between student activity, understood as the number of messages posted in the Forum, teacher activity, understood as the number of messages posted in the Forum and in the Notice board, and student retention?

Study methodology

Context of the study

The English course for the study is delivered exclusively online in an asynchronous mode in a distance university setting using the university's virtual learning environment (VLE). The course is an intermediate English level course corresponding to a B2.1 of the Common European Framework of Reference (CEFR), which is mandatory for all students pursuing a Bachelor's degree in the

aforementioned university. Within the university's degree system, students must achieve a B2 level, either by presenting a recognised qualification or by passing the two B2-level courses (B2.1 and B2.2). While students are encouraged to take a level test, the results are non-binding in terms of who registers, and this undoubtedly results in some students signing up who do not have a high enough level to follow the course sufficiently well to complete or pass it. However, this also means that some classes are mixed-level up to a certain point. The course is designed following a task-based approach and the students are assigned to different classrooms according to their degree area. The maximum number of students per classroom in language classes is 50. However, and since English is a compulsory subject across the board, differences in the numbers of students in different degrees mean that while the average number of students per classroom is 44, there may be a small number of classrooms with higher or smaller numbers, ranging in this study from 19 to 64 students (22 out of 173 in this case). The students who take this course are Spanish or Catalan native speakers who are learning English as a foreign language in order to meet the university's language requirement for the most part. One important factor affecting the amount of student participation in the classroom communication areas in the course studied is that while *participation* per se is not assessed, as a part of all of the continuous assessment assignments, students are required to respond to at least two of their classmates. In other words, *participation* is considered so fundamental that it is incorporated both in terms of minimal requirements and also in terms of how each activity is designed.

It should be noted that there are other communication areas in the classrooms that are only used for parts of the course where communication is one-to-one, in small groups or involves different configurations of communication dynamics. These areas have been excluded from this study.

Assessment

The intermediate English course under examination is built around a series of tasks that the students need to fulfil in order to advance and complete the course and for which they receive both individual and collective feedback from their teacher. The latter type of feedback is often given in the communication spaces under scrutiny. There are five sets of mandatory continuous assessment (CA, henceforth) assignments that correspond to one of the thematic units around which the course is designed. These assignments cover all productive and receptive skills (listening and reading comprehension, writing, oral production and speaking interaction), and it is mandatory for the students to hand them in on time in order to successfully complete the course.

Data

The present paper examines a total of 173 online classrooms of the abovementioned course comprising four semesters' worth of data, i.e. the 2013 and 2014 Fall and Spring semesters, encompassing approximately 40 sections per course each semester. Specifically, the examined data consist of the amount of messages in the Forum and Notice board spaces, which allow for teacher-to-student messages (the latter) as well as student-teacher interaction and interaction amongst the students themselves. The type of messages the students and teachers write in these spaces have different purposes. Teachers' messages may clarify instructions on how to complete tasks, model the messages the students will have to write to complete a communicative task, give individual and collective feedback on certain tasks or serve as a conversation booster for communicative tasks where students are showing low participation. The messages students write also have different purposes: they can ask questions or seek clarification about language issues or about the task they have to complete, and finally they serve as spaces for the communicative tasks that they are being assigned.

The overall number of teachers' messages both in the Forum and the Notice board and the number of student messages in the Forum throughout each semester were retrieved from the university's VLE. Although the students use other tools and spaces to communicate among themselves and with the teacher (synchronously and asynchronously in both oral and written formats), for the purpose of this study, we chose the activity in two communication areas as indicators of the amount of classroom activity because they are spaces used in all five CA assignments: the Forum (teacher and students can post) and the Notice board (only teachers can post). Other tools, such as wikis, video-blogging and synchronous oral interactive communication tools, are used only for some of the CA assignments and therefore would only render partial data about the amount of classroom activity. These other communication tools require

different configurations of interlocutors (pair work, small group work) and they entail a different role for the teacher in each of them.

Variables

This study explores the relationship between student and teacher activity and retention. More specifically, for the purpose of this study, the variables under investigation were defined as follows:

1. Student activity: average number of messages posted by students in the Forum.
2. Teacher activity in the Forum: average number of messages posted by the teachers in the Forum.
3. Teacher activity in the Notice board: average number of messages posted by the teachers in the Notice board.

Retention was conceived of as a three-fold construct and it encompasses the following variables:

1. Average number of students who obtained a passing grade.
2. Average number of students who failed the subject.
3. Students who did not complete the course (NP) because they did an insufficient number of continuous assessment activities or did not show up for the first three weeks of the course.

Statistical analyses

Two types of statistical analyses were applied to the data set:

1. Descriptive statistics to obtain information about means and standard deviations and
2. Correlations to obtain information about the relationships between variables.

A priori alpha level was set at .05. Following the inspection of data linearity and normality by means of scatterplots and histograms, the entire data set was analysed by the non-parametric correlation coefficient Spearman's *rho*. All reported effect sizes were calculated by squaring the value obtained for the correlation coefficient and confidence intervals for all correlations were calculated with the statistical package R.

Results

The research question addressed in this paper was as follows: "What is the relationship between student activity, understood as the number of messages posted in the Forum, teacher activity, understood as the number of messages posted in the Forum and in the Notice board, and student retention?"

Table 1 presents the descriptive statistics for this research question.

Table 1

Descriptive Statistics for Student Activity, Teacher Activity, Average Number of Students Who Obtained Final Mark Pass, Final Mark Fail and Obtained NP (Mean, Standard Deviation, Range, Minimum and Maximum Values; N = 173).

	M	SD	Range	Min	Max
Teacher_NB	50.73	12.98	66	24	90
Teacher_F	55.06	36.85	190	7	197
Students_F	752.21	199.98	1170	199	1369
Average N° students_Pass	30.89	7.27	40	9	49
Average N° students_Fail	4.37	2.62	17	0	17
Average N° students_NP	8.88	3.57	17	1	18

As Table 1 shows, the mean number of student messages across the 173 classrooms was $M = 752.21$ ($SD = 199.98$), whereas the number of teacher messages in the Notice board and Forum was $M = 50.73$ ($SD = 12.98$) and $M = 55.06$ ($SD = 36.58$), respectively. These figures imply a large discrepancy between student and teacher activity in terms of the number of posted messages, but at the same time it can be

observed that teachers are equally active in the two analysed areas on the basis of the means. Regarding the three outcome measures in relation to which student and teacher activity were analysed, a vast majority of students across the 173 classrooms passed the subject, with $M = 30.89$ ($SD = 7.27$). The average number of students per classroom who failed or obtained an NP was minor in comparison, with $M = 4.37$ ($SD = 2.63$) for the former and $M = 8.88$ ($SD = 3.57$) for the latter. These results were further explored by means of correlations, the summary of which is presented in Table 2.

Table 2

Correlation Between Student Activity, Teacher Activity and Retention (Average Number of Students Who Passed, Failed or Obtained an NP): Correlation Coefficient (Spearman's Rho), Effect Size (R^2), P-value (Sig. (2-Tailed)), Confidence Intervals (95% CI)

			Student F	Teacher NB	Teacher F
Average nº students_Pass ($N = 173$)	Spearman's *rho*		.758	.026	.104
	R^2		.57	.000	.01
	Sig. (2-tailed)		.000	.730	.175
	95% CI	Lower bound	.068	-0.12	-0.04
		Upper bound	.081	0.17	0.24
Average nº students_Fail ($N = 173$)	Spearman's *rho*		.043	.127	.059
	R^2		.00	.01	.00
	Sig. (2-tailed)		.574	.096	.437
	95% CI	Lower bound	-0.10	-0.02	-0.09
		Upper bound	0.19	0.27	0.20
Average nº students_NP ($N = 173$)	Spearman's *rho*		-.217	.111	-.080
	R^2		.04	.01	.00
	Sig. (2-tailed)		.004	.147	.293
	95% CI	Lower bound	-0.35	-0.03	-0.84
		Upper bound	-0.07	0.25	-0.73

Regarding student activity, Spearman's *rho* revealed a strong correlation between the number of messages posted in the Forum by the students and passing the subject, as evidenced by a narrow confidence interval and a large effect size (r = .758, R^2 = .57, 95% CI: .068, .081, *p* = .000). This means that the correlation coefficient was highly reliable and the estimate was precise. Therefore, the more messages are posted in the classroom by the students, the more likely the students in this classroom are to pass the subject. Likewise, student activity was not found to be correlated with failing. Also, a small

negative correlation was found between the number of messages posted in the Forum and students obtaining an NP (r = -.217, R^2 = .04, 95% CI: -0.35, -0.07; p = .004). Regarding teacher activity, Spearman's *rho* did not detect any correlation between the number of messages posted by the teacher in the two communication areas and any of the outcome measures, i.e. passing, failing or obtaining an NP. None of the correlations were statistical, the effect sizes were mostly non-existent and 95% confidence intervals spanned zero in the majority of occasions.

On the basis of the obtained results, it can be concluded that teacher activity in the two communication areas subject to analysis does not predict students passing, failing or obtaining an NP. On the other hand, the results strongly indicate that students' active participation in the Forum is a reliable predictor of them completing the course and obtaining a passing grade.

Discussion

This paper set out to explore the role of teacher and student activity in two online communication areas (Forum and Noticeboard) in relation to student retention, which encompassed the following three scenarios: students passing the subject, failing or not completing the course (obtained NP). The study adopted a quantitative approach to analyse retention and how active the two groups of users are. Rather than analysing the patterns among individual students' and teachers' activity, the study looked at whether activity in the main written forum acted as the guiding thread of the course.

The findings revealed that the intensity with which teachers are active in the two communication areas did not have an influence on any of the three outcomes which were analysed. Students were equally likely to obtain a passing grade, fail or not complete the course regardless of the number of messages teachers posted in the Forum and Notice board. At the same time, the study showed that the activity of the second group of users—the students themselves—proved to be of fundamental importance to course completion.

The fact that the amount of teacher activity did not seem to have an effect on students completing the course may be due to the fact that teachers put their efforts elsewhere: possibly they have to strike a balance between posting messages, preparing individual correction, giving feedback etc. Teachers may be prioritising other aspects of their work rather than being active in these two particular communication areas. However, the fact that the Forum and Notice board are used in all CA activities should make them two of the most important tools/spaces in the course. Until a qualitative study can be carried out, it remains to be seen what the effect of the contents of teachers' messages in the Forum and Notice board really is.

Another point to mention is that a lower number of messages (from students and teachers) is not necessarily an indicator that there is a problem; as mentioned previously, a teacher who posted "only" 7 messages could have motivated and influenced their students more than another teacher who posts all the time. The present study did not consider the length of student or teacher messages.

It should be noted that as this study takes classrooms as its unit of observation, we are not distinguishing between individual students who may be more or less active, but rather whether there is activity in the main written Forum.

Limitations

There are significant limitations to this study. The first is that this study only examines some of the interaction occurring in the online classrooms; these courses include oral work in a video/audio blog as well as group work, but neither of these classroom areas was included in this study. The second major limitation is that the contents of the interactions in the written communication spaces in the classroom have not been considered; we have taken a quantitative analysis approach as a way of purely identifying overarching trends, partly to justify a much bigger study at a later stage. Data has been collected from the same four semesters and future studies will include a qualitative analysis of the data.

It is also necessary to look closely at the individual teaching carried out in each of the classrooms; as Anderson Liam, Garrison and Archer (2001) pointed out, "it is only through active intervention of a teacher that a powerful communications tool such as collaborative computer conferencing [11], or

cooperative learning [12] becomes a useful instructional and learning resource." (p. 5). They also noted that "The teacher supports and encourages participation by modeling appropriate behaviors, commenting upon and encouraging student responses" (p. 7).

Conclusion

The relevance of these results in terms of course completion is two-fold: firstly, the more students that complete individual courses, the higher the programme retention rate is likely to be; and secondly, the results indicate that the more active the online classroom is, the more students are likely to pass the course. This, in turn, can affect the whole academic "life" of students, encouraging and motivating them to go on to complete their programme, which is a concern for many higher educational institutions. From an institutional point of view, it should help to inform and provide empirical evidence for the continuous development of its educational model and the importance of creating and maintaining a community for learners.

Further research

In light of this study, future studies might look at whether other variables can contribute to explaining the behaviour identified here, such as classroom size, experience of individual teachers and differences in the behaviours of students working towards different degree areas etc. Beyond carrying out a detailed qualitative analysis of the posts in the two main classroom communication areas, such studies could also consider the other areas of the classroom not included in this study. It would also be relevant to consider the length of teacher and student messages.

Another major line of research would be to expand the current study to conduct a finer-grained analysis that takes the student as the unit of analysis instead of the classroom.

It would also be of value to replicate the study in subjects other than languages, where communication does not overlap with learning objectives to the same extent. In this way, it would also be possible to consider whether students who are less participative are also positively affected in terms of increased retention by increased classroom activity.

Finally, as has been mentioned above, the literature points to the fact that without a qualitative analysis of both teacher and student messages, the results here can only give indications of general trends. While the results seem to confirm that increased classroom activity leads to increased student retention, we have not established any correlation between student retention and how active the teacher is in quantitative terms.

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An investigation of students' attitudes to the ICT-based ELT classroom

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The purpose of this study was to assess the attitude of students towards the ICT-enabled classroom. In a study of 113 high school students, an attitude scale was constructed and administered. The findings indicate a significant difference in the attitudes of Grade 9 students, who were found to be more in favour of and happier with ICT-based than normal classrooms on all of the tested items. No change was detected in these attitudes in relation to the type of school in which the participants studied.

Introduction

New information and communications technologies (ICT) and techniques have been introduced to English Language Teaching (ELT) throughout the world. In line with these developments, there has been extensive deployment of ICT in the Bangladeshi classroom in recent years (Chandan, 2014). High school students' attitudes to different aspects of ICT as used for ELT purposes in Bangladesh, such as m-learning and to radio-, TV- and computer-mediated ELT, are therefore of significant interest. McGroarty (1996) characterised attitude as involving beliefs, emotional reactions and behavioural tendencies related to the object of the attitudes—in other words, the way someone thinks or behaves. Students' attitudes towards the ICT-based classroom in Bangladesh may help to explain their success in learning English Language Learning (ELL) basics (reading, writing, listening and speaking), as such attitudes affect the rate of development and final proficiency achieved by ELT students elsewhere.

ICT was introduced to school education in Bangladesh by Government, NGOs and international agencies under the Digital Bangladesh scheme, Beginning in 2008, the aim was to ensure quality education in all the country's schools. Implementation has been gradual; at present, some schools are selected for the programme and some are not. The opinions and observations of students reflect their experiences and can provide invaluable information about their experiences of the competitive opportunities offered by ICT in education. In this survey of high school students' attitudes to the use of ICT, four FGDs for piloting the instruments of the baseline survey used a rating scale which was subsequently distributed to 113 of Grade 9 students at four schools—two in the capital city and two more rural schools. The survey sought to understand students' attitudes to differences between ICT-based and non-ICT-based ELT classrooms.

Research objectives

The study aimed to investigate the attitudes of Grade 9 ELT learners to the ICT-enabled classroom (teacher-facilitated video). The study had two main objectives:

- To assess students' attitudes to changes in the ELT classroom following deployment of ICT;
- To identify any statistically significant difference in attitude among these students based on the type of school in which they were studying.

It was hypothesized that the attitude of the target group to English would differ significantly because of the deployment of technology in the ELT classroom.

Research questions

The study aimed to answer the following questions.

- What are students' general attitudes to the new technology-based education?
- What are the overall attitudes of ELT learners to the ICT-based classroom?
- Are there any differences between learners' attitudes to the use of ICT in the classroom?

Methodology

Participants and procedure

The sample population comprised 113 Grade 9 students from four schools: two outside the capital city (one boys' school and one girls' school, characterised as *rural*) and two in capital city (again, one boys' school and one girls' school, characterised as *urban*). The participants were Grade 9 students. In each school, the researchers conducted classroom observations. As soon as teachers' lectures had finished, after establishing a rapport, the scale (see Instrument below) was distributed to students. Students were randomly assigned to two groups: the Treatment Group (ELT using ICT), comprising 38 participants, and the Control Group (ELT without using ICT), comprising 75.

Instrument

The researchers collected the qualitative data from discussions with the learners; quantitative data was collected by means of a rating scale. This was based on the project entitled "Teaching English Language at Secondary Schools: Effective Integration of ICT to Enhance Teaching and Learning in Bangladeshi Classrooms" to assess the attitude of students to the content and method used for teacher-facilitated videos within an ICT environment. The scale was structured as a series of choices: *Strongly Agree* (5), *Agree* (4), *Neither Agree nor Disagree* (3), *Disagree* (4), and *Strongly Disagree* (1). The questionnaire was reviewed by two ELT experts and peer-reviewed by the researchers and two teachers from each school before being distributed to the study participants. A personal data sheet was also administered to collect data on familiarity and access to media and ICT.

Significance of the study

This study was undertaken for two reasons: First, it seems important to investigate the attitudes of ELT learners to ICT as a tool to help learners and teachers in mastering the basic skills of ELT and to empower English teachers to improve the quality of ELT teaching actions. That is, although ICT has several advantages for ELT in Bangladeshi classrooms in general and for rural schools in particular, attitudes may influence the methodology used for ELT teaching. Second, there has been no study to investigate attitudes to ELT, and so there is still a need to explore the respective advantages of constructivist and connectivist approaches in ELT. Attitude, in this context, has been defined by Fishbein and Ajzen (1975) as a learned predisposition to respond in a consistent manner to a given object or situation. It is hoped that the findings of this study may be useful for decision-makers in Bangladesh in improving the quality of ELT in schools. These results can also help to bridge any existing gap between theory and practice in terms of teaching methodologies while adding to the growing body of literature in this area. The findings may also be of use to anyone interested in ELT, syllabus design or teaching methods and materials.

Results and discussion (rating scale)

In general, the current research investigated the effects of ELT technology use on student attitudes. One of the advantages commonly attributed to using computers in the classroom is that this engenders more positive student attitudes (Brasell, 1987; Brungardt & Zollman, 1995). Because computers can run all sorts of electronic media and can do so many new things so quickly and accurately, the use of computers in the classroom is believed to lead to more positive attitudes, and many students prefer using computers for further learning, reinforcing the connectivist approach. While the use of computer technology in the classroom may assist effective learning approaches such as constructivism and connectivism, there is little research to support such claims. The limited available research suggests that computers can lead to

more positive attitudes in some groups of students (especially males and younger students). Moore (2005) summarised about the positive impact of ICT on students' learning as increasing students' motivation to stay on-task and driving them to behave better and produce high quality work. Additionally, through ICT, students may learn more autonomously and complete more work at a faster pace. According to Osman and Ahmed (2003), for comprehensive teaching using ICT, teachers need to be convinced of the importance and benefit of its use in teaching and learning. Indeed, teachers should be given adequate training in how to use ICT tools effectively and efficiently. We will now consider how this aligns with students' beliefs, emotional reactions and behavioural tendencies towards the use of ICT in the ELT classroom.

Student attitudes

Students were asked for their opinions on statements categorised as (a) Attitudes and feelings towards using English; (b) Attitudes towards m-learning; (c) Learners' attitudes towards radio for English language lessons; (d) Learners' attitudes towards English language lessons on TV; (e) Attitudes towards curriculum-linked video (including animation). The analysis sought to identify any differences in attitude towards ICT-aided ELT. Students' attitudes to the modified classroom environment were measured in terms of mean and standard deviation; the results are set out in Table 1 below.

Table 1
Attitudes and feelings about using English

Statement	ICT-mediated			Non-ICT-mediated		
	N	Mean	SD	N	Mean	SD
I get nervous and confused when I speak English	38	2.4	1.7	75	2.1	1.3
I generally find trying to communicate in English frustrating	38	2.6	1.7	75	2.1	1.4
When I speak in English, the fear of making grammatical errors has a great influence on me.	38	3.4	1.6	75	2.9	1.7
I always feel that the other students speak English better than me	38	3.7	1.5	75	3.5	1.5

The attitudes of students from ICT-aided classrooms (N = 38) and non-ICT-aided classrooms (N = 75) to new technology-aided classrooms were assessed. The students using ICT-mediated classrooms show a better mean attitude and feeling about using English as compared to students for whom ICT was not applied. This indicates that ICT-mediated classrooms enable students to make fewer grammatical errors and also increases their confidence when communicating.

Attitudes towards m-learning
As reported in the FGD reports, students use smartphones and tablets at home. The qualitative data also support the proposition that learners use mobile device for learning English, and they reported a liking for *BBC Janala*.

Table 2
Attitudes towards m-learning

Statement	ICT-mediated			Non-ICT-mediated		
	N	Mean	SD	N	Mean	SD
A mobile device can help me to acquire more ideas in English learning.	38	3.7	1.6	75	4.8	0.6
A mobile device is helpful for my English learning.	37	3.6	1.6	74	4.5	1.0
A mobile device can enhance my desire to learn English.	37	3.3	1.7	75	4.2	1.1
I feel bored using a mobile device for learning English.	37	2.4	1.3	75	2.1	1.3
I am not good at using a mobile device.	36	2.1	1.2	75	2.2	1.5
I hope to apply mobile devices in English learning activities.	36	3.8	1.7	75	4.2	1.4
I hope to have a regular time to use a mobile device for learning English.	37	3.8	1.6	75	4.2	1.3
I can use a mobile device independently without another's help.	37	3.6	1.6	75	4.2	1.3
It is quite fun to use a mobile device for English learning.	37	3.6	1.5	75	4.4	1.0

| I love to use mobile devices for my English exam preparation. | 37 | 3.0 | 1.6 | 75 | 4.3 | 1.1 |
| It saves time when I use mobile devices because I can learn English without space or time constraints. | 37 | 3.4 | 1.7 | 75 | 4.2 | 1.2 |

Table 2 reveals that means and standard deviations of the treatment and control groups are almost the same. This suggests that m-learning for ELL has high potential in Bangladesh.

Learners' attitudes to radio for English language lessons
In Bangladesh, radio is very commonly used for both school and non-formal education.

Table 3
Attitudes to radio lesions

Statement	ICT-mediated			Non-ICT-mediated		
	N	Mean	SD	N	Mean	SD
I listen regularly to Bangladesh Betar (National Radio).	38	2.4	1.5	75	2.8	1.6
I listen regularly to a mobile-linked FM radio.	38	3.2	1.7	75	3.2	1.6
I listen regularly to community radio (CR).	38	2.2	1.5	74	2.6	1.5
I listen to web radio.	38	2.1	1.4	75	2.6	1.5
Radio regularly broadcasts English language lessons for school learners.	38	3.4	1.7	72	3.4	1.5
Teachers recommend popular programmes such as 'Shikharthir Ashor' on Bangladesh Betar for my language skills.	38	4.3	1.3	74	3.7	1.5
I listen to BOU radio broadcasts of English language programmes as well.	38	2.5	1.6	73	3.0	1.5
Through English radio programmes, I have the opportunity to be taught by famous teachers.	37	2.7	1.8	72	3.4	1.6
Radio English lessons are helpful for language skills.	38	3.8	1.6	72	4.0	1.4
I use radio English lessons for my exam preparation.	38	2.7	1.6	72	2.7	1.4
I believe the use of radio for English teaching will increase in the near future.	37	3.5	1.7	75	4.2	1.3

Table 4 shows that both groups return almost the same mean values and standard deviations, indicating that attitudes towards radio for ELL are very positive.

Learners' attitude towards English language lessons on TV
Bangladesh Open University uses TV for delivery of its ELT lessons for school programmes, and students' opinions were positive.

Table 4
Attitudes to TV lessons

Statement	ICT-mediated			Non-ICT-mediated		
	N	Mean	SD	N	Mean	SD
I regularly watch Bangladesh Television (BTV) and other private channels.	37	3.4	1.7	75	4.0	1.5
I watch BTV specifically for educational purposes.	37	2.7	1.5	74	3.8	1.3
BTV has school education programmes.	37	4.3	1.3	75	4.5	1.0
BTV regularly broadcasts English language lessons for school learners.	37	4.3	1.2	74	4.4	1.2
Teachers recommend some English language programmes for improving language skills.	37	4.6	1.0	74	4.4	1.1
I watch BTV broadcasts of English language programmes.	37	3.4	1.6	73	4.2	1.3
Through English programmes on BTV, I have the opportunity to be taught by famous teachers.	37	3.9	1.6	75	4.0	1.3
BTV English lessons are helpful for language skills.	37	4.3	1.3	74	4.5	1.1

	N	Mean	SD	N	Mean	SD
I believe the use of TV broadcast for teaching English language will increase in the near future.	37	4.6	0.7	75	4.6	1.0

Table 4 shows that the control group has more interest in TV programmes, as the mean value is slightly higher than that of the control group.

Attitudes to classroom video

Statements	ICT-mediated			Non-ICT-mediated		
	N	Mean	SD	N	Mean	SD
Teacher-facilitated video in the classroom is a good use of technology for learning English.	36	4.6	1.0	74	4.5	0.9
Teacher-facilitated video in the classroom would enhance my English learning.	36	4.6	1.0	74	4.5	0.9
Teacher-facilitated video in the classroom will motivate me to learn English effectively.	36	4.7	0.7	73	4.6	0.8
The use of teacher-facilitated video will be more effective as a learning tool with today's students, as most of them use ICT such as mobile devices, computer, radio and TV.	36	4.7	0.5	74	4.5	1.1
Pictures, diagrams and graphics in the teacher-facilitated video will help me to enhance English learning.	36	4.5	1.0	73	4.6	0.9
Teacher-facilitated English video animations would address my needs and issues, including learning styles.	35	4.4	1.0	72	4.4	1.0
Teacher-facilitated video animations will be user-friendly as they are to be used for English teaching.	36	4.4	1.0	72	4.4	1.0
To be effective, teacher-facilitated video would apply principles of learning.	35	4.5	0.9	72	4.4	0.9
I believe that curriculum-linked video for English is a valuable use of ICT.	36	4.3	1.1	71	4.3	1.1
I might be able to reuse the same video through a mobile memory card.	36	4.6	0.9	74	4.4	0.9
I might be able to reuse the same video from the web if made as an Open Educational Resource (OER).	36	4.3	1.2	74	4.4	1.1
The use of curriculum-linked video for teaching and learning English is likely to grow in the near future.	36	4.6	0.9	74	4.6	0.9

Table 5 shows that the treatment group has the higher mean value and standard deviation, indicating that students support use of the curriculum-linked video including animation.

Discussion

According to the current policy, the ELT classroom is based on constructivist theory. A higher score indicates a relatively more constructivist learning environment (Taylor et al., 1996). Classroom observations indicated the use of participatory and group work in the Bangladesh classroom. As the mean score for ICT-based classroom students was greater than that of non-ICT-based students on the preferred form, it would seem that ICT-based classroom students show a relatively greater preference for constructivist learning environments.

The descriptive analysis showed that a majority of students favoured the new ICT-aided classroom and the change in classroom environment for ELT under education policy. The attitudes of I ICT-aided classroom students were more favourable to the new technology-aided approach. Based on the different types of schools in which these students study, attitude scores indicated no significant difference. ICT-based classroom students consistently preferred a more constructivist learning environment than non-ICT-based classroom students. While constructivist approaches may be valuable in this respect, they are not necessarily the only way to teach English, and constructivism does not serve as a unifying theory for pedagogy (Phillips, 2000). Our results show that ICT-mediated students in general have a better attitude to ELT classrooms than non-ICT-based classroom students with the exception of the difficulty component, for which no statistical significant differences were found between the two groups. In this situation, a connectivist approach represents an added benefit for ELL in Bangladeshi schools.

Conclusion

The information provided by participants in this study provides a basis for rethinking well-established strategies in reexamining the arguments for and against ICT-mediated ELT in high school among stakeholders (students and teachers), policy-makers and other actors in ELL development, such as NGOs and international development agencies working in Bangladesh. The study investigated similarities and differences in the perceptions and attitudes of students from two very different learning milieus—one ICT-based and the other non-ICT-based. Such comparisons can potentially generate new insights into ELT pedagogy and the role of non-cognitive sociocultural variables in teaching English to school students. In the future, to enhance student attitudes toward ELL, instructors will perhaps move away from primarily using lecture methods in favour of more constructivist approaches, using videos that can reduce anxiety in the ELT classroom. In general, Bangladeshi ELT instructors should encourage students to use ICT in solving English language problems.

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Acknowledgement

ICT-based English language learning in Bangladesh: A review of the literature

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English Language Learning (ELL) competencies acquired through classroom practice remain very weak in Bangladeshi secondary schools, and English is the most commonly failed subject in examinations at this level. This also impacts on the English language communication skills of Bangladeshis, which has been characterized as a constraint on the country's economic development. Having deployed communications technologies such as radio, TV, computer and mobile telephony when these came into existence, Government, NGOs and international development agencies have been very active in seeking to improve the quality of English language teaching and learning in Bangladesh. The national policy on ELL is to support communicative language teaching (CLT) practices, influencing curriculum, textbook, technology deployment and assessment changes in support of communicative English Language Teaching (ELT). The literature reflects Bangladesh's active commitment to using information and communications technologies (ICT) for the development of ELT and now ELL. This paper discusses the various past and present interventions in Bangladesh using appropriate media to improve ELT and ELL competencies.

Introduction

Learning theory has changed with advances in technology—for instance, connectivism suggests that by connecting learners with technology-enabled learning materials, they will learn for themselves (Siemens, 2005). Distance education institutes commonly use technology to deliver learning programmes, but across the globe, there is a pressing need for transformation in ways of teaching and learning. Siemens et al. (2011) argued that connectivism can also be used as a foundational theory to support formal learning experiences. In Bangladesh, the typical formal school-level classroom is not yet well-equipped with modern technology such as computers or multimedia. However, the use of smartphones is increasing among secondary students, and the country now has 100% mobile network access by area, making technology-based learning a viable option for students. This changing landscape motivates this thorough literature survey on the use of technology in Bangladesh for both distance education and formal education in order to establish where we were, where we are and where we are going. The increasing use of smartphones indicates widespread recent technology acceptance, and in line with this, educational institutions have deployed technology for development of the learning environment. Clark and Kozma (2010) stated that media and technology play a vital role in inspiring and enhancing learning in twenty-first century schools. Computer technology is used as a means of engaging learners in higher-order thinking, providing a constructive learning environment that helps the learner to participate actively in acquiring knowledge and reflecting on their interpretations (Jonassen, Carr, & Yueh, 1998). In that context, English Language Teaching (ELT) has championed use of the latest Internet technology. Buckingham (2001) noted that as existing web resources on education are heavily English language-dominated, the field of English language learning (ELL) has tended to evolve from one paradigm to another, and there is need for a study of how ELL is viewed in Bangladesh today, where media including newspapers, magazines, radio, TV—and, of course, the Internet—are being used as learning platforms. Media influence policy direction; the Bangladeshi ELT policy context encourages teachers, administrators and other education professionals to develop, maintain and apply knowledge, skills and attributes that enable them to use technology effectively, efficiently and innovatively in support of learning and teaching. In line with these goals, the country has been implementing the Digital Bangladesh agenda while liberalizing private sector media. The present desktop research study discusses how the

media influence ELL in Bangladesh through interventions by Government, Bangladesh Open University (BOU), NGOs and the private sector

Impact of technology at secondary level

Any innovation in media (radio, television, and now the Internet) is adopted for both formal and non-formal learning. Nathan and Robinson (2001) observed that educational environments have changed as paradigms shift to include more online learning, blended and hybrid learning and collaborative models, and students increasingly use the Internet for learning and for exchanging new information (Nagel, 2014). Bangladesh has a long history of using technology in the classroom, beginning in 1956 with the supply of 200 radio sets to educational institutions (UNESCO, 2002; Rahman & Panda, 2012). Since then, national radio (and subsequently TV) has been broadcasting a curriculum-linked educational programme, with particular emphasis on ELL. When BOU came into existence in 1992, the Government allowed the University to broadcast an educational programme that included ELL communicative and curriculum-linked content. Digital technologies—especially the Internet and personal computers—have greatly influenced English learning in the twenty-first century (Kenny, 2001) and the supplementary instructional materials that support more diversified pedagogies. As one channel or toolbox for the enhancement of learning environments, media and technology offer a means of achieving ELL goals in Bangladesh, and Government, BOU, NGOs, international development agencies and the private sector have pursued a range of innovative ELL projects which, in turn, impact on the country's socioeconomic development.

Government initiatives

The Digital Bangladesh agenda assigns paramount importance to the deployment of technology in the education sector. As part of these interventions, computers are being supplied to schools and the traditional chalkboard is now being replaced with whiteboards and/or digital boards. Most schools are using multimedia in the classroom, and e-learning has been implemented through a range of initiatives. For instance, the Secondary Education Sector Development Project (SESDP) is piloting e-learning in 20 schools in urban and rural areas to support teaching of English, Mathematics, and Science subjects (SESDP, 2010). The Government is also implementing ICT-based education programmes and broadcasts English lessons among other subjects on its territorial channels. In addition, some schools already have a language lab as part of their ICT-enabled ELL programme. On the instructions of the Prime Minister, the Ministry of Education broadcasts classroom lectures in English, Mathematics and Chemistry for class-IX for rural learners from a number of well-regarded schools in Dhaka city. These are delivered through Bangladesh Television (BTV), offering quality education on Sunday, Monday and Tuesday each week from 9:10 a.m. to 10:00 a.m. English classes from the Viqarunnisa Noon School (ranked first on several occasions in SSC results) have been telecast since mid-2011. Initially, education boards bought televisions for some schools, and the Minister urged managing committees and affluent members of society to donate televisions to schools for the sake of education (The Daily Star, 2011). This Ministry initiative indicates two things: that policy clearly favours the deployment of technology in education, and that ELL has been assigned top priority in this regard.

BOU initiatives

BOU came into existence in 1992, following a long history of curriculum-linked educational broadcasts on national radio and TV by its predecessors Audio-Vision Cell (AVC), the Audio Visual Education Centre (AVEC), the National Institute of Educational Media and Technology (NIEMT), the School Broadcasting Programme (SBP) and the Bangladesh Institute of Distance Education (BIDE) (Rahman & Panda, 2012). School broadcasts still run on Bangladesh Betar and Bangladesh Television under the supervision of the BOU Open School, where English is the dominant subject. The BOU Open School runs pre-university programmes in open and distance learning modes, with an emphasis on media programmes as part of programme delivery—for instance, the School broadcasts an innovative video programme incorporating SMS technology so that learners can enjoy live interaction through mobile technology. The School prepared a series of 28 video programmes (see Chart 1), entitled *Virtual Interactive Classroom* (VIC), for the English course of the HSC programme in collaboration with Orebro University, Sweden. In addition, it regularly broadcasts English programmes. The School of Social Sciences, Humanities and Languages (SSHL) runs two programmes entitled *Certificate in English*

Language Programme (CELP) for enhancing communicative skills and *Bachelor of English Language Teaching* (BELT) for education and training in English; these two programmes have been a very popular element of its radio and TV broadcasts. Other schools such as the School of Science and Technology (SST), the School of Agriculture and Rural Development (SARD) and the School of Education (SOE) also have audio-video programmes that are broadcast repeatedly on radio and TV (Shahabuddin, 2014). However, these broadcast only a few such programmes. BOU has now established virtual interactive classrooms on campus and in a few RRCs, with support from KOICA for ELL for school learners.

Chart 1: English Programme Broadcasts by BOU

	CELP	SSC	HSC	BELT	BAgEd	BScN	DSA	BA/BSS
Video	23	9	7	12	3	5	3	7
SMS linked Video			28					
Audio	108							

No. of programmes (y-axis: 120, 100, 80, 60, 40, 20, -)
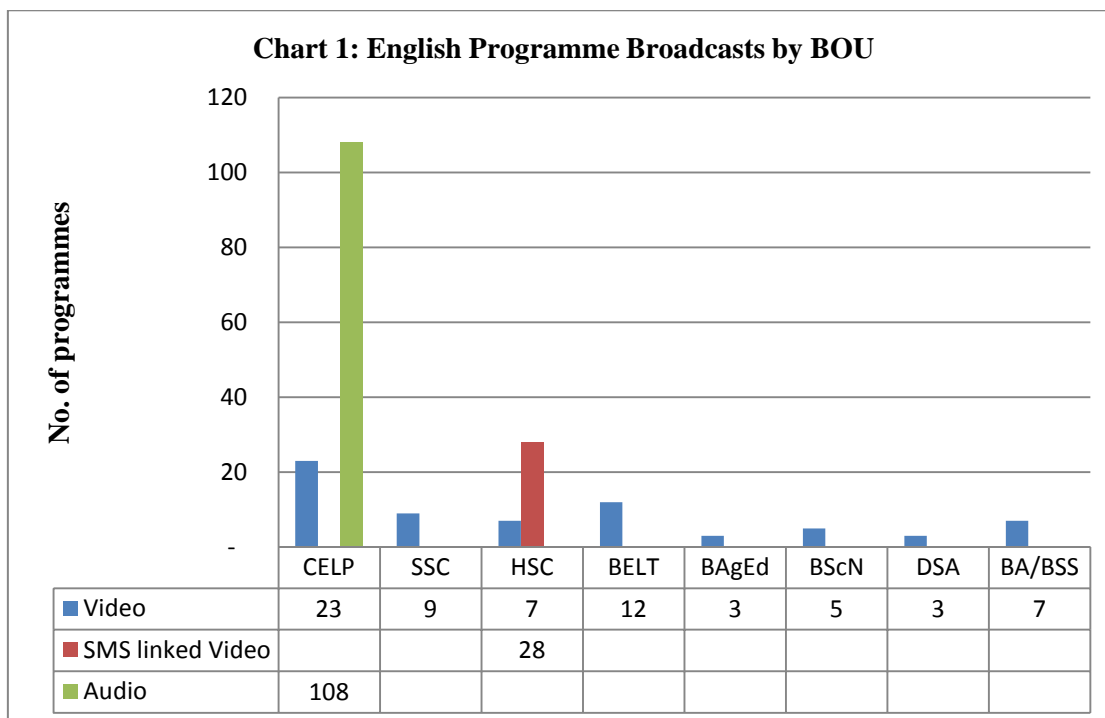
Chart 1

NGO initiatives

Dhaka Ahsania Mission (DAM) is the second largest NGO in Bangladesh. It operates mainly at a non-formal level but recently began to produce ELL CDs as supplementary learning materials through its subsidiary *Ahsania Books for Creative Learning* (ABCL) to supporting conventional school-based learning. The material is based mainly on the English Grammar course entitled *ABCL English Grammar Multimedia* (audio-video animation) (Hussain, 2013). In an interview on 1 February 2014, ABCL Director Mr. Zahirul Alam Badal reported that the multimedia package contains six CDs for Grades 6–10 learners, with an initial distribution of 2,000 copies. He also noted a high demand for this material among both learners and teachers, but no impact assessment has yet been done. Although still subsidized, the materials are marketed on a commercial basis through designated distributors in every district of the country. As these CDs are curriculum-linked, learners are using them as supplementary materials. This initiative is part of the *joyful learning* programmes at school level and has created an environment now referred to as "joyful school."

Chart 2: DAM-produed English learning CDs

Chart 2

In addition, the DAM also developed a software application entitled *ABCL Creative Writing and Listening* to assist learners hoping to achieve a high score in competitive international English tests such as IELTS, TOEFL, GMAT or GRE. This software also help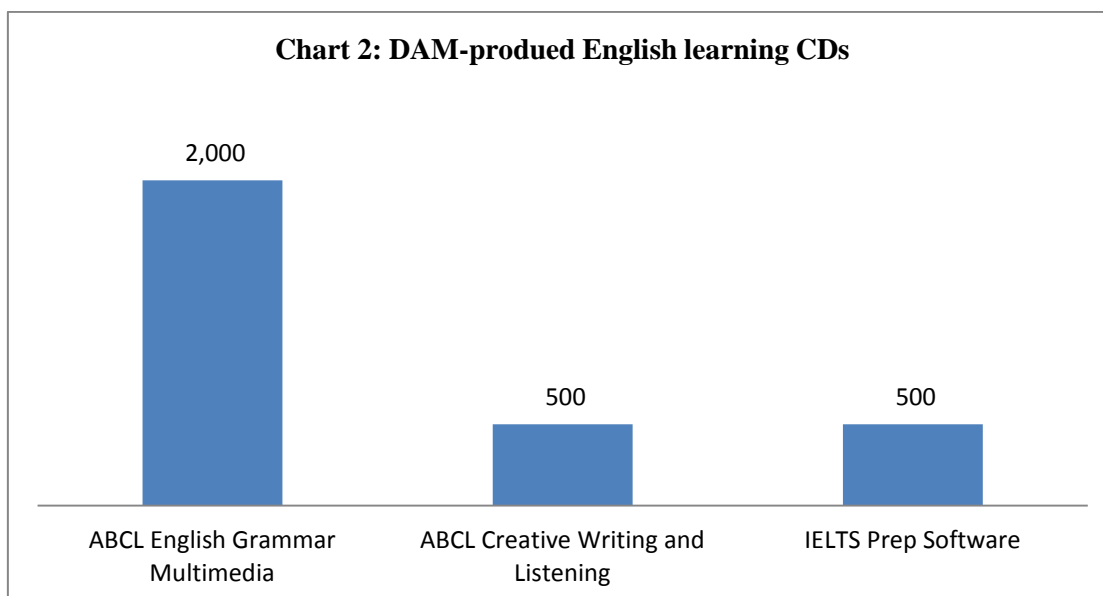s to increase skills in argumentative writing. Five hundred copies of this software have already been produced and distributed (Hussain, 2013a). English learning software entitled *IELTS Prep Software* provides an English learning platform mainly for IELTS candidates, providing help in developing basic skills such as reading, writing, listening and speaking (Hussain, 2013b).

Relief International Schools Online (RI-SOL) is among other NGOs seeking to introduce these new teaching approaches to teachers and to develop a learner-centred classroom environment (RI-SOL, 2010). In response to the growing demand for English as the language of opportunity for the twenty-first century, RI-SOL has launched English Language Clubs across schools in the Global Connection and Exchange Program (GCEP). The aim is to stimulate learners' interest in English language skills, to empower them to communicate fluently and effectively and to provide a platform for learners to learn and enhance their English language skills, improving their performance and potential (RI-SOL, 2009).

Influence of mass media

Bangladesh has a long history of using media to support ELL, broadcasting English lessons entitled *Shikharthi Ashor (School Broadcasting)*, on the radio from 1956 and subsequently on TV. Rahman and Panda (2012) noted that the country made significant progress following implementation of the IT policy in 2000, and this was subsequently customized in accordance with the Government's implementation of the Digital Bangladesh agenda. Hossain and Muttaqui (2006) state that the mass media were extensively used when BOU came into existence in 1992, as it runs open and distance learning programmes in which radio, TV, audio-video cassettes and other media play an integral role in programme delivery. Rahman and Panda (2012) noted that the dramatic acceleration in English teaching at NFE level was achieved through the appropriate use of ICT in communicative English. With the help of DFID, the EIA project developed English courses that use radio and TV programmes, non-broadcast audios and lessons for mobile phones. Support has been tested through baseline surveys, which found that mobile support is of crucial importance as it is very low cost and reaches learners effectively. Quality and extended service has enabled EIA to produce better media material to reach most of the dispossessed masses, and both radio and television have the potential to enhance English teaching in Bangladesh. In this way, the EIA contributes its share to programme delivery in this area, as other open learning systems have done, using radio, TV, mobile phones and the Internet. EIA materials offer the first Open Educational Resources (OER) for English learning, which are readily available on the web free of charge to any user. This EIA initiative has dramatically changed the ELL environment in Bangladesh. *BBC Janala* has proved to be a

very popular programme for learning English at NFE level through radio, TV, mobile phone and Internet. With the advent of mobile computing, the second language acquisition (SLA) process has become very effective. The spread of telecommunications, Internet and wireless technology has been dramatic, taking only a quarter of a century to earn the acceptance of various cultures around the world. The question now is how technology will affect the SLA environment, pedagogy and learning. We must consider Bangladesh as peripheral in view of its limitations and its people's capacity to spend on technological accessories for SLA (ELT World News, 2009). EIA English teaching programmes such as *BBC Janala* and *Bishaash* are very much learner-centred, operating outside the formal educational system of schools and colleges and focusing on practical skills and knowledge.

BBC Janala allows Bangladeshis to access short (2–3 minute) audio lessons by means of a simple voice call, using a four-digit code. The aim is to use the most widely adopted and affordable media available (television) to reach out to the many millions of ordinary people who have poor or nonexistent English language skills and lack the confidence to learn. Children and adults of all ages can watch the drama series *Bishaash*, accompanied by the linked English language learning show *BBC Janala: Mojay Shekha (Learning is Fun)* (BBC World Service, 2010). *Bishaash* is a drama-based TV lesson that captivates audiences while providing an introduction to beginner's English. While most of the speech is in Bangla to attract a mainstream audience, it includes functional English lines woven into the stories. This is followed by *BBC Janala: Mojay Shekha*, an entertaining educational game show and comedy that builds on the English used in the drama, offering a fun, accessible and free way for families to learn English together.

Mixing Bangla and English is a proven way of drawing people in and improving English language comprehension. EIA has made an innovative leap, using Buzz to generate interest in lessons that are available via mobile phone. The initiative is supported by Bangladesh's five biggest mobile phone service providers. Dial-up English lessons are three minutes long, but there are 49 hours of lessons available, with more being added. Lessons focus initially on essential phrases for interviews, work, greetings and travel, for example, with a strong emphasis on comprehension and pronunciation. Clarification, explanation and repeat options are available. At the end of each lesson, users are directed to follow-on courses, enabling them to expand the breadth of their spoken English as they move up levels. Within five weeks of being launched in October 2009, 1.5 million lessons had been accessed on Buzz, supporting the theory that engaging television content would stimulate interest in improving English language skills. Numbers were expected to jump dramatically when the new drama series, *Bishaash*, was launched in October 2010 (MacDonald, 2011). With regard to EIA's adult learning component, BBC WST's *BBC Janala* service (www.bbcjanala.com) looks to transform the way people learn language using technology. Support is provided through mobile telephony; by simply dialling the number 3000, learners can access lessons ranging from *Essential English* for beginners to *How to Tell a Story* for more advanced learners (Zaman, 2010). Baseline surveys and an impact assessment confirmed the appeal of their ICT programmes to the target group, creating a new environment for learning English as a second language among Bangladeshi citizens, both at the non-formal level and in the classroom. EIA has already developed an audio lesson on English subjects for secondary schools and made it freely available on the web for use in the classroom (EIA, 2015).

Private intervention

Learning English has been characterized as a high-demand subject among school graduates, who consider that it may make it easier to pursue studies in overseas countries and/or get a job. Responding to this demand, private coaching centres such as FM English Language Teaching Research Institute, Syf@rs and Mentors provide support to improve basic school language skills through face-to-face sessions, print modules and learning CDs, prepared in their in-house style and broadcast through private electronic media and newspapers (FM Institute, 2014). Once there is a demand, there is a business, and this demand is created by the country's resource constraints in providing conventional classroom facilities for learning English as a second language. As well as these private coaching centres, which offer English teaching on a commercial basis and have had a considerable impact on ELL in Bangladesh, print media regularly publish English lessons linked to the school curriculum.

Challenges of media-enabled learning

In school settings, the constant issue is how best to design instruction and implement applications in the classroom. There are some concerns about applying technology in the real-world classroom. First, the virtual classroom approach delivered through TV, radio or Internet is not necessarily suitable for every learner, as it requires more self-discipline from learners themselves and may not be able to provide a complete learning environment that includes social experiences and interactions. For learners in Bangladesh, this is all the more challenging. Secondly, the process of technological implementation will take time to integrate with current school systems and will involve a lot of money, time and effort. Will most schools have sufficient resources to adopt new technologies? Although Bangladesh has stated its commitment and has made significant progress towards mainstream technology-enabled classrooms, it remains a major challenge to keep up with innovation. Finally, the EIA survey found that many teachers realize that they are not well-prepared for new technologies. Susan Nelson mentions that educators cannot adopt technological instructions at a sophisticated level because "the school setting and the learner-teacher learning paradigm have been largely ignored by most major software designers" (2000). It is important that schools provide teachers with continuous professional development training to enhance their teaching methods and to improve their confidence in using new technology tools. For instructional designers, it is important to incorporate teaching methods that will create a more effective and interactive learning environment. These are the challenges and real problems that lie ahead. The programme has presented the real challenge of addressing learner needs through effective integration of ICT in support of learning, which has real potential as the number of Internet users continues to increase (see Figure 3).
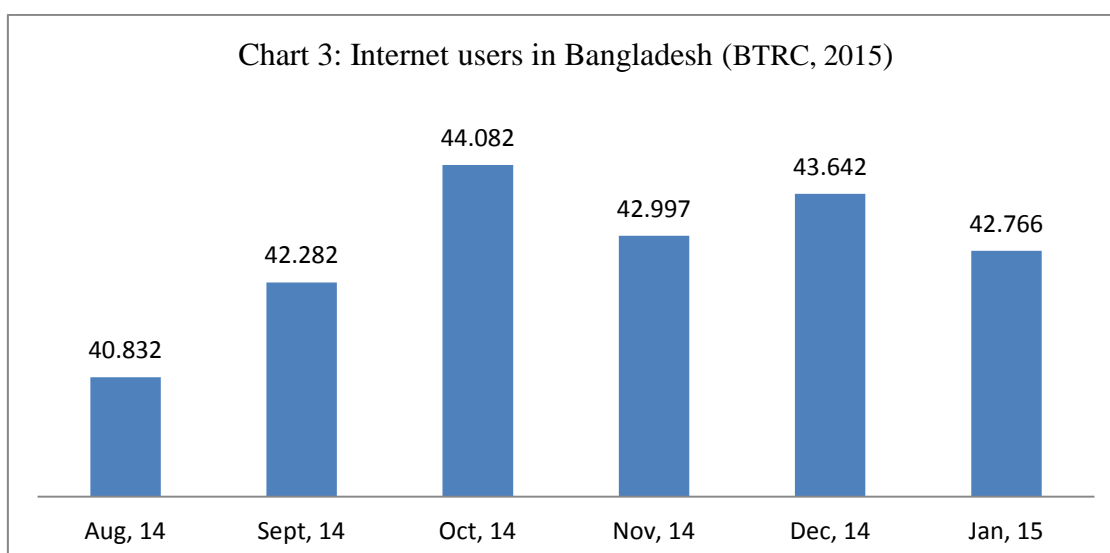
Chart 3

Conclusions and recommendations

When integrating technology into instruction, policymakers and educators should seek answers to the following questions.

- What is the educational value of technological advances?
- What type of information is best presented through which medium?
- How can we acquire more tools for education that combine quality technology with quality education?
- What are the critical tools for education?

Bangladesh already has resource constraints, and these questions are good reminders, encouraging policy-makers and educators to analyse instructional methods before creating new technology-embedded tools. There is no doubt that these tools can change learning and offer a more dynamic learning environment, but only if they are implemented effectively and efficiently for learners. Comprehensive action research is

therefore required to identify appropriate solutions. A further question arises: Will this in turn phase out the need for schools? Perelman (1993) argued that public education and schools or colleges will be replaced in the future by the hyperlearning revolution, but it is hard to imagine that everything that needs to be learned can be learned only through technology. At present, Bangladeshi classrooms are gradually being equipped with ICT resources such as multimedia projectors, language labs, computer labs and audio sound box systems. Everyone is unique; while some learners may readily absorb new knowledge through technology-incorporated materials, others may need more face-to-face interaction, where curriculum-linked, teacher-facilitated video lectures may prove effective. On that basis, both face-to-face and technology-embedded options are given equal consideration in Bangladeshi education policy.

Modern technology offers an easier and ever faster environment for accessing and retrieving information, and MOOC, OER and Moodle teachers are now being used as learning materials. Children can retrieve information much more rapidly online, but this does not necessarily mean that they have the ability to evaluate that information, nor does it mean that such information will trigger them to think deeply. Current creative education in Bangladeshi schools uses true learning that is less about the gathering of information than using and analysing information; the Internet does not promote this level of thinking (Nelson, 2000). Essentially, education should prepare learners to be creative thinkers by developing the requisite models and purpose for learning. As in the education policy of 2010, the goal of teaching and learning should be to train learners to think critically, providing them with opportunities to build up their own thinking experiences to implement the future teaching model. The Bangladeshi language classroom should therefore pay more attention to how instructions are delivered to learners and how learning objectives should be achieved. At the same time, the country should equip children with lifelong ELL capabilities such as reading, writing, listening, and speaking and decision-making, to face a society that is changing rapidly. As mobile Internet usage stands at about 97% ,and given younger generations' fondness for smart phones (see Figure 4), Internet-based ELL can be said to have tremendous potential in Bangladesh.
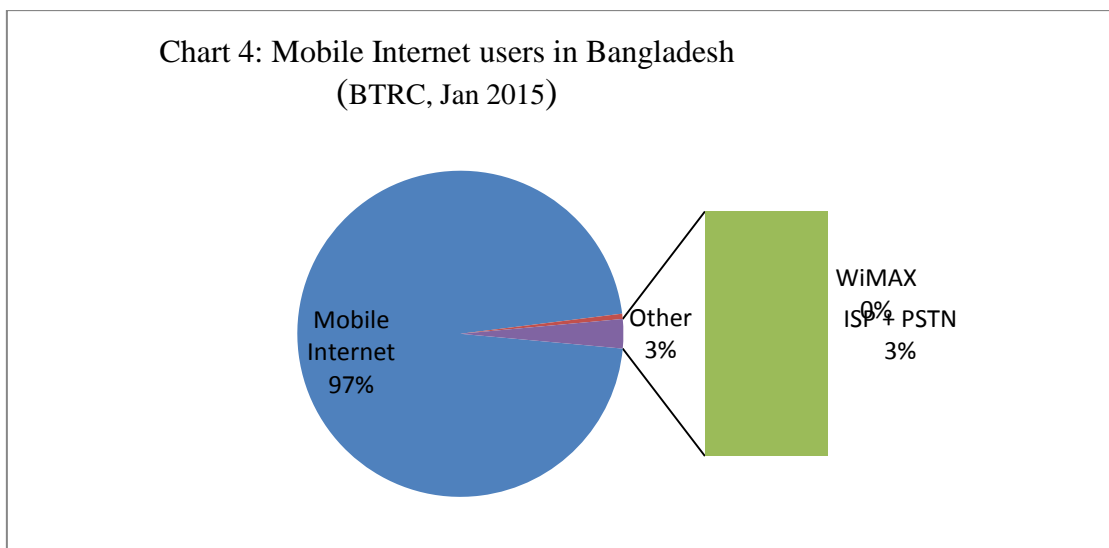

Chart 4

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Acknowledgement

Can innovative learning applications influence the students' attitudes towards science: The case of educational robotics

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This paper suggests the introduction and use of programmable robotic constructions in secondary school education aiming at changing students' attitude towards science. The theoretical background of the methodology is learning by inquiry and the tool that is going to be used is Lego Mindstorms Ev3, which offers a great variety of constructing and programming potentials.

Introduction

It has been observed in recent years that students are drawn away from science. This is due to the difficulty of the subject, the non-connection of what they learn to real life and the fact that students do not *learn* science. The only thing that they do learn is solving *some equations* (Redish et al., 1999; Mc Dermott, 1991).

The investigation of students' attitudes towards studying science has been a substantive feature of the work of the science education research community for the past 50 years. The increasing attention to the topic is driven by a recognition that all is not well with school science and far too many pupils are alienated by a discipline that has increasing significance in contemporary life, both at a personal and a societal level (Osborne, 2003). As Osborne states in his review article, «while it would be difficult to transform the nature of science offered in most curricula, at least in the short term, a better understanding of the attributes of science classroom activities that enhance 'task value' might make a significant contribution to how the quality of students' experience might be improved». Thus, innovative learning activities, such as the employment of educational robotics, may provide with the enhanced 'task value' and therefore influence the students' attitudes towards science.

Educational robotics is the tool that we will use in our attempt to alter this situation. We believe that as students are designing, building and programming these robots, they will be motivated to learn math and science needed to achieve their goal, (Frangou et al., 2008; Rusk et al., 2008; Church et al., 2010; Douglas et al., 2008), by exploring (Papert, 1980; Vosniadou, 2001).

Nowadays, the teacher has the means to associate the theory of science with real life through educational robotics. The students realize that they really use what they learn. The tool that will help us to achieve this goal is the Lego Mindstorms EV3. The majority of students are already familiar with the Lego bricks and the Lego constructions. Programming the robot is not going to be a problem as the Lego software being used is quite easy to be understood (Lego site, 2014). The versatility of the hardware and software allow a wide variety of possibilities in what students can build and program. Lego Mindstorms have been used by teachers all over the world in teaching STEM.

The main educational method being used in this research is the inquiry method because we believe that children may reach higher levels of understanding science when they perform structured investigations. Other methods being used are the constructional method and constructivism. In this work, we examine how students' attitudes towards science are influenced by innovative learning applications, such as educational robotics.

Description of the Sequence

We are trying to change students' negative attitude towards science by using educational robotics. In our attempt, Lego Mindstorms are used as "friendlier" towards the students. Lego bricks, sensors and an

"EV3 brick" (microcomputer) are used to construct the robot. In our research, the robot is constructed by the students easily by following some given instructions (Figure 1). The robot is a rover.

Figure 1 Rover

This study implements a ten-hour robotics program in the first grade of secondary school (12-year-old students) in Platon School of Katerini, Greece. Questionnaires had been given to them to examine their attitude towards science before the program took place (pretest) and after the program ended (posttest). Students were divided into groups of five or four with clear, but different roles each time (coordinator, manufacturer, developer, etc.). The division was made by us in order to have, students with different grades in science, different attitudes towards science, different genders, etc. in the same team.

We mentioned earlier that this was a ten-hour program. In these ten hours, the teams had to accomplish some *missions*. The scenario of the *missions* was that NASA has ordered you (the students) to build a rover that they need to send to a new planet that they have discovered. The rover must be fully programmed to act *by its own will* and can't be remote controlled. The *missions* guide the students to set the rover to fulfill its purpose, explore the planet. In order to do so, the rover must be capable of avoiding objects (using its sensors). During this procedure the students learn things about physics (velocity, force, friction, reflection of light, etc.), learn things about math (unit's conversion, angles, etc.) and acquire scientific skills (carry out measurements, draw graphs, solving problems). These *missions* were assigned to each team through students' worksheets. The teams use the worksheets to follow some guidelines and keep some notes. Through this procedure, they come across some problems that they have to overcome on their own. Of course these worksheets include some instructions given by us but as the program is progressing, less instruction is given. This is our way of making them inquire and not just follow instructions.

The programming of the robot is carried out by Lego Mindstorms software. The software is easy for the children to understand and use as it works with pictures. They don't need to know a programming language and so they can focus on understanding the nature of programming and not wasting time in trying to learn the language (Figure 2).
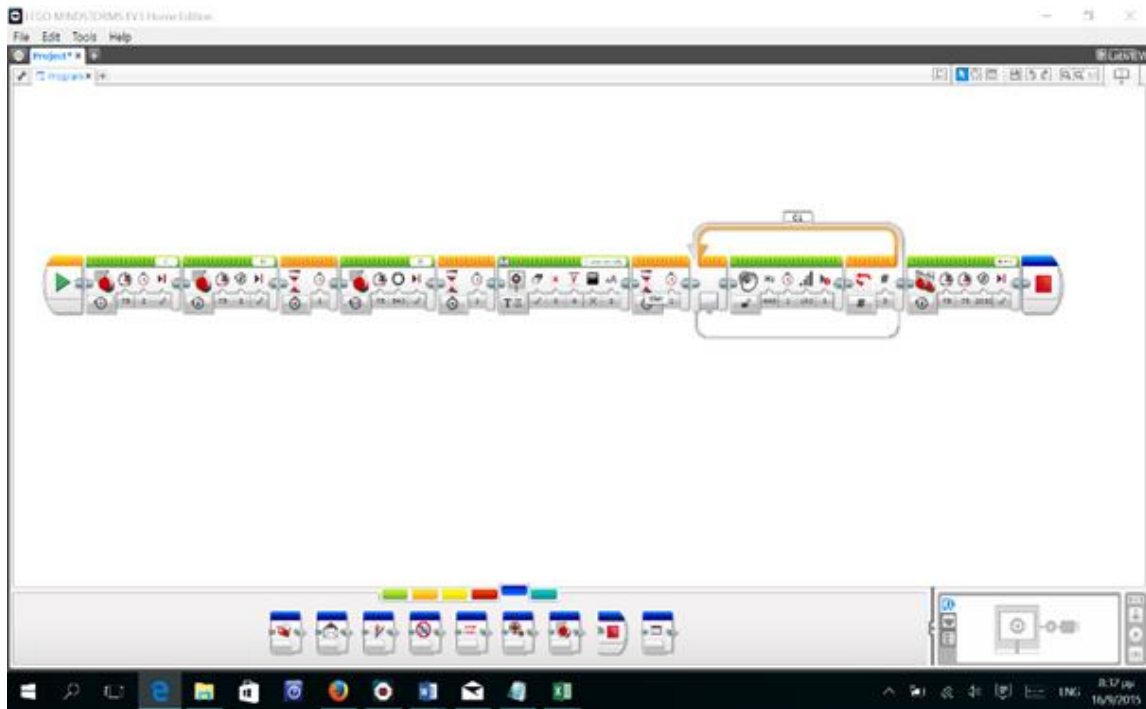
Figure 2 Lego Mindstorms software

Description of the method

In order to check if our method had any impact on students' attitude toward science, we constructed a questionnaire on a Likert scale, which was given to students before the program (pretest) and at the end of it (posttest). The scale was:

Never/Strongly disagree	Rarely/Disagree	Sometimes/Undecided	Usually/Agree	Always/Strongly agree

You can find the whole questionnaire in the appendix and it consists of 21 questions categorized in 5 categories that are:

1. Seven questions about themselves (gender, age, grade in physics, etc.)
2. 5 questions checking if the students are interested in physics and math (Q1: I observe natural phenomena and try to learn why they happen, Q2: I read science book and articles, Q3: I would like to have a job that has to do with science, Q9: I like science, Q10: I like math)
3. Four questions checking how students feel or react during class (Q5: I care about science class, Q6: I participate during science class, Q7: I feel nervous during science class, Q8: I would like to experiment more during science class)
4. Three questions checking if the students consider physics important (Q4: it is important for someone to know physics, Q11: I use what I learn in physics class in everyday life, Q13: I don't need physics)
5. Two questions checking if the students think that physics is easy (Q12: Science class is easy, Q14: Science is easy)

Results & Discussion

The data from the questionnaire is presented in Table 1. The statistical analysis was made using miniTab Statistical Software in two different groups, boys (11) and girls (16). We want to check if there is a significant difference between the pretest answers, given by boys and girls if there and what impact the sequence have in both groups. The scale used to assign the data was -2,-1, 0, 1, 2.
Table 1

Data divided into two groups boys (11) and girls (16)

	BOYS (11)					GIRLS (16)				
Question	Mean (pre)	Mean (post)	Alteration of Mean	Std. Deviation (pre)	Std. Deviation (post)	Mean (pre)	Mean (post)	Alteration of Mean	Std. Deviation (pre)	Std. Deviation (post)
# 1	-0,18	0,45	0,64	1,33	0,69	0,00	0,94	0,94	1,21	1,06
# 2	-0,91	1,00	1,91	1,30	1,29	-1,00	0,13	1,13	1,15	0,96
# 3	-0,91	-0,27	0,64	1,30	1,27	-0,56	-0,56	0,00	1,59	1,46
# 4	1,00	0,82	-0,18	0,77	0,60	0,56	0,94	0,38	1,31	1,39
# 5	1,18	1,18	0,00	0,98	1,25	0,44	1,75	1,31	1,55	0,58
# 6	1,00	1,09	0,09	1,26	0,83	1,00	1,25	0,25	0,89	1,18
# 7	-0,64	-0,91	-0,27	1,12	1,30	-0,63	-0,31	0,31	1,20	1,35
# 8	1,09	1,27	0,18	1,04	0,90	1,06	1,13	0,06	1,34	1,26
# 9	0,45	1,18	0,73	1,21	0,75	0,19	1,31	1,13	1,17	0,95
# 10	1,09	1,27	0,18	1,38	0,79	1,44	1,56	0,13	1,03	1,03
# 11	0,55	0,36	-0,18	1,04	0,81	0,38	0,75	0,38	1,20	1,00
# 12	0,18	0,45	0,27	0,60	0,69	-0,13	0,38	0,50	1,36	1,15
# 13	1,36	1,36	0,00	0,67	0,67	0,50	1,38	0,88	1,46	1,09
# 14	-0,09	0,27	0,36	0,30	0,90	0,25	0,19	-0,06	0,77	1,38

In the pre-test, the mean values are not significantly different for boys and girls (P=0.673, p>0.1), as shown by the 2-sample t-test. Similarly, the mean values in the post-test are not significantly different for boys and girls (P=0.730, p>0.1). In Figure 2, are shown the mean values for each of the 14 questions (gray points), along with the mean value of the distribution (red point) and the corresponding standard deviation. As can be seen, the mean values for the distributions in pre & post test for boys and girls are very close, and within the standard deviation of each sample. However, both boys and girls show the significant difference in the mean values for pre-post paired t-test comparison (P=0.028 for boys and P<0.001 for girls). Thus, both boys and girls have changed their attitude towards science, to more positive values.
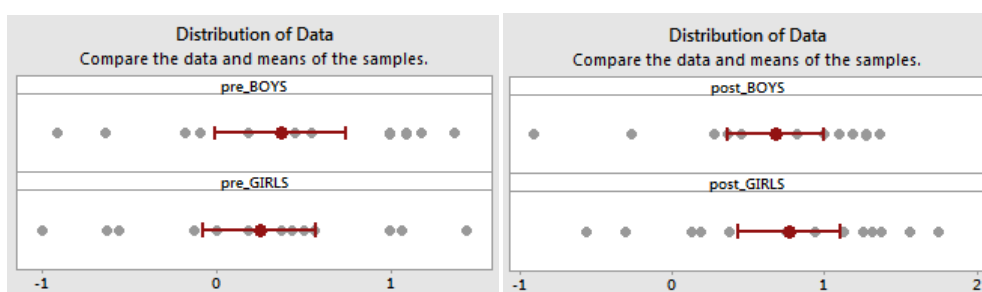
Figure 2 Distribution of data for pre (left) and post (right) tests for boys and girls

In order to explore more the change of attitude, we performed as the 2-sample t-test for the difference post-pre for boys and girls. Results are shown in Fig. 2. Though the there is not enough evidence to conclude that the means differ even at the 0.1 level of significance (P=0.288), the mean for girls is slightly higher than for boys (0.52 to 0.31) and the distribution for girls is narrower (standard deviation 0.46 to 0.56). Despite the low number of samples (11 boys, 16 girls), the distribution for girls is different from the one for boys. The skewness for girls is 0.46 (1.91 for boys) and the kurtosis is -1.27 (4.78 for boys). Skewness quantifies how symmetrical the distribution is. The higher value for boys indicates that the distribution is more asymmetrical, with longer tail to the right. Kurtosis quantifies whether the shape of the data distribution matches the Gaussian distribution. The negative value of kurtosis for the girls indicates a flatter distribution while the positive for boys indicates a more peaked than a Gaussian distribution.
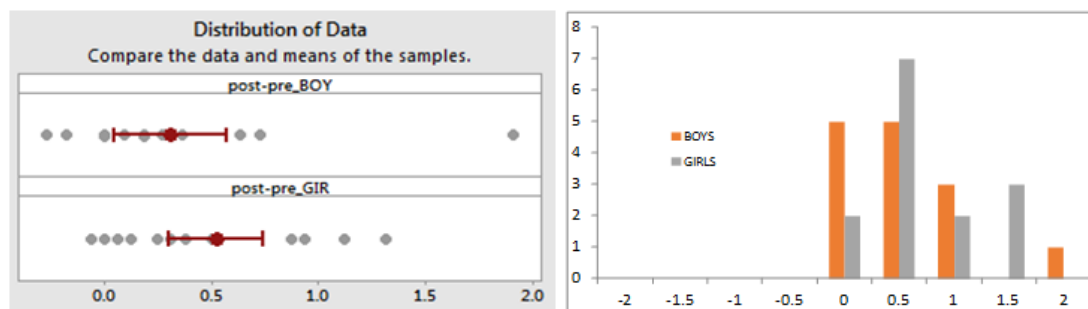
Figure 3 Distribution of data for the change of attitude (post-pre) for boys and girls

Conclusion

As an overall conclusion, there is a positive change in the childrens' attitude toward science. They have started to observe natural phenomena and try to learn why they happen more often than before; they think that science class is easier than they thought etc. The other science teachers from the school where the program took place also mentioned that they have seen some change in the childrens' behavior in the class. Some of them said: "They ask more questions", "They try to explain natural phenomena in a scientific way" and "They want more experiments".

Comparing boys' and girls' attitudes, there is not enough evidence to conclude that the means differ significantly. However, it seems that girls achieve a slightly better change in their attitudes than boys; the distribution for girls is narrower and more Gaussian-like.

It seems like innovative learning applications, in this case, educational robotics can influence the students' attitudes towards science. Although, we should consider that the number of students that took the program (27) is not adequate for us to draw concrete conclusions, it encourages us to continue the research.

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ECO project MOOCs. MOOCs for everybody.

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The European Commission, in its continuous effort to improve quality, access and equity in education and training in Europe, approved the ECO Project (E-learning, Communication and Open-Data) in 2013. Its MOOCs (Massive Open Online Courses) aim to reduce the barriers, by promoting inclusiveness and contributing to the collaborative construction of knowledge in the European education. At ECO project, the concept *openness* is the key for reducing the unnecessary barriers to accessibility and inclusiveness, understanding "open" not only as free -with no cost- but also as open accessibility, open licensing policy, open entry, open pedagogy and freedom to study everywhere and anytime. Based on these principles, and conducted in six languages, the sMOOC – social MOOC – *Step by Step* invite its learners to reflect on the importance of the massive online and open education in the 21st century culture and prepare them to become e-teachers, providing spaces in one of the ECO's platforms to host – for free – their own sMOOC.

Introduction

The debate about incorporating digital technologies in the educational environment has become obsolete. Now, the concern is focused on the technology accessibility and connectivity as essential means to overcome the digital divide and allow citizens to participate in the culture of our time.

The Open Online Courses have provided citizens with new ways of social construction of knowledge and new ways of access to information. Not only should these courses be measured in the technological advances, but also in the cultural and communication changes they entail.

In particular, MOOCs (Massive Open Online Courses) differ from the traditional online education because of the number of participants. There is no precise number for defining "massive", so depending on the characteristics of a MOOC it could have even thousands of students and, therefore, it implies a huge diversity and variety of learners.

In 2013, the European Commission decided to bet on a quality massive online education and approved the Project *Elearning, Communication, and Open-data: Massive Mobile, Ubiquitous and Open Learning* (henceforth ECO Project), in which inclusiveness and accessibility are two of the essential goals.

Figure 1 Eco Project Website (http://project.ecolearning.eu)
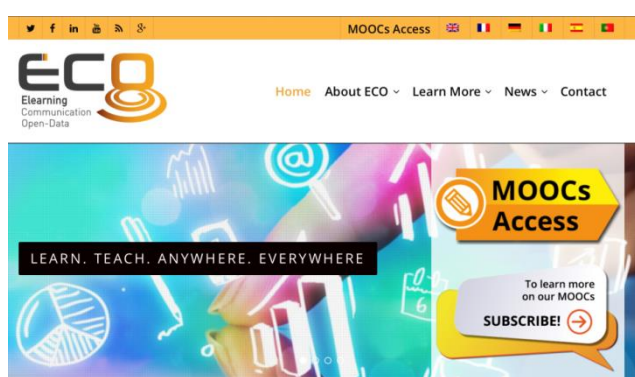
ECO Project MOOCs

The ECO Project is part of the Open Education movement in Europe. This project was approved by the European Commission with the aim of removing all unnecessary barriers to learning and providing citizens with the chance of having a successful education, regardless their language, culture, social status, location, or physical or mental ability.

ECO MOOCs are focused on a networked and ubiquitous learning, and concepts such as equity, social inclusion, quality, diversity, autonomy and openness are the basis of their pedagogical framework. This *openness* should not be understood just as free –with no financial cost-, but also as

- *open accessibility*, paying special attention to people at risk of social exclusion and people with disability;
- *open licensing policy* (reuse – remix – rework – redistribute), both in the MOOC contents and the MOOC platforms;
- *open entry*, to everybody, in 6 languages;
- *open pedagogy*, involving students in their own learning process and using the support among students as a principle to promote inclusiveness;
- freedom to study anywhere and anytime.

The project is divided into two phases. The first one in which the project has been mainly focused on (a) the design of that open pedagogical framework tailored for the social and seamless MOOCs (henceforth sMOOCs), providing learning experiences marked by social interactions and participation, (b) the integration of six different platforms with a common access for all participants and (c) the implementation of three pilot phases with sixteen sMOOCs in 6 different languages (English, Spanish, Italian, French, Portuguese and German) with educational approach.

The second phase started on April 2015 and aimed to train four thousand European participants in order to create their own sMOOC. For that, the learners –most of them teachers- who finalized one of the sixteen MOOCs in the first phase have the chance to enroll in the sMOOC *Step by Step*, in which they can build their own MOOC experience and expertise in the ECO project, in accordance with its specific pedagogical model.

Figure 2 Access to the MOOCs (https://ecolearning.eu)

Therefore, not only does it guarantee the training of European teachers, but also assures and enables the production of sMOOCs for European students, generating a very important multiplying effect.

Accessible MOOCs. MOOCs for everybody

The World Wide Web Consortium (W3C) is an international community whose main mission is to lead the web to its full potential, following two main principles:

- Web for All.
- Web on Everything.

ECO sMOOCs include these two principles as essential. For that, the creators and the professors have been trained from the beginning of the project and, therefore, the contents of the sMOOCs are composed of accessible videos, texts, and podcasts.

Accessible videos

Videos are accessible when everybody, regardless of their abilities, can understand and interact with them. In particular, the following disabilities have to be borne in mind for creating an accessible video:

- Blindness.
- Colour-blindness.
- Low vision.
- Photosensitive epilepsy.
- Deafness or hearing impairment.
- Motor impairments.
- Cognitive impairments.

The video cannot be directly accessible, but must be made fully accessible to a wide range of people by providing it with subtitles, audio description, full-text transcription and, when possible, sign language interpretation.

At ECO Project, an accessible video player (Figure 3) has been developed and integrated into the ECO platforms.

Figure 3 Accessible Video Player in OpenMOOC Platform

Accessible texts

The text is the basic element in communication via Internet. For this reason, at ECO Project the text is presented in a way that can be perceived without the design interfering with readability. And *text* means not only textual documents but also any web content written in the platforms, such as massive messages, posts in the forums, pieces of news, etc.

The following features are always borne in mind:

- Correct and well-nested structure.
- Use of suitable colours and contrasts.
- Correct links, with titles when necessary.

- Images with alternative text and long description when necessary.
- Correct lists of items.
- etc.

sMOOC step by step

The sMOOC Step by Step is the result of the collaborative work among many European universities, members of the ECO Project. In Spain, The National Distance Education University (UNED), The University of Cantabria, Loyola Andalucía University, The University of Valladolid, The University of Oviedo and The University of Zaragoza; in France, Sorbonne- Nouvelle University; in the United Kingdom, The University of Manchester; in Italy, Politecnico di Milan; and in Portugal, The Universidade Aberta.

Other institutions, specialized in upper online education have collaborated in the creation of this sMOOC: *Telefónica Learning Services* from Spain, *Sünne Eichler* from Germany and *FEDRAVE* from Portugal.

The experience carried out in the first edition of the sMOOC *Step by Step* – dated on April 2015 – was very exciting and enriching for all the members of its learning community. The learning methods and the networked communication ways, as well as the pedagogical approach of the digital scenarios, promoted an exceptional activism and involvement by the community, both inside and outside the sMOOC environment.

This participants' involvement in the sMOOC was the key factor in attaining the proper construction of knowledge but, nevertheless, this involvement would not have been possible if accessibility and standards adaptation had not been prioritized.

Based on the *universal design* and the *responsive web design* principles, the sMOOC Step by Step is organized for assisting the huge diversity of participants and supporting everybody's teaching and the learning process, regardless their capabilities, needs and social or cultural conditions.

An innovating experience of a MOOC conducted in six languages at the same time: Spanish, English, French, Italian, Portuguese and German, whose participants – most of them teachers or social workers that have previously finalized one of the 16 ECO sMOOCs- learn how to create their own sMOOC step-by-step in accordance with ECO's specific pedagogical model based on social constructivism and inclusiveness.

In six steps, participants develop the skills for creating a sMOOC: Why and how to do it? How to manage it? How to use the technology? How to make it accessible to everybody? How to disseminate it? How to evaluate students? And finally, how to use the data?

Four thousand citizens will have the chance to become an e-teacher thanks to the ECO Project and, particularly, to the sMOOC *Step by Step*, where they will be provided with a space in one of the ECO's platforms to host – for free – the sMOOC they create.
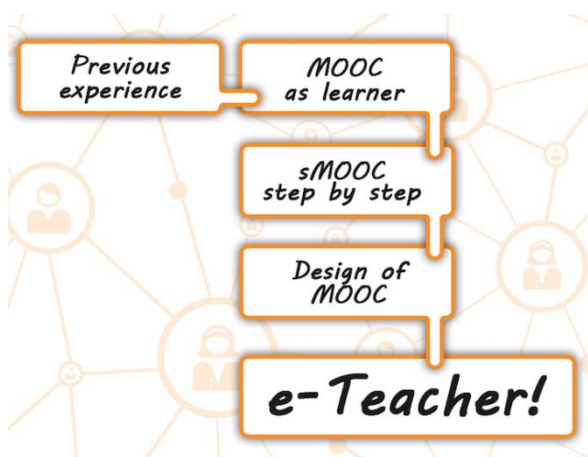
Figure 4 Flowchart *How to become an e-teacher*

Conclusions

The ECO Project provides the opportunity to have an active role as a participant in one its courses, manifesting the huge MOOC power for removing any barriers caused by social and cultural exclusion.

Particularly, the sMOOC *Step by Step* stands out, in which not only have the barriers been removed, but also the participants learn how to create a massive course for all obeying an open pedagogical model based on the inclusiveness and the social construction of knowledge.

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Acknowledgements

The UOC's educational model: From collaborative learning to agile learning

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Collaborative learning and virtual learning communities are key elements of the educational model in the UOC. Our model emphasizes the student learning process in the context of an e-learning community with a personalised and constant support from the teaching staff. Given the flexible, open and innovative spirit of the UOC, we are constantly enhancing the student learning experience. To this end, a review of teaching methods to improve the teaching-learning processes taking advantage of the full potential of technologies and emphasizing social learning approaches has been carried out. Methodologies from other fields may be incorporated to enrich our educational model. Among these methods, we are especially interested in agile methodologies that allow a qualitative leap in collaborative learning, facilitating decision-making, allocation of roles, time management and distribution of responsibilities. As a result of a literature review, a pilot test to implement agile learning in virtual contexts is proposed.

Introduction

The mission of the Universitat Oberta de Catalunya (UOC) is to provide people with lifelong learning and education opportunities. The aim is to help individuals meet their learning needs and provide them with full access to knowledge, above and beyond the usual scheduling and location constraints. Due to these characteristics, the UOC has become one of the referent institutions for adult students and people with disabilities. These students have many time constraints and are job-oriented. They do not expect traditional lectures and abstract activities, they demand meaningful activities that make them actively learn supported by experts. They need to acquire competences for their current jobs, so they ask for situated and autonomous learning.

Teachers at UOC are continuously working to offer the best learning experience for the students, focusing the efforts on guiding them and providing rich feedback to enrich their knowledge and the development of their professional competences. The personalisation of learning is one of our main principles. It also takes profit of the professional contexts of the students by promoting activities based on their real contexts.

This student-centred approach can make students react when they are asked to learn in collaboration. Collaborative learning is key for the UOC as it is considered that it is one of the most important aspects to advance in today's society. It is a must in the job market. Our students can self-regulate their learning based on their needs and taking advantage of the community of learners. However, it is not easy to create learning activities that respond both to the individual and group expectations nor to convince the students to devote more time and effort to negotiate and work with peers.

For this reason, we have been working to improve our teaching methodologies, with the aim of proposing a range of possibilities for teachers to develop active learning activities, to promote meaningful collaborative learning experiences, and to increment the link with the professional world. The result of this need for improvement is a literature review of pedagogical trends and a pilot study with a methodological proposal to implement agile learning at the UOC.

The UOC's educational model and the teaching methodologies

The UOC's educational model puts the learning process of the student into the centre being the design of the learning activities the core around which teaching is organised. The activities are based on autonomous, authentic, personalised, situated, collaborative and ubiquitous learning. The model is open and flexible enough to be adapted to different kinds of learning situations. The aim of the teaching-learning process is to encourage students to develop professionalising competencies through continuous assessment. Most of the students enrolled at the UOC are already professionals, so the educational model

offers a high degree of personalisation and adaptability that empower the student to be actively involved in his/her learning and to learn and practice within their professional contexts or based on their previous experiences.

The teaching process is designed to support the student learning process across the selected degree. The model allows each student to self-regulate its own learning process and promotes autonomous learning guided by teachers. It is based on four core pillars that configure the learning experience:

- Teacher support: there are three teaching profiles (facilitator, professor and tutor). All three work together to ensure a quality learning process by designing the subject and coordinating the facilitators (professor), guiding and evaluating the learning process within a subject (facilitator), and orienting the student to select a personalised academic itinerary during the whole UOC experience (tutor).
- Assessment: assessment is formative and provided during the whole learning process. Teachers give personalised feedback to the learning activities providing indications about the student competences' achievement and offering opportunities to improve their learning.
- Tools and resources: the UOC offers a flexible model that allows the student to learn anywhere, at any time and using any device. Students can adapt the learning process according to their lifestyle and career and can consult materials in different formats and from multiple devices. The model makes an intensive use of interactive and multi-format materials (i.e., enriched videos, hypertexts, audiobooks, videobooks), multimedia resources (combining text, audio, image and video), virtual learning spaces (i.e., 3D virtual environments, virtual campus), and diverse learning tools (wikis, blogs, forums, microblogs, tools to record and share video and audio files).
- Learning community: at the UOC the students can share knowledge and work together with peers in every subject, and learn with and from the others. Collaboration in small groups is highly promoted and students can also continue exchanging information and knowledge within the community of learners of the university and after being graduated in the "Alumni" community.

Due to the flexible, open and innovative spirit of the UOC, we are currently evolving and testing methods and techniques, including methodologies and resources from other disciplines, in order to improve the student learning experience. To this aim, we have carried out a literature review about teaching methodologies. Most of the literatures (Alcoba, 2012; Fernandez, 2012; de Miguel et al., 2006; Milwood, 2013; Sheffield Hallam University, 2014) distinguish among these four groups of teaching methodologies: information-focused learning (lectures, resource-cantered learning), self-directed learning, work-related learning (problem solving, problem-based learning, project-based learning, cooperative learning, role-playing, simulations, action-based learning, seminars), and peer-learning (critiquing, debate).

The reports regarding pedagogical trends (Sharples et al., 2013, 2014; Johnson et al., 2014, 2015) and the future of learning (Davidson & Goldberg, 2010; European Commission, 2014; Fundación Telefónica, 2012; Gros, 2011; Miller, Shapiro, & Hilding-Hamann, 2008; Redecker et al., 2010, 2011; Scanlon et al., 2014) reveal new teaching methodologies that can fit the principles of the pedagogical model of the UOC. These methodologies include inquiry-based learning, digital storytelling, agile learning, game-based learning, tinkering, and design-based learning.

From these previous teaching methodologies, we are especially interested in agile methodologies seen as an opportunity to improve the collaborative learning process.

From collaborative learning to agile learning

The EEES recognises teamwork as a one of the competencies that every student has to develop in order to meet the needs and skills of the labour market. There is no doubt that students can learn more and better when they do it with others, however asking students to work in groups does not guarantee collaboration (Soller et al., 1998). In the collaborative knowledge building approach, collaborating is much more than learning something together: it is creating knowledge through a cyclical process of problem-solving in a classroom-based learning community.

To construct knowledge in collaboration is complex and implies commitment, time management, to take into account other views, to negotiate meanings, to distribute role, to plan, to cede, and to make shared decisions (Noguera, 2013). That is not easy, and it becomes more difficult when collaboration is fully on-line. Even so, computer-supported collaborative learning has become more and more widespread. At the UOC, the capacity to work in a team in a virtual environment is considered as one of the required competencies that every student has to develop. For this reason, there is a mandatory subject called *Collaborative learning in virtual environments* in which every student has to be involved when enrolled at any UOC degree. Collaborative learning is also encouraged in any other subject.

However, we have noticed that our students, who are adults with family responsibilities and with time constraints, sometimes react negatively to collaborative learning. Kischner et al. (2008) note that the task must be such that the benefits of working together on a task outweigh the costs. Based on this premise, we have investigated how to improve collaborative learning dynamics and we have discovered that agile-based learning can be of help to design and support more effective and satisfactory collaborative practices. In our view, the agile method can be seen as a mixture of collaborative learning, project-based learning, problem-based learning and design-based learning.

The agile method comes from the development of software where teamwork, communication, adaptation to change and decision-making are promoted. In software development, there are some methodologies, like SCRUM or Kanban methodologies, that determine the way the teamwork is performed. The SCRUM methodology proposes an iterative process in which decisions are taken at different times, that can imply going back, and making changes on the go. The main features are: ephemeral roles (roles are changing among team members), sprints (partial deliveries of work between 1-4 weeks), flexibility (at the end of each sprint tasks are evaluated and, if necessary, the course of the project changes), regular meetings, work divided into blocks, and shared responsibility by the whole team. Typically, the stages are: (a) Sprint 0, (b) planning, (c) development, (d) review, and (e) analysis.

The Kanban methodology is based on the idea of frequent delivery and prioritization (Kniberg, 2009). The work is split into pieces; each item is written on a card and putting on a virtual wall. Each item has to be set in a column (i.e., to do, in progress, done) to visualise the workflow and the average time to complete each item has to be indicated.

The principles extracted from these methodologies were collected in the *Agile manifesto for software development* (Fowler & Highsmith, 2001). Trying to extend the agile principles into the education context, in 2011 was created the *Agile Schools Manifesto* (Peha, 2011) and in 2012 was published the *Agile Manifesto in Higher Education* (Kamat, 2012). In this manifesto, there are four guiding principles: a) teachers and students over administration and infrastructure, b) competence and collaboration over compliance and competition, c) employability and marketability over syllabus and marks, and d) attitude and learning skills over aptitude and degree. As Kamat (2012; p. 2) affirms: "The most important principle in agile is to take continuous feedback, learn from the previous iterations and try and improve in the next iteration".

Agile methods are widely adopted in software development and project management and increasingly used in teaching Computer Sciences in Higher Education. Royle and Nikolic (2013) consider that agile learning implies learners' creation of content and the development of skills alongside teachers in a collaborative yet competitive environment mediated by technology. The role of the teacher is based on facilitation and project direction from an informed perspective and learners become self-directed, team oriented and individually resilient lifelong learners.

According to the creators of the eduScrum guide, Delhij and van Solingen (2013:5), "the key to all is ownership, the students have the freedom to determine their own learning process within given boundaries and learning goals". In eduScrum processes, fun is an important motivator for students, and teachers have to ensure an enjoyable work. They consider that an eduScrum Team is composed by a Product Owner (teacher, who determines what needs to be learned, monitors the process and evaluate students), a student team (a self-organised, responsible and multidisciplinary team that delivers learning results iteratively and incrementally), and an eduScrum Master (coaching leader chosen by the Product Owner or by the class, that helps their team to perform optimally but do not direct the team).

Kropp et al. (2014) consider that adopting agile methods in education is challenging because: it is not easy to realize and maintain teams in a complex process of self-organisation and self-determination throughout a project; it is hard to organise and collaborate among different stakeholders with different interests and perspectives; it is complicated to manage time pressures and technical, business and management problems; mediated communication is more complex than face-to-face teams' communication. Based on a research they conducted, the biggest challenges observed in agile team development are collaboration and communication.

In the near future, we would like to establish some guidelines on how to successfully implement the agile method in e-learning in HE. For this reason, we have designed a pilot study in order to transfer the previous indicators to the UOC context.

Designing the teaching and learning process using agile methodology

The subject called *Collaborative learning in virtual environments* is a cross-curricula and common subject at UOC in all Computer Science, Multimedia and Telecommunication degrees. The main goal of the subject is to promote the acquisition of some competencies such as collaborative work and use and application of ICT in learning and professional environments. This subject uses an online project methodology that aims to build a digital project in small groups of students following a progressive and modular approach in each activity.

The project is divided into four phases. The first one is related to search and locate information on the net. The second one focuses on establishing the group agreements and scheduling for dividing the work between the students in each teamwork. The third one is for developing the skeleton and a first approach of the project while the last one is the delivering of the project itself. At the end of the subject, each group of students have to create a presentation of the project and discuss it with the whole classroom.

As mentioned in previous sections, we have seen that the agile methodology, which belongs to the software development area, will be very useful to provide students with the most used methodology in the context of the Computer Science, Multimedia and Telecommunication degrees. This approach fits into the subject area so several changes may be done in order to adapt the subject methodology to the agile methodology. We are currently in a design phase. Next semester, when the subject will be completely adapted, a pilot test with 210 students will be conducted. The design work developed till now is described as follows.

Following the main principles of the Agile methodology, the four phases of the digital project can be maintained but the current schedule has to be adapted in order to respect the timing of the agile approach. Although there are several tools and resources to support the scheduling process, we are just introducing the *Trello* tool for optimizing the ability of managing and scheduling the project phases. It means that students have to learn to use the Trello tool that is composed of three main stages and lists: 1) To do; 2) Doing; 3) Done. Each member of the work group will be able to adopt a coordinator and participant roles according to each stage. Each member, then, will be responsible for the project execution and the whole group shares the responsibility of any task. At the beginning and the end of each stage, the project development is reviewed in an iterative process. Any deviation or an avoided partial delivery may be redressed in a short period with the consent of the participants. The schedule of the stages of the digital process has continuously been adapted to ensure the final product. From the teacher point of view, continuous feedback has to be provided across each stage and at the end of each one. The teacher provides continuous formative assessment that allows students to improve and optimize their learning process across the stages to pass the project. The teachers act here as supervisors, trying to improve each iteration process along the digital project development.

Conclusions

We believe that agile methodologies could be implemented in several disciplines, not just in computer Sciences. Agile learning could transfer the barriers of teams and classrooms, truly promote the advance of

learning communities within classrooms, and to extend the interaction among students from different disciplines.

According to the aim of the UOC' educational model, agile learning would support the professionalisation of our students and would help to give continuous meaningful feedback. In fact, we consider that it is very positive to enrich the learning process adding some methods and techniques from other disciplines or from the job market itself. These methods allow teachers to redesign curricula adding the advances of the society. If students learn in the same manner they will work; the university can prepare them better for their future inclusion in the job market and lifelong learning. This process is a good effort to align the teaching-learning processes with the job market needs. Through the following semesters then, we aim to incorporate the agile method as a key element in the educational model trying to ensure an effective and pleasant collaborative learning experience. This is one of the key elements to match education processes with the real professional competences expected.

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Analysis of difficulties of Spanish teachers for the inclusion of teaching methods based on digital reading within PISA framework

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Digital technologies have changed the ways texts are produced and displayed, and those changes have a profound impact on how students read. In Spain, the results in digital reading competence are below the OECD average, which proves to be a handicap for Spanish students. This article presents a case study in which we investigate, through a quantitative methodology, teachers' perceptions on the main constraints for the effective development of a teaching methodology to improve the digital reading competence of students. The findings show how learning processes based on digital reading are still underdeveloped, and teaching staff in a large majority expresses the lack of preparation, training, and resources available in the school for the effective development of a teaching that encourages successful digital reading proficiency.

Introduction

As education systems increasingly incorporate computers and related information technologies into pedagogical processes, educators and policymakers need to know which activities and policies will lead to the most effective learning. The past decade has also seen the explosion of mobile technologies, with laptops, tablets, smartphones and other portable digital devices being sold in increasingly large numbers. Information and communication devices based on digital technologies are used in a wide range of contexts and for many different purposes. Their most important common characteristic is that they all permit the display and perusal of text. Indeed, most applications of computer technologies, including videogames, smartphones, tablets, etc., involve some textual information. As a result, whatever their purposes, tasks or goals, users of computers and networked digital technologies are compelled to read digital texts. In this context, the assessment of digital reading competence is necessary and essential to complement the indicators and descriptors of communicative competence, which has led to its inclusion in PISA-ERA, 2009-2013 (Programme for International Student Assessment-Electronic Reading Assessment).

At present, teachers are making great strides in integrating new methodologies for treatment and development of digital reading processes, but it is also true that much remains to be done (Linnakyla, et al., 2004). The appropriate use of ICT (Information and Communication Technologies) requires that students, who are now becoming critical citizens, learn new ways of reading and writing on digital environments. For this purpose is required to integrate new communication competencies and a specific teaching of a specific training in digital linguistic aspects in order to improve capabilities of encoding and decoding digital text (Salmerón, et al. 2006; Coiro, 2009; Coe & Oakhill, 2011; Vázquez-Cano, 2012). For that purpose, it is important to generate new "information skills", and "media communication skills" (Lawless & Schrader, 2008; Kemp, 2011; Agudo, Pascual, & Fombona, 2012) and combat the general lack of understanding of critical digital readings (Lin, 2003; Madrid & Cañas, 2008).

One of the main findings of PISA 2009-2013 international assessment is that there is no direct relationship between the time of use of digital devices and the Internet browsing time on improving competence in digital reading. Therefore, one of the main aspects to consider is that a teaching methodology based on promoting digital reading skills is one of the key elements to reinforce in relation to teachers' training. The Spanish students' results in digital reading are below the mean of OECD countries. For this reason and with the support of the Spanish Ministry of Education, we have conducted a research in which we analyze the difficulties and challenges that teachers have to develop teaching practices in order to enhance students' digital reading competence.

Spanish teenager digital context within PISA

The habits of use of digital devices of Spanish students at home and school were analyzed in PISA report (PISA, 2009). Students were asked to report how often – "never or hardly ever", "once or twice a month", "once or twice a week" or "every day or almost every day" – they use a computer at school for the seven following activities: *chat online at school; use e-mail at school; browse the Internet for schoolwork; play simulations at school; practice and drilling such as for learning a foreign language or mathematics; do homework on a school computer; and use school computers for group work and communicating with other students.* Students' responses to these questions were combined to make an *index of computer use at school* (Figure 1).
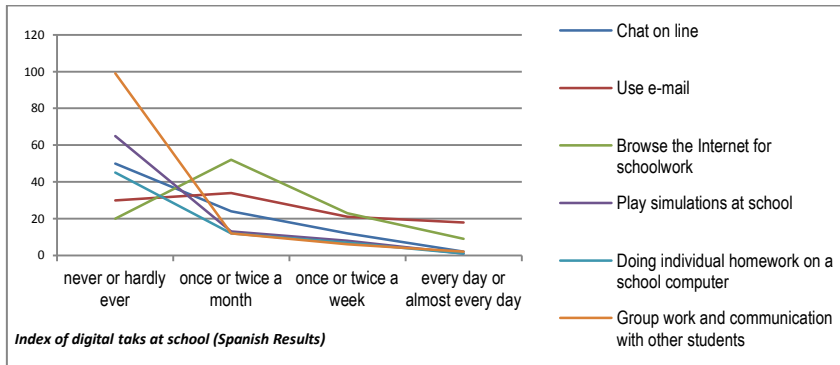
Figure 1 Index of digital tasks at school (Spanish Results)

In PISA, 2009 students also reported for the first time how much time – *no time*; *0-30 minutes*; *30-60 minutes* or *60 minutes or more*; they spend during a typical school week using a computer in three different subjects: *language-of-instruction, mathematics and science*. Students who spend no time using a computer during school lessons perform the best, and the more time students spend using a computer during school lessons, the lower their scores in all three core subjects. This finding should be interpreted with care: it does not necessarily suggest that spending more time using a computer in lessons results in poorer performance. The findings in this index suggest that access to computers at school is not the sole determinant of performance; students who use computers at school must also develop the knowledge and skills needed to locate and use the range of information available through the computer or digital devices.

In addition, students were asked to report how often they use a computer at home for the following activities: *play one-player games; play collaborative online games; use e-mail; chat on line; browse the Internet for fun; and participate in online forums, virtual communities or spaces.* Students' responses to these six activities: "never or hardly ever", "once or twice a month", "once or twice a week" or "every day or almost every day"; were combined to make an *index of computer use at home* (Figure 2).
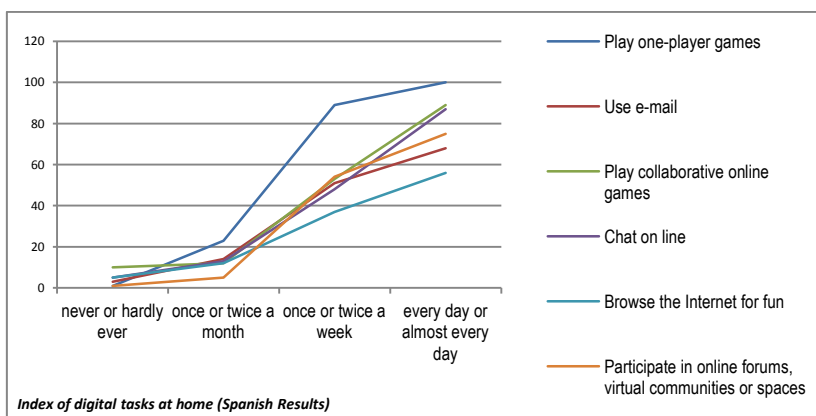
Figure 2 Index of digital tasks at home (Spanish Results)

There is a positive linear relationship between performance in digital|reading and computer use at home, particularly computer use for leisure while there is no significant relationship with computer use at school

(Postlethwaite, 1995). The frequency of computer use at home for leisure is positively related to navigation skills, which is an essential and unique part of digital reading, while the frequency of computer use at school is not. These findings suggest that students are developing digital reading literacy mainly by using computers at home to pursue their interests. It can also result from variations in how digital technologies have or have not been integrated into curricula and instructional systems.

The findings suggest that access to computers at school is not the sole determinant of performance; students who use computers at school must also develop the knowledge and skills needed to locate and use the range of information available on the computer. Thus, it is essential to assess how teachers are developing activities to improve students' digital reading competence and analyze the difficulties in performing new methodological approaches.

PISA develops a set of generic descriptors of competence in digital reading and sets the definition of *digital reading competence* when the student is able to understand, use, reflect, and interact with texts in digital format for a specific purpose, develop their knowledge and participate in society. The Spanish sample was composed in 2009 by 2300 students from a total of 170 schools. These tests require access, understanding, assessment, and integration of digital texts in a range of contexts and reading assignments. Special attention is paid to the domain of processes, understanding of concepts and the ability to handle different situations in the recent forms of digital reading and the different requirements in terms of access to the texts. Digital tests involve reading, interpretation and reflection, and an ability to use reading to achieve one's goals in life. The average score of the competition is set to 4 levels; the following table shows the data obtained in 2009 by participating countries.

Table 1
Student performance in digital reading (sorted from lowest to highest test score)

Level 1 (-420)	Level 2 (420-490)	Level 3 (490-550)	Level 4 (550-600)
1. Colombia (368)	2. Chile (435) 3. Austria (459) 4. Poland (464) 5. Hungary (468) 6. **Spain (475)** 7. Denmark (489) 8. Maco-China (492)	9. France (494) 10. Norway (500) 11. Belgium (507) 12. Ireland (509) 13. Sweden (510) 14. Iceland (512) 15. Hong Kong-China (515) 16. Japan (519) 17. Australia (537) 18. New Zealand (537)	19. Korea (568)

Source: *OECD, PISA 2009 Database* (Average punctuation: 499 points).

According to this research, the same agency has announced that the skilled reader of digital texts must be familiar with the use of navigation devices and tools. These results imply that, contrary to what is often assumed, many "digital natives" do not know their way easily in the digital environment, and it becomes thus necessary for teachers to help them acquire it at school. For this reason, good methodological approaches have to be experimented in order to improve the digital reading competence of students and, at the same time, main difficulties have to be analyzed to improve the didactics on digital reading.

Method

The objective of this study is to analyze the difficulties that Spanish teachers have to face to improve their teaching in the promotion of digital reading competence of students in secondary schools. Specifically, the research will identify difficulties of Spanish teachers to improve students' digital reading, and determine what proportion of those difficulties can be improved in the future.

The survey tool used to measure technology acceptance contained 37 items. This survey tool was electronically administered to 675 teachers in different high-schools from Spain with similar size, between 500 and 625 students. The survey instrument contained questions addressing each of the main digital reading areas. The four macro variables considered were: *Teachers' digital competence / Attitude / Actual use, Resources and Facilitating Conditions / Actual use and Training / Actual use;* organized in 21 items. Survey participants were asked to indicate their response to each statement using a 5-point Likert scale with 1 representing a strong disagreement and 5 being a strong agreement with the statement. Data were collected from teachers of different subjects including Mathematics, Spanish Language, English

Language, Biology, Social Sciences and Physical Education. From the participant pool of 675 individual teachers, the database recorded responses from 450 participants resulting in a response rate of 66.6%. Measurement validity in terms of reliability and construct validity was evaluated. The reliability analysis was conducted in order to ensure the internal validity and consistency of the items used for each variable. (Zhang, Li, & Sun, 2007).

Table 2 shows the reliability of the measurement scales. Cronbach's alpha reliability scores were all over 0.8, which is considered appropriate. Hence, the results demonstrate that the questionnaire is a reliable measurement instrument and can be used in the research.

Table 2
Cronbach's Alpha reliability

Construct	Number of questions	Cronbach's alpha
Teachers' digital competence / Attitude	7	0.85
Attitude / Actual use	6	0.95
Resources and Facilitating Conditions / Actual use	5	0.88
Training / Actual use	3	0.87

First, a simple linear regression analysis was conducted to accept or reject the four null hypotheses stated.

- $H0_1$: Teachers' digital competence has a significant influence attitude to perform digital reading activities.
- $H0_2$: Attitude towards digital reading has significant influence on the actual use of teaching methods based on reading digital activities.
- $H0_3$: Resources and Facilitating Conditions have a significant influence on the actual use of teaching methods based on reading digital activities.
- $H0_4$: Training focus on digital reading has a significant effect on the actual use of teaching methods based on reading digital activities.

Subsequently, we tested the extent to which the actual teaching of digital reading was related to the selected independent variables using bivariate analyses. We then used logistic regression to examine the strength of variable associations with digital reading activities in the classroom, while adjusting for covariates (gender, age, years of experience and training hours) according to the results on Table 3.

Table 3
Covariates

Covariates	Intervals	n	%
Gender	Male	231	51.3
	Female	219	48.6
Age	<25	51	11.3
	25-35	111	24.6
	35-45	141	31.3
	45-55	93	20.6
	<55	54	12.0
Years of experience	<5	51	11.3
	5-10	118	26.2
	10-20	132	29.3
	20-30	88	19.5
	<30	61	13.5
Training hours	0	401	89.1
	0-50	35	7.7
	50-100	10	2.2
	<100	4	0.8

The results for the bivariate analyses are reported with their *p-values*. Significant *p-values* ($p < 0.05$) indicated that there were significant difficulties among teachers for teaching digital reading activities. We also conducted analyses to examine the relationship between the number of times a month teachers had

reported being developing digital reading activities and each of the variables under study (gender, age, years of experience and training). To do this, we conducted multinomial logistic regression using the following frequency categories: *0 times*, *1 to 2 times* and *3 or more times*. All analyses were conducted using SPSS 19.0. software.

Results

The simple linear regression is presented with five parameters R^2 (the coefficient of the correlation or the relation) which show the strength and direction of the relationship. P- Value indicates the significant of the relationship, P must always equal or less than 0.05 for the relationship to be significant. Beta, β which is another parameter in linear regression shows the slope and the direction of the relationship, standard error of β indicates the percentage of error that can happen. The smaller the standard error of β the less likely error can happen while *t*-statistics is the coefficient divided by its error. The standard error is an estimate of the standard deviation of the coefficient; the amount varies across cases. It can be thought of as a measure of the precision with which the regression coefficient is measured. If a coefficient is large compared to its standard error, then it is probably different from 0.

Table 4
Summary for hypotheses testing ($H0_1$ to $H0_4$)

H0	Variable / Dependent variable	β	St. Error β	T	P	R^2
$H0_1$	Teachers' digital competence / Attitude	.724	0.596	11.490	0.003	.695
$H0_2$	Attitude / Actual use	.556	0.501	12.223	0.001	.798
$H0_3$	Resources and Facilitating Conditions / Actual use	.778	0.601	8.567	0.001	.876
$H0_4$	Training / Actual use	.823	0.503	7.654	0.001	.972

As shown in Table 4, Teachers' digital competence has a significant influence to perform digital reading activities. The relationship is significant at level p = 0.003 while R^2 (.695) which is the coefficient of the regression shows strong relationship between the variables. The positive value of β=(0.724) shows the direction of the relationship. Therefore, ($H0_1$) was accepted. It is remarkable that the strongest correlation is more pronounced on the three items that measure digital competence in relation to digital activities: "I know how to use digital devices to develop digital reading activities" (r = 0.31), "I know how to use programs to develop digital reading activities" (r = 0.33) and "I know how to evaluate digital reading activities" (r = 0.34). Teachers who reported less competence in these items were more reluctant to a positive attitude. The attitude towards digital reading has significant influence on actual use of teaching methods based on reading digital activities. The relationship is significant at level p = 0.001 with an R^2 (.798). The strongest correlations were focused on the following items: "Deter my effectiveness in class" (r = 0.28), "The teaching of digital reading would enhance a good atmosphere in class" (r = 0.26) and "The teaching of digital reading would increase students' productivity (r = 0.24). Thus, ($H0_2$) was accepted. Resources and Facilitating Conditions have a more significant influence on the actual use of teaching methods based on reading digital activities. The relationship is significant at level p = 0.001 with a positive value of β=(0.778) and R^2 (.876). Teachers reported that they do not have either software (r = 0.34) or hardware (r = 0.35). To implement digital reading activities. The lack of resources is a significant variable that confirms that this hypothesis is accepted. Finally, Training focus on digital reading has the most significant effect on the actual use of teaching methods based on reading digital activities. The relationship is significant at level p = 0.001 with an R^2 (.972). Teachers reported that they never use digital reading activities in their classroom because they have never received training focused on teaching methods applied to digital reading (r = 0.37).

In the bivariate analysis, we found significant associations between *years of experience*, *training hours* and *age*. Teachers who reported less activity in relation with digital reading activities were those with more years of experience and older. We also found a significant association between teachers implementing digital reading and hours of training. Those teachers who have received more training based on digital reading teaching methods use more than three times didactic activities to promote digital reading in their classrooms.

Conclusion

The advent of information and communication technologies has sparked a revolution in the design and dissemination of texts. Online reading is becoming increasingly important in information societies what implies new approaches in teaching. Therefore, digital reading also requires different skills, such as the deployment of new knowledge about the unique structures and features of digital texts. It also requires heightened proficiency in prediction, integration and evaluation that are even more emphatically called upon in digital than in print reading, because the amount of text visible at any one time is small, its origin often unverified and its extent often unknown. There is thus a clear need of a specific methodological approach that encourages *cyber linguistic* student competencies in reading and creating digital texts, in order to develop these teaching tasks effectively.

The discussion should not only revolve around the effectiveness but how to manage to introduce ICT with didactic approaches into classrooms and schools. In this research, derived from the quantitative analysis of the perceptions of teachers about difficulties for the improvement of teaching activities based on digital reading, we can highlight three main difficulties: the lack of resources and facilitating conditions, and lack of teacher training. Teacher training must be a priority of educational administration in order to give instruments and competencies to teachers to improve students' skills in digital reading, all of which are essential for an adequate use of digital devices in this knowledge society. Such analysis will need to consider a wider range of factors that can influence the effectiveness of ICT use at school. For example, schools could offer more project-based activities using ICT —particularly those that do not impose constraints on how to accomplish tasks— but, rather, allow students to explore various approaches to problem-solving using ICT, much as they do when they use ICT at home. This would help students improve their navigation skills. At the same time, teachers could develop reading methodologies that improve students' ability to distinguish between relevant and irrelevant material, and to structure, prioritize, and summarize text.

To ensure effective didactic approaches in digital reading, substantial shift is needed from the highly theoretical component of the subjects towards more dynamic didactic techniques involving testing of the proceedings and online activities. The new context of digital information requires continuous monitoring of the virtual processes in the following dimensions: *Digital reading activities in all subjects, a permanent training of teachers, development of teachers and students skills, new ways of creating contents by using 2.0 tools, and new ways of interpreting and processing information in digital devices and Internet*.

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Increasing completion rates through a self-service online learning strategy

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Successful online learning in a globalized adult education marketplace relies heavily on designing and implementing a teaching and learning strategy that countenances self-directed learning. Self-directed learning is a process whereby the learner identifies their learning needs, determines learning objectives, formulates their criteria for evaluation, identifies and pursues learning resources and strategies, and finally evaluates their own learning (Knowles, 1975). This self-service online learning education strategy builds upon Knowles definition of self-directed learning. This paper transcends this theory into that of self-service learning and the author's (2015) define self-service as "providing online learners with a multi-channel mechanism enabling customisation of their online learning experience" (Self-service online learning aims to deliver a proactive motivational online learning experience that successfully enriches both online teaching and learning practices.

A blended learning approach to self-service online learning

Research continues to acknowledge that "learners are motivated to learn when they learn in new and novel ways" (Kozma, 1991; Salmon, 2013). Moore (1989) confirmed three types of interactions are critical for online learner success: (a) learner-to-content, (b) learner-to-instructor, (c) learner-to-learner. In 1994, Hillman, Willis and Gunawardena (1994) added a fourth interaction (d) learner-to-interface. In contemporary times online learning language has changed, and to reflect current terminology used in academic online learning environments, this paper (Jenson & Cavicchia, 2015) uses the terms learner-to-teacher in place of learner-to-instructor and as learner-to-LMS (learning management system) in place of Learner-to-interface.

The overarching self-service online learning strategy (refer Figure 1) adopts a blended learning approach assimilating these four types of interactions with the following:

- Simulated online learning modules (formal ownership self-directed learning);
- Industry placement (where deemed compulsory by the training package);
- Flipped classrooms delivered through webinars (self-directed informal learning); and
- Face-to-face workshops where stronger learners will be socially grouped with the weaker learners (Knowles, 1973) creating a dynamic of collaboration and support for a deeper learning experience.

Self-service online learning design

Learning design is vital to provide an epistemologically robust online learning experience. Improvements in online learning technologies now provide the opportunity for self-service learning delivery. The use of technology in learning design connects the learner's increasing expectations as technology enables the delivery of purposeful, planned, cohesive, inclusive, collaborative, and stimulating learning experiences. Learning design focuses on how learners want to learn, and on creating the multidisciplinary, multi-generational learning communities required to solve complicated issues facing the world today. Rather than spoon-feeding learner's knowledge, a self-service online learning model provides learners with the opportunity to develop their cognitive skills in a well-functioning learning environment until they develop higher-level independent learning skills. The development of higher-level independent learning skills develops self-directed study skills enabling the learner to act as their own teachers and take control of their own learning.

Self-service online design is fundamentally based on blended learning and student-centred approach where a variety of techniques and active learning experiences for students are incorporated (see Figure 1) and is delivered through learning management software enabling opportunities for the incorporation of

activities that appeal to different learning styles. The data developed by Jenson and Cavicchia (2015) in Figure 1 has been aligned to Moore (1989) and Hillman, Willis and Gunawardena (1994).
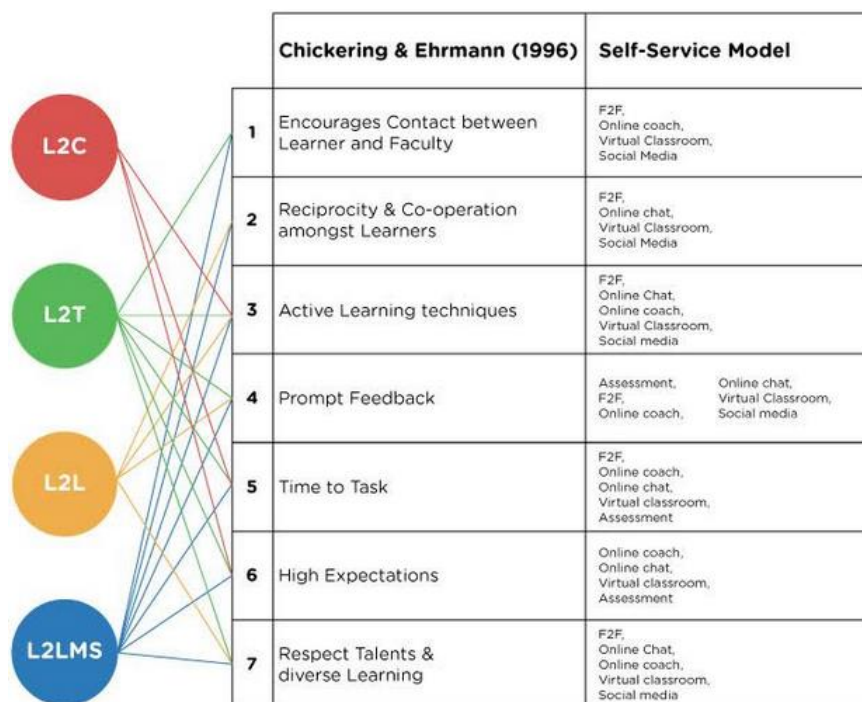
		Chickering & Ehrmann (1996)	Self-Service Model
L2C	1	Encourages Contact between Learner and Faculty	F2F, Online coach, Virtual Classroom, Social Media
L2T	2	Reciprocity & Co-operation amongst Learners	F2F, Online chat, Virtual Classroom, Social Media
	3	Active Learning techniques	F2F, Online Chat, Online coach, Virtual Classroom, Social media
L2L	4	Prompt Feedback	Assessment, F2F, Online coach, Online chat, Virtual Classroom, Social media
	5	Time to Task	F2F, Online coach, Online chat, Virtual classroom, Assessment
	6	High Expectations	Online coach, Online chat, Virtual classroom, Assessment
L2LMS	7	Respect Talents & diverse Learning	F2F, Online Chat, Online coach, Virtual classroom, Social media

Figure 1. Self-service model mapped against seven principles of good online practice.

The challenge lies in bringing change to traditional pedagogical systems and structures to drive innovative learning in an online environment. Learning design must take into consideration both cognitive development and multidimensional factors which include perceptual and affective modalities. Research suggests the most effective learning occurs when courses are designed to appeal to these various learner styles. The course concept of learning styles according to James and Gardner (1995, p. 20) is "how people react to their learning environment". Important theories of learning styles as defined through Dunn (2000, p. 9) suggest that learning styles are a biologically and developmentally determined set of personal characteristics and vary in effectiveness between learners even though instruction is identical.

Self-service online virtual learning environment

The design of content utilizing a virtual learning environment allows the development and inclusion of augmented reality learning objects. Pimentel (1999) defines virtual learning environments as:

> One that allows learners to perceive the environment, assess situations and performance, perform actions and proceed through experiences and lessons that will allow them to perform better with more experience on repetition on the same task in similar circumstances. This definition of a virtual learning environment emphasizes the importance of learning. Learners in a virtual environment are expected to make use of and include examples, observations, experiences, situations, rules, concepts and techniques in a continuous (e.g., day by day or week by week), permanent (i.e., committing knowledge into memory) fashion to improve the performance of the execution of tasks (p. 75).

A virtual learning environment incorporating augmented reality delivers the opportunity to create a simulated learning environment. Augmented reality is a global practice that is the blending of virtual reality and real life, as developers create images within applications that blend in with contents in the real world. With augmented reality, users can interact with virtual contents in the real world and can distinguish between the two. Incorporating augmented reality into a self-service online learning design caters to different learning styles through the engagement and motivation of diverse learners, thereby supporting self-directed learning across multiple learning styles. The simulation for an inability to

replicate a workplace is a core objective of transformative technologies and is a key component of its delivery.

Implementing principles of good practice

Chickering and Ehrmann (1996) suggest using technology to support online instruction through the implementation of the following seven practices:

1. Encourage contact between students and faculty;
2. Develop reciprocity and cooperation among students;
3. Use active learning techniques;
4. Give prompt feedback;
5. Emphasize time on task;
6. Communicate high expectations; and
7. Respect diverse talents and ways of learning.

Adopting the self-service online learning methodology developed by this paper (refer Figure 1) delivers online programs that are structured to achieve learning outcomes that deliver purposeful, planned, cohesive, inclusive, collaborative, and stimulating learning experience. The self-service model takes into consideration: (a) changes in self-concept, (b) the role of experience, (c) readiness to learn, and (d) orientation to learning (Knowles, 1973).

The online self-service learning model adopts the theory of Kolb (1981), James and Gardner (1995), and French (1975a, b). Kolb (1981, p. 235) developed a model of the learning cycle which focuses on cognitive dimensions that takes place along two dimensions based on experiential learning theory. Kolb illustrates how "experience is translated into concepts, which, in turn, are used as guides in the choice of new experiences". Kolb states that the learning process (ibid.) is a four-stage process which commences with a concrete experience, which in turn form the basis for observations and reflections, and leads to the formation of abstract concepts and generalization, which finally guide the creation of new experiences. The primary indication from Kolb (ibid) for learning to occur is "the individual must undergo new experiences and reflect on these". In the first dimension, concrete experiences are placed at one end of the dimension with abstract conceptualisation at the opposite end. In the second dimension active experimentation and reflective observation at the opposite ends of the dimension (refer Figure 2).
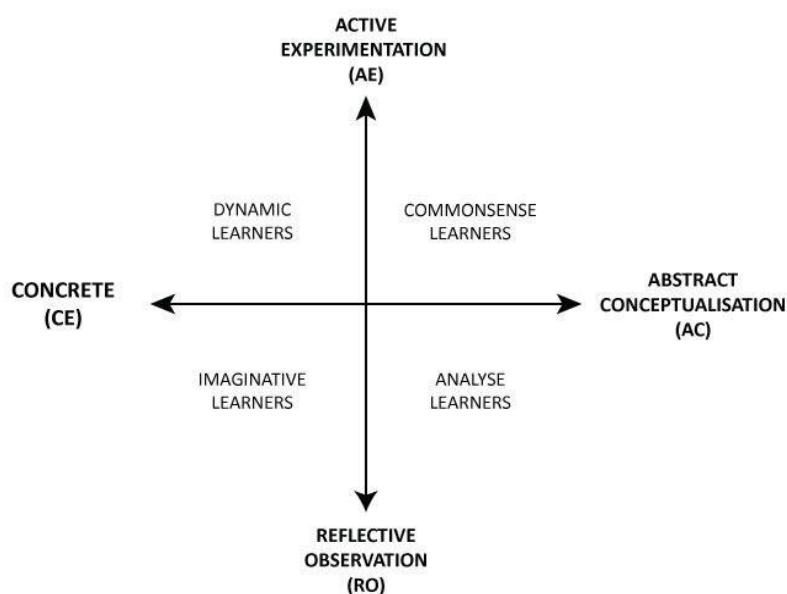

Figure 2. Kolb's learning cycle.

Other literature also suggests that learning styles can also include perceptual and affective modalities which influence learning. French (1975a, b) proposed seven concepts that contribute to perceptual

modality. Perceptual modes identify the ways in which individuals react to external stimuli and are as follows:

1. Visual – pictures, diagrams, maps, charts;
2. Print – written words;
3. Aural – hearing (auditory);
4. Interactive – discussion (verbatim);
5. Haptic – touch, feel;
6. Kinaesthetic – movement, learn by doing;
7. Olfactory – smell, taste.

The crux of learning style literature suggests that individuals are usually strong in one learning style, but will exhibit multiple learning styles or a combination of learning styles depending on age, gender, personality, culture and the environment (Burd & Buchanan, 2004; p. 404-412). Accordingly, strategies that are used to adapt instructional design in an online environment to appeal to the various learner styles can use technology for design instruction and create a variety of learning experiences for effective teaching and learning. The self-service online learning strategy has taken into consideration learning styles in the development of content and provides learners with the opportunity to self-select the delivery channel which best meets the individual's learning style.

Learning assessment strategy

Assessment of learning should be both formative and summative. Formative assessment occurs during the learning experience and includes feedback to both instructor and student. Summative assessment happens at the end of the course to ascertain the achievement of the learning objectives (Burd & Buchanan, 2004; p.408).

Technology enables assessment design to deliver a variety of learning experiences for effective teaching. For example, project-based learning activities appeal to learners whose preference is to *learn by doing*. To design a project-based learning assessment, learners are presented with a problem and develop their response through the use of discussion boards, research, analysis, and reflection. Project-based activities interest many types of learners, as they accommodate active learning with reflective observation resulting in the development of critical thinking as learners reflect on their own situations and/or problems. The self-service learning approach provides immersive online experiences that meet learner expectations, particularly in the way in which new technologies are used to communicate, engage and learn. Web 2.0 tools and applications (apps) help engage learners, meet different learning styles and connect learner-to-learners regardless of geographical locations. While tools and apps are a vehicle for learning, when deployed effectively, they assist learners in sorting information and communicating with others. The self-service online learning content development is designed in line with Biggs and Tang (2011) expectancy theory. Expectancy theory advocates that learning must have value to the learner and that the learner must expect to succeed. As outlined in Table i, the first two assessments will be designed as a computer-based assessment that are auto-marked enabling instantaneous feedback via the learning management system. Assessment types 3 and 4 are a templated approach that are relatively quick to assess and do not require high-level skilled assessors to provide feedback. Assessment type 5 is interpretive and requires a subject matter expert to interpret and assess in line with the Australian Qualifications Framework Level 5 learning outcomes.

The self-service online learning assessment strategy does not advocate assessment for assessment sake. Each assessment task is designed as a knowledge check to provide learners with an effective scaffold from which to develop confidence, and to support the learner in achieving the learning outcomes. The implementation of such practice increases learner engagement by making online learning fun and confidence building while maintaining motivation levels. It is a learning design fault to assume that learners want to dedicate hours and hours to online learning without any good reason and adopt a "one size fits all assessment strategy".

More important than providing learners with feedback is having the learner apply the feedback in their next assessment task. Feedback is most effective when it is received in a timely manner and it leans forward and maintains a continual improvement paradigm. When learners receive feedback that provides

clear, constructive advice and causes them to think, they will be more likely to incorporate that feedback into their next assessment task. The more frequently constructive feedback is provided, higher levels of growth mindset, improvement, continual learning, and confidence will be evidenced. The development of self-service online learning content inspires learners to own their learning which in turn leads to increased confidence, levels of motivation, (Schimmer, 2013) which will lead to increasing retention and ultimately deliver higher completion rates in an online learning environment.

Table 1.
Assessment strategy mapping to an Australian Quality Standard Level 5 (Diploma)

AQF5 SKILLS	COGNITIVE DOMAIN (Blooms Taxonomy)	ASSESSMENT VERBS	ASSESSMENT TYPE	ASSESSMENT GRADED
Analyse information	Knowledge / Comprehension	List Define / name / know Explain Identify / describe	Drag and drop Minute paper	Computer based assessment (Automated)
Provide solutions	Application	Apply Translate / interpret / solve / examine	Treasure hunt Puzzle Multiple choice	Skills Assessor (Quantitative)
Communicate solutions / information	Analysis	Analyse Compare / distinguish / test / prepare	Discussion questions Problem-based	Skills Assessor (Quantitative)
Apply knowledge	Synthesis	Synthesise Assess / propose / measure	Case study Analyse a situation	Application Assessor (Qualitative)
Demonstrate 1. Autonomy 2. Judgement 3. Responsibility	Evaluation	Demonstrate Judge / evaluate / compare / score	Reflection Journal / Project based learning	Application Assessor (Qualitative)

Conclusion

Online learning must be built upon the foundation of sound pedagogical practices with a diligent approach ensuring the design and development of online educational offerings are integrated into a virtual learning environment catering to all learning styles. The theory is to take advantage of new technologies to extend, not replace, the approach to online education; supporting online learning that provides learners with the opportunity to be upskilled through meaningful participation. Enhancing both teaching and learning occurs when teachers understand learning styles and the learner understands their preferred learning style. Raising awareness of learning styles enables the instructional designer to develop online programs that incorporate various formats and methods that cater to a number of learning styles. The learner then is provided with the opportunity to select from a self-service delivery mechanism and learn in a manner which aligns with their preferred learning style.

The role of the teacher and the learner is then revolutionized in an online learning environment. The teacher moves from an authoritative role to a facilitation/moderation role, and the learner moves to a self-directed role where they are responsible for their own learning. The challenge for online learning designers is to provide multiple channels catering to various learning styles to enable learners to have the opportunity to maximize knowledge acquisition. Applying these principles to a self-service online learning design delivers online education that plays a vital role in the development of human capital. The development of human capital adopting the self-service online learning strategy outlined in this paper is derived from the research conducted by Knowles (1973), James and Gardner (1975), Moore (1989), Chickering and Ehrmann (1996), Kolb (1981) and Hillman, Willis and Gunawardena (1994). The self-service online learning model acknowledges these educational researchers as providing the ingredients that have informed the development of a self-service online education strategy.

Offering a self-service online learning environment provides an engagement opportunity transgressing across learning styles. Particularly for the next generation of learners who are early adopters of technology (and whose expectations of learning in a virtual environment are very different to previous generations of adult learners), it is anticipated the self-service online learning model provides essential

ingredients of a product that can be franchised at global levels assisting in circumventing online learning attrition rates.

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The echo of value: A suggested model to build a culture of personalized learning through digital media

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Educational systems are facing a paradigm shift. This shift is pushing to reshape online pedagogical models. The aim of this paper was to develop a model for building a culture of personalized learning through digital media. The suggested model was guided by the principles of learning and instruction that have been raised in the last two decades by modern Web-based learning and readiness theories, such as connectivism, learning communities and networks. The model utilises an integrated tetrad dialogue in which online and/or Web-based learners and instructors work together to build value and experience of teaching and learning trough digital media. In this model, building value and experience depends on eight integrated and nested phases in which online and offline instructors enrich, enhance, engage and empower (the voice of teaching experience), whereas online or presence learners proact, prototype, personalize and pilot (the voice of value). To validate this model, the researcher conducted a case study on graduate students studying for a master's degree in distance teaching and training at Arabian Gulf University. The findings show that this model is effective in developing a matrix of learning values in the digital age.

Introduction

Where does learning take place in distance and online learning? How can we guarantee that learning takes place in Web-based and eLearning environments? How can digital technology enhance meaningful learning? These three questions are frequently asked and discussed in conferences and symposia. These questions are grounded in technology from its evolution to the present time, which has been used to enhance the educational system and teachers' aims rather than learners' values. Thus, the answers to these queries represent issues of concern for those interested in learning that is based on Information and Communication Technology (ICT) all over the world. It is a mistake to think of the answer to these queries in terms of the economic outcomes (profits and costs) alone. Huge profits can be gained from investment in providing online learning; however, the outcomes can be disappointing in the sense that resultant learning can be meaningless to learners and employers. Theoretically, the ultimate goal of any educational system is to prepare learners to become knowledge generators and life-long learners (Ally, 2008). Life-long learning can be identified as a learner's ability to learn, unlearn, re-learn and to help others learn (Abdelaziz, 2014c). The question is: do we have online teaching and learning models that seek to achieve this goal?

The author believes that the answer of this question is a dilemma since the goal of most educational systems, unfortunately, is to prepare learners to secure employment in a highly competitive world. Most of the modern educational systems prepare learners to absorb knowledge that is compatible with the job market or workplace. Getting a job is only a way to survive. A need to survive has been classified as a lower-level need, according to Maslow's Hierarchy of Needs. Taking this hierarchy into consideration, it may be discovered that most of the current educational systems worldwide are not preparing learners to achieve and accomplish a high level of self-actualization or a system of values that empower them to capitalize on their knowledge and wisdom.

In general, current educational practices adopt what the author calls a *mechanistic conception of education* in which learners are prepared based on industrial age attributes and beliefs. In the industrial age, a learner's brain was similar to a *CAN* or *BOX* that needs to be refilled with some sort of information to be able to complete or perform a job task or duty. In such a system (industrial age education), an assessment of learning is used to confirm learning *NOT* to promote learning (Abdelaziz, 2013a).

Online and eLearning or any type of digital learning may provide solutions to the previous problem. Digital learning is regarded as an innovative approach that provides an interactive, well-designed learner-centred environment accessible to every person everywhere and at any time using the characteristics and sources of the internet and digital technologies consistent with the principles of appropriate instructional

design (Khan, 2005). With the growing role of the knowledge economy, which is based on the information revolution, focus must be on the preparation of a generation that is able to spread, generate, distribute and use knowledge to serve the ambitions of personal and human development.

New developments in the science of learning emphasize the importance of helping people control and regulate their own learning. Therefore, the roles of teaching and learning must be expanded beyond the traditional concepts of testing to help learners build their own values and illustrate their cognition to themselves, their peers, their teachers and their macro and micro community and network.

In the 21st century learning paradigm, how new assessment models and strategies are designed that can respond to the learning requirements and reflect the characteristics of modern learning environments, which are basically personal, social, distributed, dynamic, and versatile in nature, should be reconsidered (National Research Council (NRC), 2001). Therefore, future learning and assessment models should be diverse, distinct, dynamic and developmental to fit current and future learners' mental, social and personal needs and values. Diverse, distinct and dynamic learning and assessment ecology helps in promoting deep rather than surface learning. Future learning and assessment models should also support the shift from content engagement (knowledge transfer) to cognitive engagement (knowledge creation and distribution) (Abdelaziz, 2014c). In the 21st century learning paradigm, there are major shifts in the assessment of learning. These assessment shifts are applied on all educational levels, including K-12 and the higher education level. The most important shift in the assessment paradigm in the 21st century is the shift from judgmental assessment to dynamic or developmental assessment (DA) (Abdelaziz, 2014b).

This shift is causing most, if not all, of the teaching and learning models in presence and online learning transform from a knowledge-push to a knowledge-pull model. In the knowledge-push model, the information flow is guided and directed by the instructor, but in the knowledge-pull model, the learner is the investigator and knowledge builder (Chatti et al., 2010). This shift is also causing educators to rethink and develop the assessment for learning models that are dynamic, adaptive and constructive to transfer the learning process from being a knowledge-push (knowledge expression) process to a knowledge pull (value generation and creation) process (Abdelaziz, 2013b).

Effect of digital media on education

Recently, Web 2.0 and social media applications have provided multiple solutions and applications to shift from knowledge-push to knowledge-pull models of teaching and learning. These tools have multiple tasks and authentic objects that support building the human mind's capacities through multimodal teaching and learning and interactivities. Such tools help in connecting the current and the future learners' minds throughout connected ideas that reflect the power of humans' collective minds and intelligence. Connected ideas build bridges and loops of mind that increase the probability of social, cognitive, psychological and mental presences among learners (Abdelaziz, 2013a).

The growing reliance on Web 2.0 and digital learning applications is actually due to the following characteristics: (a) Increasing opportunities for learning by permanently providing learning materials and sources outside of the classroom and educational sites (Dabbagh, 2005), which allows individual realization of thought and interaction with learning materials anywhere and anytime; (b) The ability to cope with different learners according to their learning styles, speed of learning and educational needs, allowing for students with a high competence to study more advanced or more abstract topics without depriving others from progress at their own pace; (c) Providing the possibility of using effective methods, such as learning in small groups, project-based learning, electronic modelling, simulation and electronic games (Bonk & Zhang, 2008); (d) Increasing interaction opportunities between the learner and learning materials in different forms and social interaction among humans in educational situations (Abdelaziz, 2014a); (e) Increasing the learner's responsibility for his/her own learning, which supports the trends of continuing education and lifelong learning; (f) Simple reuse of eLearning materials for long periods of time with numerous groups of learners; (g) Simple sharing of knowledge and learning outcomes by building knowledge communities and communities of inquiry and practice (Jonassen, Peck, & Willson, 1999); (h) Simple application of multiple alternatives for assessing a learner's performance and retention of evaluation and electronic feedback for long periods (Horton, 2012; Palloff & Pratt, 2009); (i) Help in the re-modelling of the educational situation and the use of instructional strategies to help the learner view, apply and review the knowledge gained (Pinto, Spares, & Driscoll, 2012); (j) Give a permanent

feedback and feed-forward to help online learners continue learning and build a culture of value (Cipolla, 2009); and (k) Activate the learner to build new mental connections as meaningful mind tools for differentiated learning.

Personalized teaching and learning

Online instructors can personalize teaching by providing organized, interconnected and authentic activities that are based on online students' current capabilities and future needs and values to ensure that all learners are able to express and apply their knowledge and skills. A piece of online learning material is only as good as its activities and feedback. Therefore, online instructors should be teaching through the activities rather than through the descriptive text. Designing eLearning activities have become one of the most important key factors to assure the quality of personalized learning because well-designed activities ensure a pedagogy of providing eLearning and online courses. In this regard, Nichols (2003; p. 3) stated that 'the choice of e-learning tools should reflect rather than determine the pedagogy of a course; *how* technology is used is more important than *which* technology is used'.

In addition, personalized teaching and learning stimulates learners' creative abilities. Adams (2004) noted the importance of creative teaching variable in comparison to the variable of technology used in teaching, where creative teaching should be applied before selecting the technology associated with teaching. Personalized learning leads to the formation of learning organizations and insight about the practices of effective learning. Smith (2009) agreed with the previous idea that the characteristics of effective activities for e-training and intrinsic motivation are factors that lead to the success of the computerized creative training programs design and that lead to improved performance in the field of e-training.

Personalization, as an instructional and learning approach, is one way to guarantee that all learners are achieving at their highest potential (Heacox, 2002). It is a dynamic process to personal development. Personalized learning also reflects differentiated instruction. Differentiated instruction has been found to be of the most important attributes to build a collaborative online learning community (Tu & Corry, 2003). To differentiate their instruction, online instructors should deploy varied approaches and strategies to fit with what their students need to learn, how they will learn it and how they can express their values of learning to increase their capabilities to be life-long learners. In doing so, online instructors should enrich, enhance and empower online learners through multi-learning objects, activities and resources that echo learners' needs, creativity and values.

Conrad & Donaldson (2011) provided an interactive model that helps online learners become involved in thinking through providing activities and resources based on creative teaching. According to this model and to achieve full immersion in learning, online pedagogical approaches and models should be based on peer partnership and team activities, reflective activities, authentic activities, games and simulation activities.

It can be concluded that the previous models dealt with the interaction variable in electronic activities, but they did not cover the value variable in the design of learning and instructional activities. The variable of value in designing teaching and learning may contribute to the development of the knowledge-generating skills and deep learning in all courses and educational tasks in the virtual learning, blended learning and presence learning environments as well. Despite the diversity of the fields and strategies for designing online instruction and learning in accordance with the previous models, they did not address the echo of value through personalized teaching and the learning of online and Web-based courses. This is what the current research covers.

The echo of value model

The suggested model is a quadrilateral (Figure 1.) in which value building is grounded through four stages of online and/or offline zones of engagements in differentiated teaching and learning. They are: (a) zone of curiosity (enriching/proacting); (b) zone of partnership (enhancing/prototyping); (c) zone of trust (engaging/personalizing); and (d) zone of value building (empowering/piloting). To maximize the application of this model, five types of presence were applied to ensure the quality of interactive online and offline activities: social presence activities, mental presence activities, epistemological presence activities, psychological presence activities and technological presence activities (Abdelaziz, 2013a). The

assessment of values was guided by Abdelaziz's *Bridges of Trust Model* (2013c) for assessing online learning. The bridges of trust model consists of four levels of assessments: (a) assessment of awareness, (b) assessment of initiative, (c) assessment of meaning construction and (d) assessment of value building.

In addition, the author applied multiple levels and sources of feedback and feed-forward. Four sources of feedback were used: demand-led feedback (students-generated feedback), peer-led feedback, group-led feedback and instructor-led feedback. These sources of feedback were integrated within three levels of feedback: universal feedback, targeted feedback and intensive feedback (Abdelaziz, 2014b). The interaction between the sources and the levels of feedback was meant to increase the learning discourse of pedagogical, cognitive, mental and psychological presence in online and blended courses, which is delivered through this model.

It can be observed from Figure 1 that the echo of value model is a holonomic model for teaching and learning in both face-to-face and Web-based learning environments. This model is guided by Merrill's e^3-learning (e to the third power learning) design themes. These three themes are: effective, efficient and engaging (Merrill, 2008). In addition, the echo of value model is an adaptive and evolving model in which both instructors and learners play an integral role to qualify the value of learning. In this new teaching/learning model, learning is holonomic and value-driven. Learning occurs in an open learning environment in which instructors and learners design a shared vision, develop a sharable eLearning task and experience learning through scaffolding and multi-levels of collaborative feedback for knowledge and value distributing.
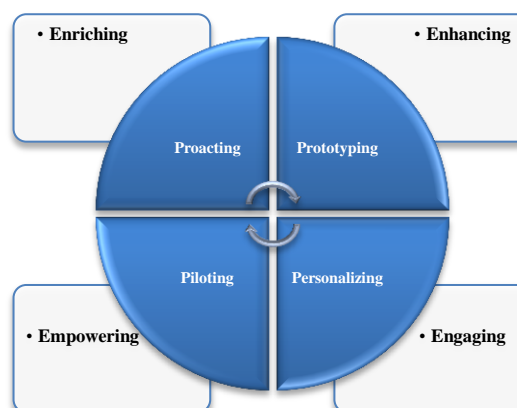

Figure 1 The echo of value model for personalized learning

Value distributing reflects Wegner, Trayner, and de Laat's (2011) conceptual framework of the community and network as two aspects of the social fabric of learning. According to Wegner et al., (2011) learning is a partnership and a set of connections among people to learn from and with each other about a particular domain whether or not these connections are mediated by technological networks. They use their connections and relationships as a resource to quickly solve problems, share knowledge and make further connections (p. 11).

In addition, this teaching/learning design model was guided by a connective pedagogy that emerged from the connectivism theory (Downes, 2007; Siemens, 2005; Strong & Hutchins, 2009). Connective pedagogy focuses on the development of the networks of both content and persons that can be applied to authentic problems. It focuses on the creation and contribution by learners of learning content to create an ever-growing global connection of learning content and other artefacts of the learning process. Connectivism conceives of learning as the creation of networks involving objects, resources and human beings (McKerlich, Riis, Anderson, & Eastman, 2011).

In the first stage of the suggested model (Enriching/Proacting), both learners and instructors build a zone of curiosity through a line of searching and immerging knowledge. In the second stage (Enhancing/Prototyping), both learners and instructors build a zone of partnership through presenting, articulating and sharing knowledge. In the third stage (Engaging/Personalizing), both learners and instructors build a zone of trust through a line of connecting and elaborating knowledge. In the fourth stage of online engagement (Empowering/Piloting), learners and instructors build a zone of value shaping through a process of modeling and transforming knowledge. In this regard, Lefrancois (2000; p. 228) stated that 'one of the most important goals of education is to empower students by providing them with both specific information and learning/thinking strategies and by helping them to develop the feelings of personal power that accompany the realization that one is competent and worthwhile'.

Research significance

The present research derives its significance from the fact that it is the first attempt, to the best of the researcher's knowledge, to develop a model for personalizing teaching and learning through digital media. More specifically, this research is expected to: (a) Empower and lead human learning in the Third Renaissance era through a well-designed and innovative learning and pedagogical approach that emphasizes value-centred learning and 21st century skills; (b) Prepare a future generation of online instructors or facilitators to be a long-term asset and human capital for any educational organization delivering presence and/or online learning; (c) Introduce well-prepared instructional designers and eLearning practitioners who are able to improve web-based education and the eLearning profession; (d) Produce a multi-tasking learner who is able to adapt to and adopt new ways of knowing and unlimited techniques of learning throughout a lifetime; and (e) Improve human internal and external learning conditions through creative solutions of pedagogical practices of presence and online learning.

The present research aimed at developing and validating a model to build a culture of value of personalized teaching and learning through digital media. More specifically, the study addressed the following two questions:

1. What are the main components of an instructional model to build a culture of personalized teaching and learning through digital media?
2. How effective is the proposed model in enhancing value-centred learning on a sample of graduate students?

Methodology

A developmental research method was applied through a mixed approach that included a Focus Group Interview (FGI) and a Case Study to develop and validate the proposed model on a micro level. Richey (1994; p. 714) defined developmental research as 'a systematic study for the design, development and evaluation of educational programs, processes and products that must match the necessary criteria of consistency and efficiency'. Educational technology literature divides developmental research methodology into two main types. The first type is developmental research that focuses on an educational product or program or on developing an educational tool. This type of methodology includes four basic stages: the description or systematic analysis, systematic design of the product, systematic development of the product and systematic evaluation of the product. The second type is developmental research that focuses on the design, development and evaluation of instructional models and processes. This type of methodology includes three basic stages: design, development and evaluation (Richey & Klein, 2005). Developmental research methodologies may be directed towards the study of a specific context or towards generalized conclusions. The present research was limited to the second type, which is the developmental research methodology directed towards obtaining generalized conclusions of the proposed model after its design, development and evaluation. The procedures of the developmental research stages are presented in the next section.

Focus group interview

An open-ended questionnaire through a Focus Group Interview (FGI) that uses group decision-making techniques and processes to formulate the final components of the proposed model was used. A Focus Group Interview (FGI) is a structured process for interviewing a small group of experts. The purpose of a focus group interview is to obtain in-depth views or opinions regarding the topic of concern (Witkin & Altschuld, 1995). The focus group interview was also implemented to determine how professional people felt about the proposed model and to identify the range of perspective regarding the model. Three full professors in the area of Curriculum and Instruction, Instructional Technology and eLearning, and Information Technology were asked to provide an in-depth view and opinion regarding the proposed model and its possible replicability and usability in both online and offline contexts.

Case study

A case study technique was also implemented to obtain an in-depth understanding and feedback about the proposed model. The participants were 34 graduate students enrolled in the Distance Teaching and

Training program at Arabian Gulf University. The Distance Teaching and Training program is a blended learning program that grants post-graduate higher diplomas and master's degrees. These 34 students were divided equally into two groups: the experimental group and the control group. The proposed model was applied in the *Writing the Materials* course. This course is 3 credits. Its goal is to train students to design and develop Open and Distance Learning (ODL) materials and activities through 5 intensive face-to-face days and 15 distance days.

Research design

The control group pre-test and post-test design was adopted in this research. Participants in the experimental group were asked to use the suggested model in studying, designing and developing Open and Distance Learning activities and materials. They were asked to give intensive feedback about the applicability and affordability of using the model to build their own values regarding this course through group interactivities and tasks according to the echo of value model and its stages prescribed in figure 1 and appendix A, whereas the participants in the control group were asked to select the expected values before studying the module and gained values after studying this module without using the proposed model.

Evaluation of the proposed model (validity)

To investigate the validity of the proposed model, the researcher put it into action through the application on the experimental group mentioned above. This procedure was important to verify the validity of the proposed model by testing its applicability to build a culture of personalized teaching and learning through digital media. This phase was implemented according to the following steps:

1. Develop an operational strategy that explains the stages of the model and instructor and learner's roles in each stage (Table 3).
2. Build a list of the most expected values that reflect the digital age teaching and learning behaviours that are expected to be gained as a result of studying the course based on the echo of value model. The researcher suggested 40 values to build a culture of personalized learning through digital media. These values were clustered into five main categories: social presence values, psychological presence values, epistemological presence values, mental/intellectual presence values and universal presence values (Table 4).
3. Develop a generic scale to measure the extent to which each learner sees the gained values as a result of studying the course. Each value on the scale is given a score of 1 to 10. Obtaining *10* indicates that learners have mastered the value or always practice it when and wherever learning takes place. A score of *1* indicates that learners do not employ the value during learning. For the purpose and context of the current research, a short description was written for each value to make it easy for the learners to understand it. The scale was applied on a pilot sample of 20 students to compute its reliability coefficient. A Cronbach's Alpha of 0.76 was estimated for this scale.
4. Distribute the list of expected values previously mentioned before distributing the course syllabus, assessment tasks and criteria for evaluating learners' performance (pre-application on both the experimental and the control group).
5. Present the model and its phases to the experimental group only.
6. Provide the participants with clear instructions about using the suggested model while interacting with each other and with course materials and resources.
7. Ask the participants in the experimental group to apply this model to course assignments and other online and offline activities. Five formative assessment tasks were assigned to the 34 participants in the experimental group and the control group. These assessment tasks were: (a) Reading and writing a reflection about a self-selected book chapter; (b) Participating in an online discussion forum or chatting through the course Learning Management System (MOODLE); (c) Evaluating an existing instructional unit based on the principles and standards of writing interactive materials; (d) Developing an instructional unit based on the principles and standards of writing interactive materials; and (e) Conducting a group presentation regarding writing the interactive materials.
8. Collect prototyping feedback from the experimental group regarding the applicability of the proposed model and its phases.

9. Collect final feedback about the gained values after finishing all course requirements (post-application).

Findings

Answering the research questions

The first question
The first question is: 'What are the main components of an instructional model to build a culture of personalized teaching and learning through digital media'?

Based on the components presented in Figure 1, it can be concluded that building a culture of personalized teaching and learning through digital media can be achieved via four main teaching and learning stages in which online and/or offline instructors enrich, enhance, engage and empower online learners to be able to proact, prototype, personalize and pilot their value of learning. In doing this, both online learners and instructors build their echo of value and experience to maximize their social, psychological, epistemological, mental and universal presence. To put this model and its stages into action, an operational strategy should be adopted. This strategy is presented in Table 4.

The second question
The second question is: 'How effective is the proposed model in enhancing value-centred learning among a sample of graduate students'? To answer this question, the researcher computed descriptive statistics and conducted a one-way analysis of covariance (ANCOVA) to eliminate the effect of pre-testing the echo of value scale. Tables 1 and 2 present the findings of the descriptive and inferential statistics, respectively.

Table 1
Descriptive Statistics for Groups' Score on the Echo of Value Scale

Group	Mean		Standard Deviation	
	Pre	Post	Pre	Post
Experimental Group	130.06	302.41	9.84	7.01
Control Group	118.18	177.24	13.15	17.45

Table 2
One-way ANCOVA for between Groups Differences on the Echo of Value Scale

Source	Type III Sum of Squares	df	Mean Square	F	p	Partial Eta Squared
Pre-test	39.15	1	39.15	0.216	0.645	
Group	106110.68	1	106110.68	585.72	0.000	0.95
Error	5616.03	31	181.16			
Total	138842.94	33				

Table1 shows that the post-echo of the value scale in the experimental group scored higher than the control group (M = 302.41 and 177.24). There were less variations among students in the experimental group (SD = 7.01) than students in the control group (SD = 17.45) in the post-application.

Table 2 shows that there was a significant difference between the experimental group and the control group. This difference was in favour of the experimental group (F (1, 31) = 585.72; p=.000). Also, Table 2 shows that the amount of variance in the dependent variable (the echo of value scale) that was accounted for by the independent variable (the new model) is equal to 95%. These findings illustrate that the new model has a significant statistical and practical effect on students' learning values of the writing interactive materials course. Based on these findings, we can reject the null hypothesis.

Table 3

Instructors and Learners' Roles According the Echo of Value Model

Teaching Stages & Instructor's Role	Action Taken by Instructor	Learning Stages/learner's role	Action Taken by Learners	Type of Interaction	Type of Presence	Type of Assessment	Value Zones
Enriching (Information Distributor and Facilitator)	▪ Selecting Web-based course materials ▪ Stating goals and missions ▪ Socialize learning ▪ Shaping group dynamic regulations	**Proacting/** Information Seeker and Navigator	▪ Design a learning vision ▪ Develop self-study action plan ▪ Delve course goals, objectives, conditions ▪ Distribute personal expectations to other learners	▪ Leaner-interface interaction ▪ Learners-content interaction ▪ Learner-instructor interaction	Technological Presence	Assessment of Awareness	Zone of Curiosity
Enhancing (Knowledge Mediator)	▪ Sequencing Web-course content ▪ Stating learning tasks ▪ Show how to do learning tasks ▪ Standardize students' mission	**Performing/** Knowledge Generator	▪ Design individual and co-learning tasks ▪ Develop self-generated ideas ▪ Delve other students' ideas ▪ Distribute common understanding (meaning making) of other learners' ideas	▪ Learner-learner interaction ▪ Learner-instructor interaction	Psychological & Social Presence	Assessment of Initiative	Zone of Partnership
Engaging (Cognition Activator, and Cognition Coach and Scaffolder)	▪ Sort common ideas ▪ Seriate students' work ▪ Storm students' power through expanded activities ▪ Stimulate students to organize well-structured knowledge	**Personalizing/** Cognition Builder and Creator	▪ Design new lines of common understanding of course materials ▪ Develop propositions of new concepts ▪ Delve new connected ideas ▪ Distribute new well-structured knowledge with other students	▪ Learner-learner interaction ▪ - Learner-instructor interaction ▪ Learner-expert interaction ▪ Learners-learners interaction	Mental Presence	Assessment of Meaning Construction	Zone of Trust
Empowering (Values Maintainer) - the voice of experience)	▪ Symbolize structured knowledge ▪ Summarize learning tasks/solutions ▪ Shape holonomic understanding of course applications ▪ Share a new revised vision and value	**Piloting/** (Value Distributor) - the voice of value	▪ Design mind-maps for whole ideas and concepts getting from the course. ▪ Develop connected ideas with other courses being taught (generalizability) ▪ Delve organized knowledge for new meaning (building trustworthiness) ▪ Distribute well-preparing values with other students (transferability of learning)	▪ Learner-context interaction	**Epistemological** & Universal presence	Assessment of Value Building	Zone of Value Shaping

In addition, to compare the averages of the social presence, psychological presence, epistemological presence, mental presence and universal presence values that were gained by the experimental group because of using the echo of value model, the researcher drew a quintet shape (Figure 2.)
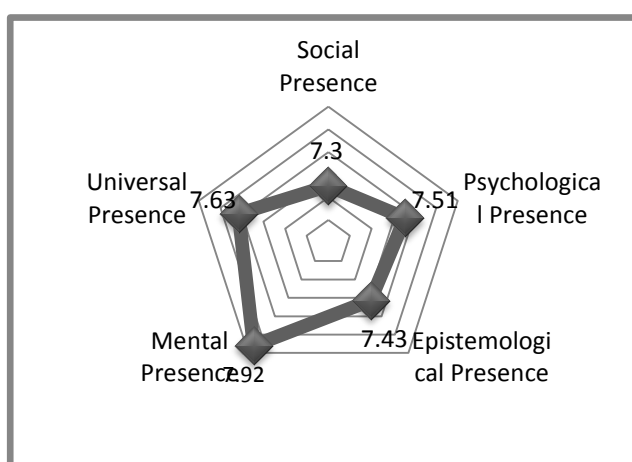

Figure 2 The average of each presence of the value matrix

Table 4
The learning values matrix in the digital age

Type of Presence		Values
Social Presence Values	1	Community involvement
	2	Co-operation
	3	Information sharing
	4	Interdependence
	5	Open communication
	6	Partnership
	7	Responsibility
	8	Teamwork
Psychological Presence Values	1	Adaptability
	2	Commitment
	3	Competence
	4	Creativity
	5	Innovation
	6	Openness
	7	Optimism
	8	Passion
Epistemological Presence Values	1	Continuous improvement
	2	Goals orientation
	3	Long-term perspective
	4	Mission focus
	5	Results orientation
	6	Shard vision
	7	Strategic alliances
	8	Wisdom
Mental/Intellectual Presence Values	1	Empowerment
	2	Excellence
	3	Exploitation
	4	Image
	5	Making a difference
	6	Mentoring
	7	Power
	8	Productivity
Universal Presence Values	1	Appreciation
	2	Being the best
	3	Challenge
	4	Efficiency
	5	Integrity
	6	Respect
	7	Spirit
	8	Trust

Figure 2 shows that the echo of value model is effective in developing all types of presence. The theoretical average of each presence exceeds 7 out of 10 points in the echo of value scale. From Figure 2, we can conclude that the mental presence was the highest presence ($M = 7.92$), and the social presence was the lowest presence ($M = 7.3$). The following is a short description for each type of presence.

Social presence ($M = 7.3$) value refers to the interpersonal relationship that helps in building a learning community. It is important to develop learning strategies and online mediating techniques. In their study, Tu & McIsaac (2002) explored the effect of social presence on online interaction. They indicated that there are three main dimensions that impact social presence: social|context, online communication and interactivity.

Psychological presence ($M = 7.51$) helps online and offline learners understand their intrapersonal capacities. Psychological presence refers to the degree to which each learner knows the positive and negative characteristics that guide and shape the interactivity with others in the learning context. For example, online learners may adapt their opinions as a sense of connection with other learners participating in a learning situation or community.

Epistemological presence ($M = 7.43$) refers to the degree to which online or offline learners have insight regarding the type of knowledge or learning tasks that they are involved in. Epistemological presence is very important to build a knowledge economy of the content of learning. This in turn may help in building a long-term perspective, goal, vision and mission to be shared with other learners in the learning community.

Mental presence ($M = 7.92$) involves the mental tools needed to help learners organize and reflect their own progress and achievement. Each learner needs a personal intellectual scaffolding to model the echo of value and experience. It is a tool to enable a transformative learning experience through a mind mapping tool and a percept graph.

Finally, *universal presence* ($M = 7.63$) is the mechanism that each learner employs to distribute gained value and experience. It is a learning network topology that helps online and offline learners appreciate and respect others' efforts and work. It is the learner affordance that allows for representing content in multiple ways that reflect multiple meanings. This type of presence is very important to build a lens of formative interaction in learning communities.

Discussion

The echo of value for a personalized teaching and learning model presented in this study consists of four main integrated and nested stages of teaching and learning with four main zones of personalized learning. This model was effective in developing social presence, psychological presence, epistemological presence, mental presence and universal presence values. There were statistical differences between the experimental and the control group in the echo of value scale applied in this study. This difference was in favour of the experimental group. All students in the experimental group scored higher than the theoretical average on this scale. These results could encourage the use of the proposed model in all educational programs delivered in both online and offline settings.

Although there are very few studies that applied personalized learning environments, these findings are partly similar with the findings of Tu and McIsaac (2002) and Yang, Yeh, and Wong (2010). The findings are also supported by Clark and Sampson's study (2007). Students in the experimental groups were responsible for navigating and developing ideas about course content and materials in four ways: proacting the content and resources, prototyping their ideas and concepts, personalizing their meaning construction and piloting their learning value via a modelling-driven process.

The echo of value model presented in this study could be used as a dynamic support platform for building a culture of personalized learning and instruction since it offers extra support while still allowing for a flexible and responsive balance in a learning community and network. The five types of presence discussed in this study when provided along with multiple sources and levels of feedback in online learning yield three types of supporting scaffoldings: cognitive, psychological, and affective scaffolding. Therefore, they could be a supporting metaphor for cognitive, psychosocial and affective scaffoldings through a combination of pedagogical enrichment, enhancement, engagement and empowerment.

Overall, this study was one of the first to build a culture of personalized learning value through digital media. The findings can act as a future foundation to continue to test the quality of teaching and learning in online and offline learning environments. Thus, this study should be replicated on much larger samples. It is also recommended to train online instructors and learners to have the power of synergy of knowledge sharing, expression, generating and capitalization to increase the learning discourse.

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Collaboration for IEP on Palm

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Following the results of international research, the benefits of contemporary changes in the education of students with disabilities are manifesting in order to achieve *education for ALL*. In this paper we emphasize the importance of collaboration between the participants of the inclusive process as one important component of quality inclusive education. The paper describes the theoretical concepts of inclusive schools, individualized education programs (IEPs), cooperation and the application of ICT in education. The paper presents the results of quantitative research which provides insight into the opinions, expectations and satisfaction of teachers, supportive education collaborators and parents of students with disabilities regarding the development and implementation of IEPs. The results indicate the development of a practical approach in the development and implementation of IEPs through a web application.

Introduction

Inclusive schools today are developing the potential of each student, which is encouraged and achieved through getting to know the student's personality, abilities and *strong sides*. The inclusive school begins by observing the similarities between the student and his peers before observing their differences (Ivančić & Stančić, 2013). Following recent changes in the world, the tendency to achieve education for all is growing in Croatia. This means fostering educational involvement focused on the inclusive education of students with disabilities and their peers with typical development (Stančić & Matejčić, 2014). Inclusive education strives for a universal design in which the family environment, school programs and services are furnished in a way that they can be used by all students while also catering to certain groups of students, including those with disabilities, learning difficulties, behavioural and emotional problems and difficulties conditioned by language and environmental factors. The described design which contributes to the development of an inclusive process (IP) is achieved by creating and implementing an individualized educational program (IEP) that takes into account the child's characteristics and promotes individualized procedures, learning resources, methods, supplies and equipment (Ivančić & Stančić, 2002; Vaughm et al., 2007; Ivančić & Stančić, 2006; Edmunds & Edmunds, 2008; Kiš-Glavaš, 2010; Ivančić, 2010). In order to achieve a successful inclusive process through the development and implementation of the IEP, it is necessary to establish good collaboration and communication between school experts (principals, assistants and teachers) and parents of students with disabilities. The important thing is mutual respect, trust, reciprocity, joint orientation towards the goal and professional responsibility to reach an agreement (Ivančić & Stančić, 2004).

In accordance with the mandatory documents of the international community, the Croatian legislation has developed a number of documents related to the rights and interests of children, including laws, national policy strategy, the equalization of individual opportunities for persons with disabilities, state pedagogical standards for preschool, primary and secondary education and national curriculum, among others. Although the progress of legislation is evident, there are difficulties in applying the relevant legislation caused by the weaknesses of the education system. These weaknesses are manifested in a lack of financial resources for education, unfavourable spatial and material conditions in Croatian schools, an uneven support network, insufficient and inadequately qualified professional staff, the prevailing negative attitudes and difficulties to adapt to parenting children with disabilities (Ivančić &Stančić, 2013). Three decades ago, Croatia began to experience formal changes, but these changes were unfortunately not accompanied by deep changes in education. In order to create profound changes in education with the aim of achieving quality inclusive education, it is necessary to promote good communication, collaboration and teamwork between parents of students with disabilities, teachers, supportive education collaborators, educational assistants and students with disabilities.

Development and implementation of IEPs in Croatian schools

Complete integration of students with disabilities in the regular education system requires effective preparation and implementation of the IEP. In order to ensure a more efficient and functional IEP for students, teachers, parents and supportive education collaborators, it is essential to fulfil the following requirements during the preparation and implementation of the IEP. The first request is based on the achievement of a team approach during all stages of the IEP, including the assessment, the draft plan of support, the implementation and the evaluation of achievements. In order to create an effective program, complete information about the functioning of the student and his skills, interests and needs is required. It is essential that the objectives of the IEP follow the educational needs of students. Therefore, SMART goals must be determined which are specific, acceptable, measurable and time-bound. In order to contribute to the development of educational, emotional and social skills, it is important to encourage the complete development of students through IEP. Another important requirement that must be fulfilled in the development and implementation of IEP is the flexibility of the program with respect to the customization of content, procedures and requirements with respect to both students and the timely introduction of amendments. The third request in the application of the IEP is the evaluation and assessment of student performance, which must be aligned with the intended goals of the program (Ivančić & Stančić, 2006). In the education of students with disabilities, equal participation and involvement of family members, principals, classroom and subject teachers, supportive education collaborators and other school staff (technical staff and paperwork) is very important. Apart from such equal participation, good collaboration between parents and schools, mutual respect, trust and good communication are also very important. The role of the family of students with disabilities is indispensable in order to achieve the goal of a modern, inclusive approach of working with such students.

Unfortunately, despite the present legal regulations which ensure the development and implementation of IEPs in Croatia, the main components of the program are often left out in practice. Certain subjects of the inclusive process are being excluded and there are difficulties in the timely development and implementation of IEPs. Although current laws related to education around the world are ensuring the equal integration of the family in the process of educating students with disabilities, the non-participation of parents and students themselves is still common in our region (Hammond et al., 2008; Rock, 2000; Diliberto & Brewer, 2012; Stančić & Matejčić, 2014).

Collaboration as a precondition for quality inclusive education

The numerous scientific research studies conducted by Croatian authors and authors around the word demonstrate the importance of good collaboration and the involvement of all participants in the educational process as a necessary precondition for quality education of students with disabilities. The classroom teacher (CT) is a model for all students in the class, but he does not work alone (Stančić et al., 2002). Supportive education collaborators (SEC) are needed to provide support as appropriate. Educational assistants (EAs) also are available in a support role (Stančić & Sekušak-Galešev, 2008; Igrić et al., 2009; Gomila, 2015). Parents (PA) and all students in the class should be a natural part of the support team (Stančić & Matejčić, 2014; Bunch, 2015). For the successful implementation of inclusive processes focused on creating an IEP, good communication between professionals, school staff (i.e. principals, SEC, CT, EAs) and PA of students with disabilities is necessary. Regarding the expectations from school, individualization of educational, socialization goals, artful teaching and monitoring the progress of students with disabilities during their education are all required. Regarding the parents, while the child needs the support and care of his own family, he must be included in regular schools and participate in school and extra-curricular activities with his peers. Good collaboration with the school is thus also required from the parents (Ivančić & Stančić, 2004). The students will feel the benefits of parental involvement and collaboration with experts from the school because their interests, needs and abilities will be recognized through the collaboration between the school and the family (Reiman et al., 2010). A review of research on the relationship between parents and schools discovered the various obstacles that are complicating the communication; the most important are related to the problems of accessibility and the accountability of the school focused on the development of the IEPs (Nelson et al., 2004). In order to achieve a successful collaboration and involvement of all participants in the inclusive educational process, it is necessary to provide new ways of developing and implementing of IEPs, such as the application of information and communication technologies (ICT).

Innovation in the development and implementation of IEPs

Following the guidelines of the twenty-first century, it is inevitable to use technology in today's educational system in order to improve the learning and teaching process. It is very important to utilize digital content and ICT tools not only in teaching, but also in assessing, planning and monitoring the progress of students. We have national strategies for ICT in Croatia, including e-learning and digital competences, national research projects and initiatives for ICT. The Croatian Academic and Research Network (CARNet) created the application e–Dnevnik for classroom books in electronic form. This application was introduced as a pilot project in three secondary schools at the beginning of the 2011/12 school year. CARNet is a public institution that today operates under the Ministry of Science, Education and Sports in the field of ICT and its application in education, ranging from network and Internet infrastructure to e-services, security and user support. At the beginning of the 2012/13 school year, three schools from the pilot project and 29 other schools started using e-Dnevnik in all of their the classes; e-Dnevnik became a CARNet service in the 2013/2014 school year. More than 250 schools applied for its use, including branch schools. In order to improve the development of IEPs and their availability to all subjects of the educational process (CT, SEC, PA and students with disabilities), a web application for tablets, smartphones and PCs was created in collaboration with students and teachers from the Faculty of Education and Rehabilitation Sciences, the Faculty of Graphic Arts and the Faculty of Electrical Engineering and Computing at the University of Zagreb. CARNet recognized the value of application. We expect the implementation to start at the beginning of the 2015/2016 school year. The IEP application allows entering and updating data and monitoring the achievement of students with disabilities. The teacher, with the support of supportive education collaborators, creates an IEP for each student. The IEP form contains general information about the school and the student, individualized curriculum and monitoring of achievement in a particular month of the school year. The monthly IEP also provides timely insight to students and parents of students with disabilities regarding the content (goals) of the IEP. This, in turn, offers the possibility of direct communication with teachers. The innovation of this web application is that it gathers all participants in an inclusive process through collaboration in the timely preparation and implementation of the IEP. The web application symbolizes the link between elements in an inclusive approach to educating students with disabilities. As previously stated in the introduction, the use of web applications for creating IEP provides a central place for students in the educational process; the involvement of all participants in the circle of support; the timely preparation of the IEP; collaboration through communication; sharing of information between the participants in the inclusive process, the availability, accessibility and monitoring student achievement during the school year.

The problem of the study

Based on the literature on the inclusion of students with disabilities discussed in the introductory part of the paper, the following needs are evident: teamwork and collaboration between school experts and families of students with disabilities; the involvement of families and students with disabilities in the development and implementation of the IEP and new methods for creating and implementing IEPs, such as web applications.

The aim of the study

The competence of school experts and the active participation of parents in the educational process are features of the successful implementation of inclusive school practices. Such a process involves the timeliness, collaboration and involvement of all participants in the inclusive process in order to assess skills, plan support and monitor the progress of students with disabilities. The study contained two main goals. The first goal was to gain insight into the opinions, expectations and satisfaction of classroom teachers (CT), supportive education collaborators (SEC) and parents of students with disabilities (PA) regarding the development and implementation of IEPs. The second goal was to develop a practical approach to develop and implement IEPs through a web application.

Methods

The sample

The study was conducted on three intentional samples with a total of 109 people. The sample was selected according to the following criteria: CT and SEC with experience working with students with disabilities; PA of children with different learning and/or development difficulties; students who are educated on the basis of decision on the appropriate form of education (an IEP with the adaptation of content or an IEP with the individualization of procedures); the SEC employees of education rehabilitators (e.g. speech therapist); parents of students follow the progress of their children through informing by the school and schools that are a practice place for students from the Faculty of Education and Rehabilitation Science at the University of Zagreb. The research was conducted in five primary schools in Zagreb. The first group of respondents consisted of 76 CT, including 14 males and 62 females. The respondents in the first group had an average of 28 years of service. Furthermore, 44 out of 76 respondents had undergone additional training for working with students with disabilities. The second group of respondents consisted of 8 SEC from the school, including 4 education rehabilitators, 1 psychologist, 2 pedagogists and 1 librarian. The sample consisted of 1 male and 7 female respondents. The respondents in the second group had an average of 13, 6 years of service. Half of the respondents had received additional training to work with students with disabilities. The third group of respondents consisted of 25 PA (2 fathers and 23 mothers) of students with disabilities. Eleven PA have a university degree, 2 with the higher, 10 have a secondary education and 1 parent is low-skilled. The respondents in the third group had an average of 17.4 years of service. Furthermore, 7 out of 25 respondents had received additional training for working with students with disabilities.

Instrument

The "Questionnaire of opinions of teachers, school experts and parents about the ways and possibilities of development and implementation of IEPs in working with students with disabilities" was used in this research. The questionnaire was designed for research purposes (Matejčić & Stančić, 2014) and consisted of two parts. The first part of the questionnaire contains general information about the respondents. The second part of the questionnaire contains 18 statements, 13 of which are Likert-type statements. The independent variables included in the general part of the questionnaire include the following: gender, education, years of work experience and additional training for working with students with disabilities. The dependent variables contained in the second part of the questionnaire refer to CT's, SEC's and PA's opinions regarding IEPs and investigated the following hypothetical areas of value: the philosophy of inclusion of the school and school experts; collaboration between CT and SEC (education rehabilitators, psychologists and pedagogists) in the development and implementation of IEPs; involvement of parents and students in the development of IEPs; difficulties in the development of IEPs; application of innovation (Internet applications) in the development of IEPs and the teacher's needs in order to make the development of IEPs easier and more effective. Respondents could round up one of five options for each statement that indicate the degree of their agreement (1 = *completely disagree*, 2 = *mostly disagree*, 3 = *neutral*, 4 = *mostly agree* and 5 = *completely agree*). In addition to these statements, the questionnaire includes two claims ranking with 7 and 5 answers that respondents scores in grades 1 to 7 or 1 to 5 given the importance of assessing the requirements for implementation of the IEP, the least important to most important. There is also a statement to which the respondent answers yes/no regarding the need for innovation and an open question that allows respondents to comment on the development and implementation of IEPs.

The test procedure

A student from the Faculty of Education and Rehabilitation Science at the University of Zagreb conducted a research. CT and SEC filled the questionnaires in the school staff room. SEC forwarded the letter of consent and questionnaires to the PA of students with disabilities. The PA of students completed the questionnaires at home. The completed questionnaires were returned to the SEC and then to a student. This study respected the ethics of scientific integrity and data protection defined in Article 2 of the Code of Ethics Committee for Ethics in Science. Parents' privacy is protected through the guarantee of voluntary participation, confidentiality, secrecy and anonymity of information (Committee on Ethics in Science and Higher Education, 2006, 2-3).

Methods of data processing

Data was analyzed with descriptive statistical analysis techniques. We performed a qualitative analysis of the open question (Mesec, 1998). The response categories were obtained through the participants' statements. The response categories are described in the section below.

Results

The results were obtained using descriptive statistical analysis techniques. For the purposes of this study, variables were selected that focused on the problem and research objectives and the results are presented in absolute frequencies. Table 1 shows the responses to the 4 statements on the questionnaire regarding collaboration of the participants in the educational process (8, 9, 10, 11).

Table 1

The Distribution of Classroom Teachers (CT = 76), Supportive Education Collaborators (SEC = 8) and Parents (PA = 25) in Separate Variables of the Questionnaire Used in This Study Expressed in Absolute Values.

SAMPLE	ITEMS	COMPLETELY DISAGREE	MOSTL DISAGREE	NEUTRAL	MOSTLY AGREE	COMPLETELY AGREE
CT	8. The teachers of our school made IEPs in collaboration with supportive education collaborators.	7	5	11	32	21
	9. The teachers of our school made IEP is in collaboration with other teachers of our school.	6	11	12	35	12
	10. Parents of students with disabilities, of our school, are involved in making IEPs for their child.	19	10	26	18	3
	11. Students with disabilities of our school are involved in making their own IEPs.	24	19	22	9	1
SEC	8. The teachers of our school made IEPs in collaboration with supportive education collaborators.	0	1	1	5	1
	9. The teachers of our school made IEP is in collaboration with other teachers of our school.	0	0	4	4	0
	10. Parents of students with disabilities, of our school, are involved in making IEPs for their child.	0	1	4	2	1
	11. Students with disabilities of our school are involved in making their own IEPs.	2	3	2	1	0
PA	8. The teachers of our school made IEPs in collaboration with supportive education collaborators.	0	2	9	7	5
	9. The teachers of our school made IEP is in collaboration with other teachers of our school.	1	2	13	6	1
	10. Parents of students with disabilities, of our school, are involved in making IEPs for their child.	8	3	4	7	2
	11. Students with disabilities of our school are involved in making their own IEPs.	7	4	6	4	2

Analysis of the responses of the first group of respondents, teachers (CT), reflected the agreement of the majority of teachers (N = 53) in statements related to the collaboration between teachers and supportive education collaborators (pedagogists, psychologists) in the development of IEPs. In the statement related to the collaboration of teachers with other teachers in the school, 35 CTs agree that the collaboration is realized. Many CTs disagree with the statement concerning the involvement of parents of students with disabilities in developing IEPs (N = 29); 26 CTs are neutral, 18 mostly agree and only 3 CTs completely agree with the statement. The statement regarding the involvement of students in developing their own IEPs produced dissent among CTs; 43 of them completely or mostly disagree that this form of collaboration is required, while only 1 CT is in complete agreement with this statement. The second group of respondents, SEC, mainly agree (N = 5) that teachers collaborate with supportive education collaborators in the development of IEPs. Half (N = 4) of the SECs are undecided regarding the cooperation of teachers with the other teachers at the school in the development of IEPs, while the other half (N= 4) generally agree. The answers given in response to the statement regarding the involvement of parents in developing IEPs were varied. Four SECs are undecided, 1 mostly disagrees, 2 mostly agree and only 1 completely agrees with the statement. The SECs generally disagree with the statement concerning the involvement of students in developing their own IEPs (N = 5). The majority of the third group of respondents, PA, were neutral in their response to the statement about teachers' collaboration with supportive education collaborators (N = 9); 7 PA mostly agree with the statement. The majority of PA (N = 13) were undecided regarding the statement about teachers collaborating with other teachers at the school in developing IEPs. The majority of PA (N = 11) expressed disagreement and only 9 expressed agreement regarding the following statement: "Parents of students with disabilities at our school are involved in developing IEPs for their child." The majority of PA (N = 7) also disagree with the statement that "Students with disabilities at our school are involved in developing their own IEPs."

The questionnaire in the study offered respondents the opportunity to ask questions and leave comments regarding the development and implementation of the IEP through an open question. The analysis of these responses gave rise to the response categories. For the purposes of this study were isolated statements of the respondents, response categories relating to "collaboration." Response categories are shown in Table 2 as examples of an open coding method (Mesec, 1998).

Table 2

Examples of Teachers' and Parents' Responses and Comments in Response to the Open Question About the IEPs

SAMPLE	CATEGORIES	STATEMENT
CT	Collaboration of teachers and supportive education collaborators	"It takes a strong, hard-working professional pedagogical service to help not only the development of the program, but also in the work of the teachers, because I believe that they are experts at a higher level than me." "We need better ccollaboration and assistance of professional services."
PA	The involvement of parents and students in making IEPs	"We and our children have never previously involved in the development of individualized educational programs."
	Collaboration between the school and parents	" It takes the necessary collaboration between parents of students with disabilities and school as well as training teachers by supportive education collaborators."

In the category response *Collaboration of teachers and supportive education collaborators*, CTs report that there is support from supportive education collaborators to solve problems. They emphasize the need for high-quality professional services that will support and help in the development of IEPs and work with teachers. The need for better collaboration between teachers and professional services is highlighted. Based on the parents' questions and comments are allocated expectation of collaboration with the school and the need for greater collaboration of parents and school experts. Parents also assert the lack of parent and student involvement in the development and implementation of IEPs.

Concluding observations

According to the analysis of the responses, there is an obvious lack of collaboration among all participants in the educational process (CT, SEC, PA). The exclusion of parents of students with disabilities and students themselves is present in the development and implementation of IEPs. The lack of collaboration and lack of involvement of all participants in the educational process is reflected in the quality of inclusive processes. These difficulties and disadvantages indicate that changes in the development and implementation of the IEPs are required in order to achieve effective collaboration and active participation of all participants in the educational process. It is necessary to encourage teamwork at school and collaboration between school experts and the families of the students. It is important that teamwork involves mutual respect and the equal participation of all participants in the educational process. Involving parents as active and equal members in the creation and implementation of IEPs is also of the utmost importance. Along with teamwork and effective collaboration, teachers' education and collaboration between school experts is crucial. It is necessary to encourage school workers and school experts to focus on the possibilities and *strengths* of students with disabilities rather than on difficulties and these students' limitations. It is necessary to promote the philosophy of inclusion in the regular primary school system and make the relevant stakeholders aware of the obligations and rights of students with disabilities. It is necessary to involve students in the development of their own program. They should take part in the agreement, in the creation of educational objectives and in the evaluation assessment of the program. In order to contribute to the current practice of developing and implementing IEPs, it is necessary to introduce innovations in the design and implementation of these programs, such as web applications. The advantages and benefits of web applications for creating and developing IEPs have been recognized (Stančić & Matejčić, 2014). The web application in this study achieved the following: created a central place for students in the educational process; fostered the active involvement and effective collaboration of all participants in the educational process; helped ensure the timely development and implementation of the IEP; increased the availability and accessibility of programs to all participants and provided continuous monitoring of student achievement.

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An educational platform for all: The e-Hoop approach

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Nowadays, a plethora of learning environments is available through the World Wide Web with the intent to fulfill learners' and educators' different needs. However, despite significant progress achieved over the past several decades, many educational methodologies still discriminate between learners, and they fail to take into consideration that learners have diverse cultural backgrounds, respond to different learning styles, or have learning difficulties. The e-Hoop learning platform has been developed to place the focus on individual needs and eliminate social exclusion. E-Hoop introduces a new conceptual framework of education via a unified way to address learning differences. The e-Hoop learning platform is a universal, dynamic, and adaptable environment which educators can use, modify, and expand according to their needs. The platform provides diagnostic tools which are used to evaluate and identify learning preferences and the abilities of individual learners (how they best learn, i.e., auditory, visual, etc..), and it delivers educational material in the form of learning bjects. In this way, learning differences can be eliminated. This paper presents the pedagogical approach of the e-Hoop concept and an overview of the e-learning platform.

Introduction

E-learning educational approaches have numerous advantages compared to conventional learning settings (Zhang, 2004). An e-learning environment provides educational material via the Web, and in this way, overcomes any distance-related obstacles. Another advantage is that a learner's activity within an e-learning educational platform can be tracked and monitored. This information can be used to improve the learning procedure and experience (Dawson, 2010). Nowadays, a vast variety of learning environments is available to help educators deliver better educational services and address the demands of the learners who are the actual end users. However, selection of the appropriate e-learning platform remains a difficult task, especially when the main goal is to suit the needs of learners with diverse learning profiles and needs.

Over the last several years, many pedagogical approaches have emerged which have shown that the learning process is directly connected to the learning environment. Also, different types of environments may radically change the way learning takes place (Bransford, Brown, & Cocking, 2000). In the conventional way of teaching in schools, the educational tool is usually a book which contains text and images. Web technologies increase the use of various types of educational content, and e-learning platforms change their learning material from plain text and images to an enhanced multimedia form. According to Wheeler (2010), "Multimedia brought the world into the classroom. Smart technologies will take the classroom into the world." Additionally, the teacher-centered approach of learning has shifted towards a student-centered procedure (Smeets & Mooij, 2001).

Learning environments follow a user-centered approach due to the goals they aspire to, which in some cases could be the education of students independently from their age groups. In this sense, many educational environments are focused on one or more target groups of learners. The main difference that distinguishes e-Hoop from other environments is that e-Hoop is an educational tool for all, an umbrella which covers many educators' and learners' profile needs. E-Hoop evaluates the users' learning abilities and provides them with the appropriate format for the educational content. By using multimedia and supporting interactive educational content, e-Hoop could be a powerful tool for educators to overcome obstacles inherent in conventional metods of classroom teaching.

Literature Review

Learning is the process of attaining new knowledge, behaviours, skills, values or preferences and involves processing different types of information controlled by different parts of the brain. Learning depends on the mental capacities of the individual, the type of knowledge to be acquired and the environmental circumstances.

International research evidence (Blease & Wishard, 1999; Lewis, 1999) indicates e-learning's potential to address key elements of effective learning and higher achievement. Its benefits include the following: intrinsic rewards (increased motivation, more enjoyment of learning, increased concentration on tasks); challenge (e-learning enables differentiation to encourage the less able); user control (increases independent learning skills by shifting the locus of control to the learner); increased self-esteem (increases attention to presentation and detail and improves spelling); higher order thinking (learning is made easier and students are able to do more and learn more); zone of proximal development (work is made easier and learning is sped up); and improved curiosity (immediate feedback is provided, there is engagement with the student and learning is faster). Additionally, e-learning enables sensitivity as well as responsiveness to the an individual learner's needs and profiles, and these are crucial aspects for individualized learning.

A range of learning theories (Cooper, 1999) has been proposed throughout the years with the most prominent ones being the following:

- Behaviourism – a learning process focusing solely on the aspects of learning that are objectively observable;
- Cognitivism – a learning process that goes beyond behaviour to explain learning based on thinking and mental activities;
- Constructivism – a learning process in which the learner actively constructs new concepts or ideas.

Behaviourism is one of the oldest educational methods and is described as a developmental theory operating on a principle of stimulus-response, i.e., behaviour caused by external stimuli unrelated to internal mental states. The learner uses low-level processing skills to understand information on material that is often isolated from real-world situations. The learner is essentially passive to learning and responds solely to environmental stimuli. As a result, the theory of behaviourism concentrates on the study of overt or obvious behaviours that can be observed, and it does not consider any independent activities of the mind. In behaviourism, the teacher has the sole responsibility for the learner's training/education, and learning takes place in a highly controlled environment through repeated practice.

Cognitivism focuses on the inner mental processes where mental activities such as thinking, knowing and memory are the focus of attention. Cognitive theories attempt to answer questions such as how and why people learn by attributing the mental process to cognitive activities as well as adopting the viewpoint that students actively process information as learning takes place. Learners acquire new knowledge by linking it to old knowledge, and the individual learns by listening, watching, touching, reading or experiencing. Whereas behaviourism regards learning solely as an observatory process, cognitivism takes into account changes in an individual's behaviour, but only as an indication to what happens in a learner's head. Additionally, it has been argued that cognitivism is the reason for the separation of schools into different, discrete levels (i.e., preschool, primary and secondary levels) and that it considers the mind to be like a computer where the learner is the information processor.

Constructivism focuses exclusively on the meaning-making activity of the learner's mind, and it considers learning to be based on the individual's active participation in problem solving and critical thinking that is regarded as relevant and engaging. The theory adapts to the idea that individuals construct their own meaning (knowledge) and that this new knowledge is gained when it is linked to pre-existing intellectual constructs. In constructivism, learning is the result of the search for meaning. There are two dynamic principles of constructivism: 1) education focuses on the learner and 2) there is no such thing as knowledge (in the form of an entity). It is important to mention that in constructivism theory, focus is shifted away from the educator and redirected to the learner and that students are encouraged to learn independently. Here the educator's role is to understand the mental models that students utilize.

With the emergence of e-learning, new teaching and learning practices have moved towards the constructivism theory underpinning the more effective use of e-learning. E-learning shifts the emphasis from the teaching to learning (Loveless et al., 2001) and from the product to the process of learning. There is additionally a shift from teacher-centered instruction towards the facilitation of learning, particularly towards student-centered learning (Smeets & Mooij, 2001).

One of the great claims for e-learning is its ability to provide differentiation by task, process, materials, routes through learning, outcomes, pacing, timing, learning styles, abilities, kinds of knowledge, difficulty of material and personal involvement of the learner, enabling as a consequence student choice, assessment and individualized learning. Table 1 depicts the differences between traditional learning and new learning paradigms (Morrison, 2004).

Table 1

Differences Between Traditional Learning and New Learning Paradigms

Traditional Roles	Newer Roles with e-learning
Teacher transmission to passive learners who obey and receive	Process-based curricula with learners who question and analyse
Teacher-oriented	Learner-oriented
Teachers as task setters for individual learning	Teachers as managers of collaborative learning
Organiser of learning activities	Enabler of quality learning experiences
Dictate the learning	Creation of enabling structures for learning
Technology as a tutor	Technology to promote interaction

E-Hoop Overview

The E-Hoop platform has two separate features: the educators' environment and the learners' environment. More specifically, the platform provides educators with an administrative control panel on the back end, as shown in Figure 1, where they can upload their learning material (any multimedia type of content). Furthermore, a media library is available for storing all such multimedia content and is used as a pool of objects by educators to design and create their courses. Additionally, educators are allowed to create lessons and quizzes; manage groups of students; and manage students' and teachers' individual profiles. Within the learning environment, the learners are educated by using the e-Hoop learning platform in a personalized manner and by utilizing auditory and visual features to their benefit. As Figure 1 shows, the front end is the learners' side of the learning platform. Learners have the opportunity to take a course in a way tailored to their individual learning needs that will adjust to differences attributed to social exclusion. Additionally, learners participate in courses and quizzes and receive feedback on their progress. Learners can also provide feedback because they are an active part of the educational process.

The E-Hoop learning environment provides the educational material in an appropriate way that suits the learner's unique individual needs. The development of the e-Hoop platform was based on the availability of innovative open source tools which form the base of the learning platform. These tools have been customized, extended and enhanced with the appropriate algorithms, programming code scripts and database extensions to enrich the adaptability and personalization of the learning environment. The core algorithm, which is presented in the following section, is called Learning Object Sequencer (LOS) and is used to select and provide the educational material in an appropriate mode, based on these factors: (a) results of diagnostic/profiling tools, (b) educators' predefined constraints and (c) learning progress. The platform is a combination of Web 2.0 technologies, diagnostic tools for learning abilities and end user profiling. These components are used for delivery of the educational content to learners in a personalized manner (Learning Object Sequencer algorithm).

In conclusion, it is to be noted that the key activities for educators are the following: (a) use, modify and expand the e-learning environment, (b) deliver e-learning material as learning objects and (c) provide equal learning opportunities. The e-Hoop learning platform's main advantages for learners are these: (a) evaluates learning abilities and preferences, (b) delivers educational content to learners in ways

they can learn best (i.e. auditory, visual, etc..) and (c) eliminates differences (i.e. learning disabilities, dyslexia, etc..).
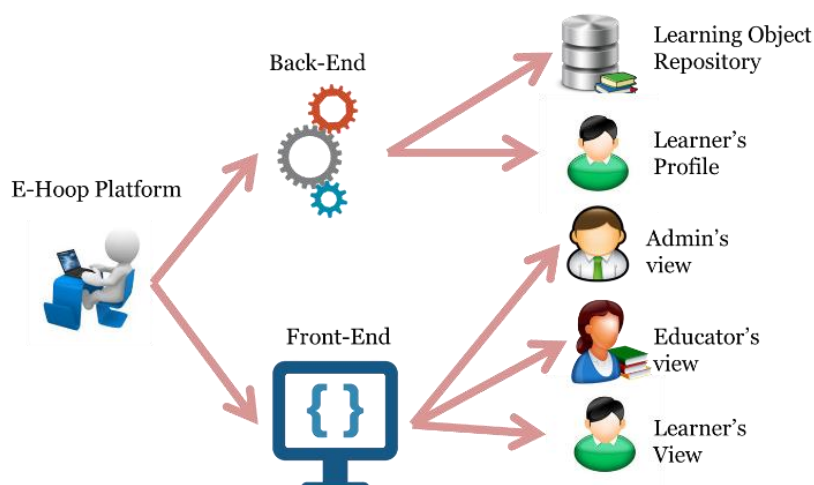

Figure 1. e-Hoop platform.

E-Hoop Added Value

The added value of the e-Hoop platform is a multidimensional issue, which includes an alternative pedagogical aspect through the mapping of users' profiles with the appropriate educational content. Another dimension is the integration of various diagnostic tools concerning users' learning abilities. These tools are the Mental Attributes Profiling System (MAPS), the Visual, Aural, Read/Write and/or Kinesthetic sensory modalities (VARK) and the Honey/Mumford Learning Styles Questionnaire (LSQ). Each diagnostic tool focuses on different aspects of the user's preference. After logging in, every participant-learner goes through a short assessment process composed of a number of tests. The results of the tests are subsequently combined to derive the requirements imposed on the functionality of the learning environment. The MAPS (Laouris, 2009) cognitive test is a battery of video game-like tests that assess the learning abilities of pre-elementary and elementary age school children, profiling cognitive mental attributes which include short-term visual and auditory memory and visual and auditory discrimination. These results are used to differentiate between those who perform better using the audio, the visual or the combination of the two channels. MAPS can be used for learners 6−12 years old. VARK's (VARK, 2015) profiling learning preferences are similar to MAPS, but use a short questionnaire instead of video game-like tests. It can profile learners' visual, aural, read/write and/or kinesthetic preferences, and it can be used for all ages. The Honey/Mumford (Honey/Mumford, 2015) learning styles questionnaire differentiates between activist, reflector, theorist or pragmatist. Even though there is criticism in the literature, the assessment of learning styles is used widely. It distinguishes between (a) Activists who are 'hands-on' learners and prefer to have a go and learn through trial and error, (b) Reflectors who are 'tell me' learners and prefer to be thoroughly briefed before proceeding, (c) Theorists who are 'convince me' learners and want reassurance that a project makes sense and (d) Pragmatists who are 'show me' learners and want a demonstration from an acknowledged expert. Moreover, the platform uses a self- declaration option for visually-impaired, hearing-impaired persons for which no testing is required. In addition, children with diagnosed Dyslexia or ADHD can self-declare their differences. The aforementioned diagnostic tools provide information about the special learning needs of each learner in order for it to be included in an individual profile. The results are fed into the LOS, which is the main algorithm delivering the educational content. The LOS's unique adaptability allows individuals to learn according to their specific requirements and in their own individual ways by using the appropriate educational material. It is thus an innovative and practical plugin which fosters an inclusive learning environment by specifically targeting socially and educationally disadvantaged groups.

Methodology

Learning Material

The process of designing and developing the educational material based on the e-Hoop conceptual approach is presented in this section. Teachers can organize their educational material into courses, where each course represents a complete series of learning objects that can be delivered during a specific period (i.e., a semester). Courses belong to a course category, which describes the thematic orientation of the course. Each course consists of modules, and each module represents a complete set of learning objects that can be taught during a class.
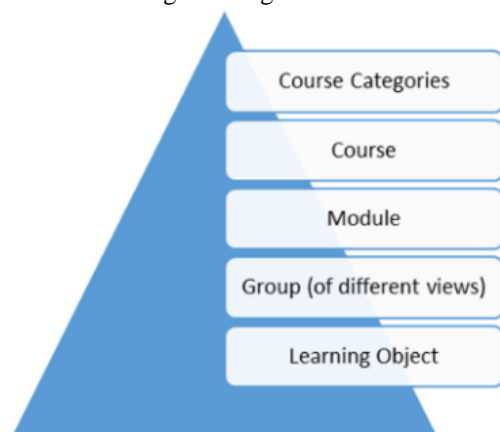

Figure 2. Learning Material Hierarchy.

Learning objects that belong to the same module are organized into groups. Groups of learning objects are assembled by the educator, who defines the proper educational material sequence as a conventional lesson in a classroom. The learning material hierarchy is shown in Figure 2 above. The learning objects that belong to the same group contain the same educational information, but each learning object presents this information in a different way, which is more suited for learners with specific learning preferences. Additionally, the learning objects that belong to the same group may use different language. So far, five languages are supported by the e-Hoop learning platform, which are the following: English, Finnish, German, Greek and Lithuanian. Each learning object must have at least one tag, which describes the type of the interactivity that can be achieved between the specific object and the learner. According to this categorization, a learning object can be a) theoretical, b) hands-on, c) demonstration or d) educational game. Furthermore, to each lesson can be applied one or more tags from the following list: 1) talking book, 2) audio recording, 3) large print book, 4) amplified speech, 5) sign language video, 6) ip reading video, 7) subtitled video, 8) special structure or 9) multimedia, all of which indicate the educational type of the specific learning object. If two learning objects belong to the same group, they cannot have the same combination of educational type, type of interactivity and language tags.

The e-Hoop unified methodology defines which educational material view is the most appropriate for each user, taking into consideration the user's profile extracted via multiple diagnostic/profiling tools, such as MAPS and the educational types, the type of interactivity that the available educational material belongs to and the preferable by the learner language. The diagram of Figure 3 explains, in a simple way, the preparation and the presentation of the educational material for all possible users.
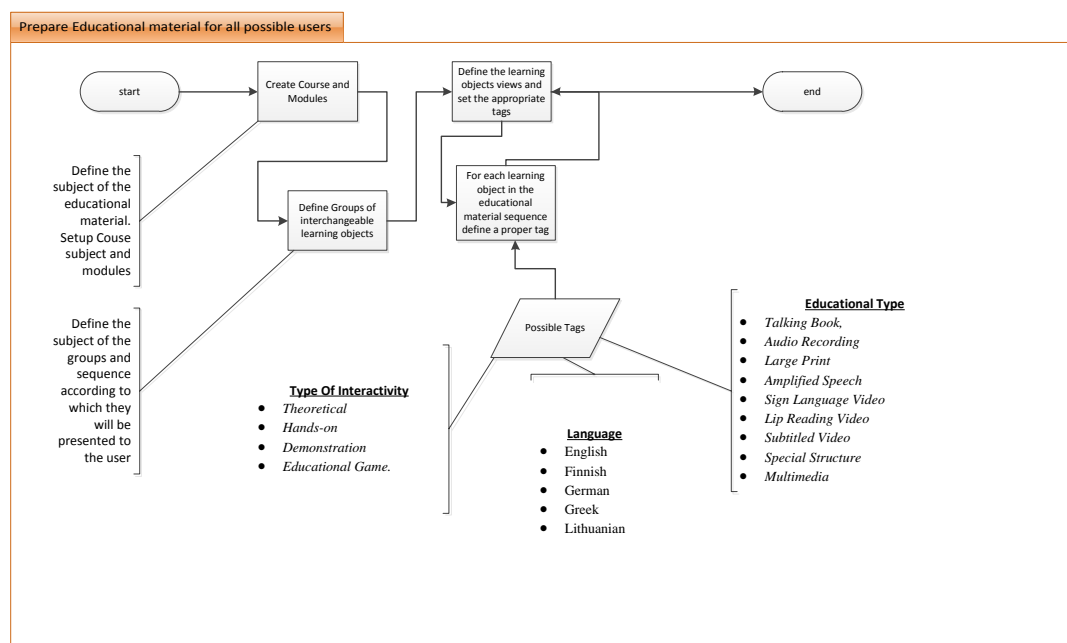
Figure 3. Prepare Educational material for all possible users.

Platform Functionality

A Content Management System (CMS) is a bundled or stand-alone application that provides the appropriate functionality in order to allow users to design, create, manage, store and deploy various types of content on Web items, such as text, images, video and audio. Furthermore, a Web CMS provides client control over HTML, which selects, assembles and delivers all the content at runtime to specific end users based on the demand (Boiko, 2005; Rockley, 2003; White, 2005). A Free and Open Source Software (FLOSS) can be used as the base of the desired learning platform, in order to concentrate the efforts on the main objectives of the study, develop something totally new and avoid consumption of effort and time on already solved problem (e.g., Web content management). An extended research on open-source Content Management Systems (CMS) and Learning Management Systems (LMS) was performed, in order to select which is the best choice of open-source software according to e-Hoop objectives. There are hundreds of CMS and LMS solutions licensed under GPL that can be used for developing new platforms and tools. By using prior knowledge and providing new knowledge as well, e-Hoop can achieve a place as part of the developers' community with the aim of spreading a new educational approach.

In order to decide which learning platform best fits the purposes of the e-Hoop project, an extensive research was conducted. Based on the results of this research, it was decided that the best solution is to use the Joomla CMS (Joomla, 2015) combined with its LMS extension, named Guru (Guru, 2015), as the base of the e-Hoop learning platform.

Joomla is an open-source framework CMS with a huge community of developers and support forums. Joomla CMS allows customization, provides a useful administration tool to manage the content and has many available components and modules. Also, Web developers are allowed to extend its main functionality by designing and developing new components, modules and plugins. The E-Hoop platform is an innovative learning platform built on the Joomla framework following the open-source software paradigm. The Joomla framework at the back end of e-Hoop is used for handling the content management functionalities fulfilling the e-Hoop requirements. The creation of a new platform by using, modifying and integrating proven and tested open-source components helps to proceed successfully to fulfil the project's purposes. Guru is an open- source LMS component, which allows the creation of online educational courses, modules, lessons and quizzes. Joomla CMS combined with Guru LMS provides a powerful combination that is the most appropriate choice to be used as the underlying system of the e-Hoop learning platform. The Guru LMS can be extended and customized, so as to meet the requirements of the e-Hoop project for a unified and adaptable learning environment. This new learning approach

proposes the learning platform as an innovative educational tool, but also the pedagogical aspects of an alternative way of learning. Also, it will be easily extendable in order to meet the future and potential needs of the learners.

The aim of the Learning Object Sequencer (LOS) is to provide personalized educational material, in the appropriate form, to learners based on their individual profiles. The LOS is running in the back end of the e-Hoop platform, and its presence is invisible to the learners. It is implemented as an extension of the Guru LMS component in order to extend its functionality. Furthermore, the LOS algorithm affects both the data stored in the platform database and the logic executed on the server by using dynamic scripts and functions. The algorithm decides the appropriate form of the learning objects, which are parts of a specific course, by taking into consideration the learner's profile according to the results of the profiling tests (MAPS, VARK, etc.). The purpose of the LOS is to select, combine and present the educational content in an appropriate manner to the learner. The LOS combines the results from diagnostic tools and also takes into account the learning progress achieved so far by the learner. Actually, the LOS decides for each group of learning objects, which objects can be displayed to the learners based on learning preference. Figure 5 presents the functionality of the actual delivery algorithm from the LOS.
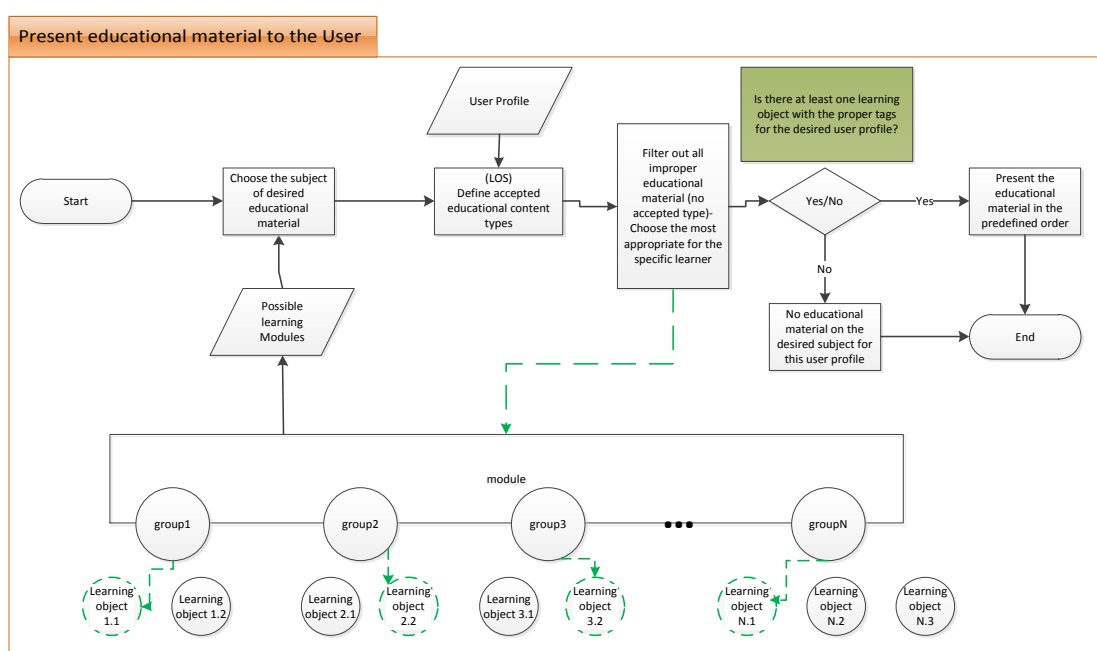

Figure 5. LOS algorithm functionality.

Furthermore, learners could participate in one or more courses, educators could teach many courses and each course could include many learning objects, as explained in the previous section. A media library entity is used in order to store a large number of learning objects which can be reused by the educator in various courses. The LOS algorithm uses results from the diagnostic tools, information from learners' profiles and their groups, the recommendations for the learners and the constraints of the educators, and in this way, it decides the appropriate view of the learning material in order to present it to the learners.

Conclusions and Future Work

This paper presents the pedagogical approach of the e-Hoop concept and an overview of the e-Hoop e-learning platform. This platform has been created with the vision of supporting different learners with various learning styles and differences by enabling them to learn in ways that suit their individual needs. Currently, the e-Hoop platform offers a set of courses available in five languages, and it is expanding by adding new content. An extensive usage of the platform has already been planned for the forthcoming months, where it will be presented at various schools in five countries.

Acknowledgment

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Technology-enhanced self-directed and self-regulated learning outside the campus – An Inclusion of students as designers

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The aim of this paper is to reveal how to support and enhance all students' self-directed learning activities outside the campus. The data collection was carried out among radiography students and students of hospitality and tourism management at University College North (UCN) in Denmark. By the use of participatory design-based research following the Collaborative E-learning Design method (CoED), the students generated descriptions of new tools and activities to handle the challenges of self-directed study activities. Based on the findings from two workshops and a content analysis, the results reveal values such as engagement and motivation which should be taken into consideration. The students also stress that the learning management system must provide tools for ubiquitous learning, peer-support, collaboration and feedback.

Background

This study is a project under the auspices of the Digital Education Laboratory (DUIT) on the development of IT-integrated design, where the intention is to develop new ways of teaching and studying using digital learning resources to facilitate and qualify learning among different groups of students in different social and cultural contexts. The study examines the following research question: How can IT be used to support students' learning activities outside the campus?

The project reveals how design processes can generate a design which supports students' self-directed and self-regulated learning activities off-campus. The intention is to make the students more self-directed and make them take control of their own learning, supported by technology. This would qualify them to seek, combine, use and develop knowledge and thus become lifelong learners, managing information and gaining knowledge and competencies. Ubiquitous technology has an advantage of being inclusive, so all students have equal support opportunities. However, technology-enhanced self-directed and self-regulated learning involves a change in pedagogy (Dau, 2013).

A study among 535 university students in Denmark revealed that 32% of the students complained about the lack of lectures and the amount of self-study, some of them adding that they did not get enough instruction and that they felt that they did not achieve the necessary competencies (Overgaard, 2011). This study illustrates that an increased reduction in face-to-face lessons and an increased amount of self-directed and self-regulated learning activity is not without constraints.

Equivalent problems are seen among undergraduate students at University College North (UCN). Research carried out among students participating in blended learning environments at UCN, where approximately half of their study took place off-campus, has revealed how students struggle to become self-directed learners outside the campus (Nyvang & Dau, 2013; Dau, 2014). Students seem to lack guidance and support in carrying out their study activities off-campus, either online or offline, especially when they study at home. For instance, the students experienced troubles navigating the learning management system (LMS) at UCN (Dau, Falk, & Jensen, 2014).

Self-directed and self-regulated learning

The question of how to support students' self-directed learning has been described by several researchers. Most of the research is related to approaches within constructivism and social-constructivism, for instance, Bandura's descriptions of self-regulation (1991) and his notion of self-efficacy (1977) and ideas of scaffolding students' self-regulated learning (McCaslin & Hickey, 2001) based on Vygotsky's (1962, 1978) activity theory.

Self-directed learning and self-regulated learning are overlapping multiple concepts, but there seems to be a greater emphasis on constructive and cognitive processes of learning in the latter (Pilling-Cormick & Garrison, 2007). Self-directed and self-regulated learning have been applied in many kinds of technology-enhanced learning environments (for example, Gabrielle, 2003; Steffens, 2006; Lenne, Abel, Trigano, & Leblanc, 2008; Ryberg & Christiansen, 2008; Bartolomé & Steffens, 2011). Different social and technological online tools have thus been applied in an attempt to scaffold self-regulated or self-directed learning in an effort to obtain continuous lifelong learning.

Self-directed learning is not a new concept but seems to have roots going back to the ancient Greek philosophers, for example, Socrates' questioning, his pedagogy and his elaboration of knowledge as both *epistemé*, *techné* and *phronésis*. However, within later descriptions, self-directed learning has been conceptualized as the ability to learn on one's own (Knowles, 1975). Garrison (1997) extends this understanding by adding a *collaborative constructivist* perspective and a focus on the learning process. He proposes a model of self-directed learning which integrates external management, internal monitoring and motivational issues associated with learning in an educational context (Garrison, 1997), something which seems to be extended in his contemporary descriptions of blended learning and *communities of inquiry*. Garrison defines self-directed learning as follows:

> An approach where learners are motivated to assume personal responsibility and collaborative control of the cognitive (self-monitoring) and contextual (self-management) in a constructing and confirming meaningful and worthwhile learning outcomes (1997, p. 18).

This definition is in accordance with Zimmerman's (1990) descriptions of self-regulated learning. However, Zimmerman seems to have a greater focus on processes than outcome in relation to learning, which is also a consequence of the concept itself, as "directed" refers to something as an outcome, and "regulated" refers to processes. Based on different definitions of self-regulated learning, Zimmerman (1990) stresses that students' self-regulated learning involves three different features:

- their use of self-regulated learning strategies;
- their responsiveness to self-oriented feedback about learning effectiveness and
- their interdependent motivational processes.

Despite the different focus on self-directed learning and self-regulated learning between the authors, there is a great amount of similarity, as both point at motivation and cognitive strategies. However, self-directed learning is not easily attained, and recent studies point at different kinds of constraint. For instance, a study of undergraduate medical students in radiography reveals that self-directed learning is not favoured as a learning method for anatomy, even though small group interactive sessions with a clinical radiologist facilitating self-directed learning have been offered. These initiatives did not induce the students to read more outside the core curriculum (Murphy et al., 2014). Other difficulties are elaborated by Åkerlind and Trevitt (1999), who stress that processes of change towards more self-directed learning and the provision of students with autonomy involve stress and student resistance, despite the benefits of technology.

Aim of the study

The aim of this study was to explore how to scaffold students' self-regulated, self-directed learning outside campus. As studies based on research findings in this setting indicate difficulties in relation to students' off-campus self-directed study activities, it became essential to gather the students' knowledge, experiences and suggestions for how to enhance their learning activities off-campus with the use of technology.

Informants

Data collection was carried out among undergraduate students at UCN in the fields of radiography and hospitality and tourism management. Two classes were selected for participation in a full-day scheduled workshop. The participation was voluntary, and the students were informed prior to the settlement. All

participants signed a confidentially agreement. Radiography students and students of hospitality and tourism management participated in the workshop.

Design process

The design process was generated by including students as fellow researchers in the process. Students have the greatest insight into what is meaningful and significant in terms of their own student activities outside the campus, and therefore their inclusion was essential.

Workshops were designed with inspiration from the Collaborative E-learning Design (CoED) method developed by Nyvang and Georgsen (2007). The CoED process was supplied by creative elements and tools. The creative process in use was inspired by the ideas behind flow theory, suggested by Csikszentmihalyi (1991).

The CoED method affords a task-oriented, non-judgmental creative platform for student parallel thinking and the production of knowledge. The CoED method divides the design process into three phases, adding specific tools and techniques at each stage. The three phases, respectively, focus on design options, fundamental values and concrete design. The method draws on iterative design processes. Through structured cooperation phases and card-sorting processes, a prototype of the design was developed.

In the first phase, students were introduced to the CoED method and the workshop's structure and were shown a short theoretical presentation about being online students. This introduction was followed by each student's choice of one item which defined a substantial value for that student. The values linked to the items were noted on a Post-it and were transferred to a second-phase values card. In the second phase, students identified the ideals and values of being active online students off-campus, through a card-sorting process which sorted them into groups of two to four students. Here the participants identified the guiding values and principles of the design. This was done through three rounds of card-sorting and prioritizing (see Figure 1 below).

Figure 1 Card-sorting

In the third and final phase, the specific design was generated from a template. In this phase, a toolbox was tailored by students' detailed descriptions of the activity. In the third phase, students had access to laptops, the internet, whiteboards, blackboards, Legos, pen and paper and more (see Figure 2 below).

Figure 2 Creative toolbox

The tools offered (Figure 1) in the third phase were made available to evoke creative thinking in the design process.

Methodology

Throughout the workshops, videotapes, audio recordings and photos were collected, but other essential material also included text and notes derived from templates, revealing prioritized values, written ideas and suggestions for designs.

Audio tapes were transcribed, and videos and pictures were browsed; designs were analysed in relation to these materials. An initial qualitative conventional content analysis was made of the transcribed data. Content analysis was used as a method to provide knowledge and understanding of the phenomenon under study. The analysis was inspired by Cavanagh's (1997), Downe-Wamboldt's (1992) and Weber's (1995) descriptions of the method and categories of analysing, taking into account the elements generated by the CoED method.

Findings

Four main values were identified as essential for students' self-directed and self-regulated IT-supported learning off-campus: motivation, school engagement, communication and accessibility. Based on the revealed values, the designs were all centred around a user-friendly LMS and the development of the intranet. The content analysis categories are illustrated in Table 1 below.

Table 1
Content analysis findings

Questions	Workshop 1	Workshop 2
What is said about the design?	An overall user-friendly LMS which works as an app.	A user-friendly LM/intranet where all information is accessible and allows professional dialogue and discussions in and across classrooms.
How is the activity practiced?	By the use of an app accessible on smartphones, computers or tablets. Must contain web units, module plan and LMS and give access to shared documents. Opportunities to have contact with lecturers and students through the mails.	On the intranet LMS including: schedules, class forum, educational activities, classes, study groups, lecture plans, events calendar, curriculum, webmail, assignments, grades, class pictures, search box, internship activities and absences. Using computers, tablets and smartphones to enhance internal and external communication among students and among students and lecturers.

What is the purpose of the activity?	To make study activities off-campus foreseeable and to generate time, enthusiasm, excitement and transparency.	Making information accessible and manageable.
How should the activity be structured?	Bring it all together on the same platform and uses colour codes, for example, in schedule in order to add clarity. Make platform sites manageable by content specificity, colours and system recognisability.	Forum-based dialogue with subject division. The student has a direct link to the calendar of homework, forum updates and more. Direct link to the subject, forum, projects and more.
Who is responsible for the design structure?	A graphic designer develops the app. Schedulers, lecturers and students are part of the structuring.	Lectures at the University College. In forums, both students and lecturers cooperate and are responsible, and in study groups, students are responsible.
What is the role of the lecturer?	The lecturer puts information, materials and updates into the platform and familiarizes him-/herself with the technical competencies using the app.	To follow the discussions. To make continuous updates. Support and guide in forums. Make use of homework possibilities online and react to student feedback.
What is the role of the student?	To seek out information and be updated. To show interest and commitment towards a new learning platform and provide feedback to lecturers about the pros and cons of the platform.	To keep updated in relation to schedules, homework, news and assignments. In forums, students show seriousness and helpfulness to peers. Participation, outreach and support to peers.
What is the role of peer students?	Active participants. To seek out information and be updated.	Seriousness and helpfulness to peers. Active in bidirectional communication.
Which IT tools are applied?	Computers, smartphones and tablets. Videotaped lessons distributed online and multiple apps.	The intranet/LMS provides online and offline access.
What are the challenges?	New workflow for lecturers, demands for courses and financial support.	Online forum may not take over teaching, and questions for homework must be included in classes. Teachers follow up on the forum activities.
How can the design make a difference?	The platform will support students' self-regulated learning and study activities off-campus. The app will aid structure and easy accessibility to the module and to the students' tasks and assignments at home. It is more manageable. It induces more desire to get started, because it is simple and time-saving.	More accessible and manageable and less time-consuming. Better cooperation between lecturers and students and between students and students in an academic online forum. Better clarity in relation to the scheme, homework and questions.
What are the main themes?	Accessibility, clearness and user-friendliness. Transparency, accessibility and manageability.	Time-saving accessibility and manageability. Accessibility, cooperation and clarity.

Based on the themes outlined in Table 1, there is significance to a design based on the following:

- One LMS for all study activities, based on a clear structure, transparency, clarity and consistency in subjects, schedules, literature, homework, activities, rooms and mail.
- Accessibility, for instance, with one login for everything available as an app on computers, mobile phones and tablets and access to streamed lessons.

The technology-enhanced design reveals how the students can be supported in their self-regulated and self-directed learning activities outside the campus. However, the students' suggestions are tightly related to their existing familiarity with the LMS and disregard contemporary problems. Moreover, lecturers' guidance, support and structuring all seem to have an impact on the described activities. The cooperation

between students and lecturers and among peers seems to be essential to external management, internal monitoring and motivational issues. In one of the workshops, there is a clear focus on self-regulated learning as a process, as students emphasize feedback for lectures during implementation. The students point to the LMS and app features and tools as important to support their self-regulated learning strategies off-campus, and the dialogue and discussion forum seems to enhance students' interdependent motivational processes.

Conclusion

The inclusion of students in the research design process entails that students are well informed, guided and motivated to participate in the collaborative design processes. However, motivation will naturally occur as the development of the design affects the students' future everyday lives. Despite the students' lack of research experience, their contributions are important and reflect the reality of the challenges that students experience.

The derived designs are based on values which are founded in the students' choices, which makes the process value-rooted, taking identical matters into account. The pitfalls of the CoED method lie in the possible non-renewal of students' experience and perspectives, as it is based on their familiarity with ICT. However, this familiarity is also a necessity if the design is to have a direct relevance to the students' self-directed and self-regulated learning activities.

The results from the study point at designs that extend the existing LMS functions by adding more user-friendliness, accessibility, clearness, manageability, cooperation, transparency and time-saving structures. It is suggested that the intranet and thus the LMS must be more inclusive in adding schedules, materials for lessons, assignments, dialogue or discussions and the notification features which were proposed. Easy access and simple structures are also requested, for instance, supported by notifications and colours. Delivery on different mobile devices is preferred as well, and access to videotaped lessons is suggested as a repetitive resource by which to reinforce superficial knowledge. Despite some differences among the revealed designs, there seems to be an expressed wish for more collaborative features, where both students and lecturers play a central role in feedback processes. Self-directed and self-regulated learning is thus supported by ICT when it meets requirements as the design dictates.

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Personal learning environment which enables inclusion and social interactions

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There are needs for innovative educational strategies for learning and teaching with today's increased use of digitization in education and society. Rising demands on embracing new digital learning and educational environments and integration of the social context for enhancing teaching and learning inclusion are required. Embracing social interactions can enhance community building and collaborative knowledge building and sharing. The purpose of this development project is to innovate truly the channels of communication and to share among users. This is one of the key pieces in a next generation learning environment and one which has not, as of this date, been completely integrated into learning environments. This PLE Communication Hub is presently in development for release Q4 2015. The entire concept will be demonstrated from the learner's perspective. This means to show how to interact with a student and how this interaction is integrated with the course features as well as with social stakeholders and how it is achieved within social media. Interaction with externals will also be demonstrated. Course building from the teacher's perspective will also be focused. Furthermore, the demonstration will highlight how learning analytics can be used by an organization to forge strong networks for use by their alumni.

Introduction

With today's increased use of digitization in education and society, there are rising demands on embracing new digital learning and educational environments and integration of the social context, such as social interactions outside the formal institutional settings and social media to enhance new digital educational practices. New and innovative educational strategies for learning and teaching must be created, and these further require designs for enhancing teaching and learning inclusion.

Social media can be used as a catalyst for supporting the process of inclusion. Embracing social interactions can enhance community building and collaborative knowledge building and sharing. Informal and formal learning can in this way also be integrated. Cormac (2014) argues that there be needs for a shift from learning by curricula toward seeing the society as the curricula. Increasingly there are needs to leave the siloed approach to learning (Bruce, 2015; Ossiannilsson in press) for rhizomatic learning (Ossiannilsson 2012, 2015, in press). Interdisciplinary teaching/learning with the involvement of societal stakeholders will make an impact on the educational cultures of teaching/learning for inclusion, as well as enhancing quality in individual and collaborative learning processes.

The term personal learning environment (PLE) describes the tools, communities, and services that constitute the individual educational platforms learners use to direct their own learning and pursue educational goals. A PLE is frequently contrasted with a learning management system (LMS) which tends to be course-centric. Conversely, PLE's might be useful or indeed central to learning in the future. Furthermore, we emphasize that this not be so much a technical question as an educational one, although changing technologies are key drivers for educational change. Accordingly, we argue that the development of ubiquitous computing may offer new opportunities for the use of Information and Communications Technology (ICT) for learning. The characteristics of a PLE include using tools that would allow the learner to:

- Learn about other people: manage and create relationships, forming connections between contacts that are not part of a formal learning network.
- Control their learning resources: allow them to structure, share, and annotate resources they find or have been given.
- Manage the activities they participate in: provide opportunities for them to create as well as join activities that bring together people and resources.
- Integrate their learning: allow them to integrate learning from different institutions and sources, re-using evidence of competency and making links between formal and informal learning. (Milligan, et al., 2006).

Another way to express the quality features of a PLE would be to employ the four C model, to wit:

- Collect: Gather articles, tools, data, images and resources
- Communicate: Share ideas, convey information, ask questions, reflect, respond, comment and clarify
- Create: generate ideas, research, write, bring content into being
- Collaborate: synthesize, working with peers, engaging one another

Short description

The purpose of this development project is to innovate truly the channels of communication and to share between users. This is one of the key pieces in a next generation learning environment and one which has not, as of this date, been completely integrated into learning environments anywhere in the world. Needless to say, this has been one of the core ambitions since the very beginning. Keywords here are dialogue and sharing and through this, collaboration.

The main objective is to integrate cross-channel communication and break the barriers of a typical system approach to learning. Specifically this means that communication and sharing for learning and teaching purposes can be done through various channels such as Twitter, Facebook, LinkedIn in combination with internal options such as blogs, forum, teams and more - and reach out to where students and teachers prefer to be, as well as through other relevant channels. Communication is not limited to a fixed set of internal functions, rather, it can occur via virtually any communication channel where participants are present and active. Learners can actively participate where they are at any given time. They can, therefore, follow a discussion without needing to log into the "legacy system" or be available while in front of their computers. Teachers can include dynamic external sources, topic matter experts, stakeholders and organize all these this into the course setup.

Also, by making sharing more convenient to each individual through design, networking between students will improve and enhance collaborative learning. Activity levels will be boosted in the spheres they act in on both passive and active contributions. There is no need to invent new channels of communication but rather to support, focus and facilitate the ones already being used. Doing this will also allow externals to be part of a sphere of interest, such as previous students (alumni), subject matter experts and more through social media pages or online social groups for example. A prerequisite to this is the integration of social media profiles of the individual learners and focus all of this in relation to the sphere of interest (classes and courses) rather than "everything" the world is publishing. In other words, by effectively creating a funnel one takes the social media to a point where it concerns the relevant few rather than the millions. This makes it possible to forge network among people who have not yet connected with the things they have in common. It is all about making long-lasting network alliances that will be powerful not only for the single learner but also for the brand value of the organization.

The value of the presented model by Mentorix is that the Personal Learning Environment (PLE) and the Learning Content Management System (LCMS) are totally integrated, see Fig 1. Furthermore, the interface for the students' PLE is transparent, interactive, personalized, flexible, and accessible. Those features used to be ranked as the most important quality indicators in open online learning and were also confirmed in the research study by Ossiannilsson et al (2015), in which more than 40 quality models around the globe were examined and analyzed. What more is important is that the teacher and the

academics are completely responsible for course building and design because they are in control of the process from start to finish.

The design approach for the PLE is first and foremost to be inclusive. Central to this is the upcoming Communications Hub (cHub) and the way it interacts (design) with the everything the teachers and students can do inside and outside the system.

To successfully achieve the above, there is a need for an evolved interaction interface throughout learning environment. Communication is supported naturally through interaction points everywhere, not just in silos like forums and blogs that one must find in order to "enter to communicate." However, a more natural form, one to which the world is presently accustomed due to the influence of social media, would now be one of full immersion into a learning environment.
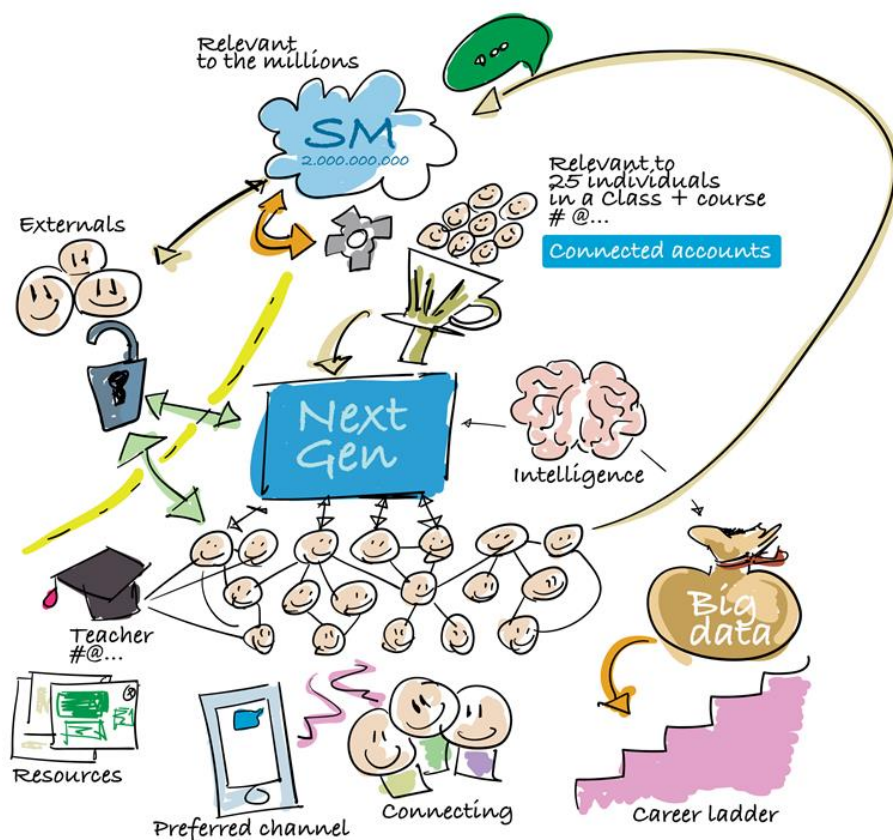

Fig.1. The integration of Personal Learning Environment (PLE) and the Learning Content Management System (LCMS) (Mentorix 2015).

Summary of novel characteristics

In summary the novel features of a PLE within the communication Hub (cHub) are:

- Social is the default state
- Facilitates Inclusiveness
  - Class centered while simultaneously collaborating with externals
  - Sharing across the system barriers (inside-out & outside-in)
  - Sharing and promotion to groups and individuals
  - Integrated with multiple personal social accounts
- Interactive with social media

- Combined internal and external communication channels in one interface
- Facilitates Interactivity through accessible UI design
- Dynamic individual personal space with social media integration
- Allows use of learning analytics
- Allows use of career ladder
- Allows use of social score
- Online status across system barriers

Furthermore, while, within the communication Hub (cHub), the teacher is the monarch and is fully responsible, in as much as course construction is entirely at his or her discretion through the user-friendly and interactive "course builder". The PLE by Mentorix meets all four quality dimensions.

Features to be demonstrated

The PLE Communication Hub is presently in development for release Q4 this year. We will demonstrate the entire concept from the learner's perspective. This means that we will show how to interact with a student and how this interaction is integrated with the course features as well as with social stakeholders and how it is achieved within social media. Interaction with externals will also be demonstrated. We will include the teacher's perspective as to focusing on how to build a course. Furthermore, the demonstration will highlight how data (learning analytics) can be used by an organization to forge strong networks for use by their alumni in the future.

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