Association for Information Systems

AIS Electronic Library (AISeL)

ICIS 2019 Proceedings

Digital Learning Environment and Future IS Curriculum

Student Learning Behaviour in the Digital Age

Hendrik Steinbeck
University of Potsdam, hmichel@uni-potsdam.de

Julia Matthiessen
University of Potsdam, jmatthiessen@lswi.de

Gergana Vladova
University of Potsdam, gergana.vladova@wi.uni-potsdam.de

Follow this and additional works at: https://aisel.aisnet.org/icis2019

Student Learning Behaviour

in the Digital Age

Short Paper

Hendrik T. Steinbeck
University of Potsdam, Potsdam
Weizenbaum-Institute, Berlin
Germany
hendrik.steinbeck@wi.uni-potsdam.de

Julia Matthiessen
University of Potsdam, Potsdam
Weizenbaum-Institute, Berlin
Germany
julia.matthiessen@wi.uni-potsdam.de

Gergana Vladova
University of Potsdam, Potsdam
Weizenbaum-Institute, Berlin, Germany
gergana.vladova@wi.uni-potsdam.de

Abstract

Over the last 20 years, in context of higher education the potential of digital media has been recognised in order to facilitate learning. Nevertheless, digital learning formats are still applied rather optionally. In the present work, we examined how, where and when Mongolian students learn in the context of digitalisation and which constraints they face during this process. Through a survey among 233 Mongolian students and an on-site non-participatory observation, different conclusions can be drawn. Major findings indicate a high digital tool awareness among students, revealing a desire for applicable skills and lessons thereof. Videos represent an additional medium in higher education preferred by students. The learning environment in Ulaanbaatar provides distinct learning constraints, primarily with a financially and logistically nature. In the ongoing research process, our results will be used for a German comparative study in order to gain an intercultural perspective of digital learning approaches.

Keywords: e-learning, Mongolia, digitalisation, higher education

Introduction

Bernadette Robinson (1995) was the first researcher raising the question whether new educational approaches such as distant learning could be applicable to Mongolia. Nearly 25 years later, this paper follows her ambitions and transfers the question into modern times. Specifically, in the present research, we focus on digital learning formats in the context of university education with students as an investigation group.

With reference to this investigation framework, the starting point for our research is the general need for new teaching and learning methods as well as strategies. The current educational strategy is still largely based on teaching the "3 R's" - reading, writing and arithmetic. The teacher-centred approach is based on long traditions (Benedek and Molnár 2015; Postman 2011) and mainly involves teaching content through repetition. Students have to store a large amount of information, which expands their knowledge. Accordingly, the teacher evaluates and determines the level of learning by means of tests and quizzes at the

end of the specified teaching period (Alismail and McGuire 2015). Nowadays, in the context of digitalisation, the demands on competence development and the competences themselves have changed significantly. The relevant competences exceed the absorption and internalisation of factual knowledge and aim much more at building general competences and skills such as self-organisational skills, team skills and problem-solving skills, only to name but a few (cf. Higher Education Forum Digitalization 2017) These are becoming increasingly important in the new world of work. The digitalisation of education and science - in particular the use of new media and the internet - is changing universities sustainably (Benedek and Molnár 2015; Thoring et al. 2017). Two of the main didactic challenges of university education are the integration of formal and informal learning as well as balancing the learners' online and offline life (Johnson et al. 2016; Wijesooriya et al. 2018). Curriculum developers follow the changes and emphasize the importance of developing new educational goals and teaching methods in order to prepare students for their future careers (Tsui and Dragicevic 2018). Furthermore, students have the freedom to decide what and how they want to learn as well as how to apply digital tools during the learning process (Gross et al. 2016). Study results show that the millennial generation entails enthusiastic users of digital media and that almost all students possess a form of digital computer (computer, tablet or mobile phone) (Isaacs et al. 2002; Junco 2012; LaRose et al. 2003).

Against this background, we present the first results of a descriptive study among Mongolian students that aims to capture and analyse current developments in the use of digital media in their studies. After presenting the relevant theoretical background, we explain the reasons for examining a country like Mongolia in detail, discuss the results already achieved and come up with implications for further research, introducing a planned comparative study in the future.

Theoretical Background and Research Questions

Over the last 20 years, research and society recognized the potential of digital media in higher education for facilitating the learning process (Wan and Fang 2006). The term "digital turn" summarizes all approaches, ideas and changes concerning the idea of using digital strategies in tertiary education (Higher Education Forum Digitalization 2017). In the latest NMC Horizon report (Becker et al. 2018), it is argued that the process of the digital turn is essential for today's higher educational system. Clayton Christensen (2011) from the Harvard Business School established the term "disruptive innovation" to capture the fact that new technologies are changing the higher educational sector sustainably.

Currently, approaches such as personalized learning become increasingly popular. The underlying idea is that learning becomes more individual and self-directed (Melzer and Schoop 2018). Personalized learning aims to adapt learning according to students' individual preferences in terms of pace, methods and content. Consequently, the heterogeneity of students, their individual goals, educational or cultural backgrounds, skills and characteristics are taken into account (Melzer and Schoop 2018; U.S. Department of Education 2010). Another approach is "integrated" or "blended learning", which combines the advantages of both online and offline learning, leading to a new learning experience (Garrison and Kanuka 2014; Meltzer and Schoop 2018). Furthermore, the concept called "bring your own device" introduces the idea that students can bring and use their preferred digital learning tool (e.g. laptop or tablet) in different learning environments (Afreen 2014; Becker et al. 2018).

Despite this vast amount of technological approaches, digital learning formats are still applied rather optionally as a supplement to traditional teaching and learning offers (Higher Education Forum Digitalization, 2017; Josefsson et al. 2016). One of the reasons might be that evidence-based research of digital teaching and learning processes is still in its infancy. Currently, there is a need for an underlying theoretical and empirical research to understand the conditions under which the digital tools have to be applied and for whom digital media works best (e.g. Chien 2012; Gross et al. 2016; Sevillano-Garcia and Vázquez-Cano 2015).

The effective implementation of digital media in higher education remains relevant and one of the most important research topics.

Digital Media Use in the University Context

The first part of our research project, an (ongoing) literature review has been conducted and constantly being continued. For this short paper we only have the possibility to present a representative part of the literature research. Thus, in the following we concentrate on two main types of papers: The general effects of digitization on the university context on the one hand as well as the students' perception of the changes and use of digital media on the other hand.

Digital offers evolve rapidly and change the educational landscape sustainably (Wilms et al. 2017) offering many advantages (e.g. Becker et al. 2018; Chien 2012; Gikas and Grant 2013; Kam and Katerattanakul 2010; Kaplan and Haenlein 2016; Martin et al. 2011; Tess 2013; Wilms et al. 2017). Digital media can be used by students both, in a formal way (as part of the university's IT infrastructure), but also in a self-organised way (use of digital self-learning offers) (e.g. Bull et al. 2008; Blitzer and Janson 2014). When it comes to formal learning, university IT faces the challenge of managing a widespread use of information technology to support teaching and learning (e.g. time-delayed learning through podcasts, digital materials and annotation or real-time interaction in class) (Brown-Martin and Tavakolian 2014; Hanna 2016; Higher Education Forum Digitalization 2017; Thoring et al. 2015).

EDUCAUSE's annual ECAR studies provide a good overview of the status quo when it comes to digitalisation in tertiary education. (Alexander et al. 2019, Brooks 2015; Thoring et al. 2015). The studies report increased levels of commitment to innovative teaching materials in teachers and constantly growing technical equipment of students. The latest report for the current year shows, that universities are actively developing new strategies. Following the authors, this development is party driven by a new majority of learners: the typical learner is older, more likely to reconcile work and family life with college and has completely different needs than a student of traditional age. Consequently, new social needs of students arise and require, among other things, student-centred learning and are related to an increasing demand for digital learning experience and instructional design expertise. Individual areas of digitalisation are also being investigated, e.g. the use of mobile devices and online services in university libraries or the use of online literature and online references for studies (Connaway at al. 2013). Thoring et al. (2015) point out that students use and benefit from an increasingly digitised study environment. This is associated with a need to explore the needs of students and their view of digitalisation in-depth.

Gross et al. (2016) found in an analysis of higher education at universities that there is a mixture of different learning environments: co-presence lectures with institutionally based learning management systems and learning-based Personal Learning Environments (PLEs). PLEs cover explicitly a personalized instead of a general software tool for e-learning, also including other types of software such as e-mail software or even operating systems (Attwell 2007; Gross et al. 2016). One of the study results by Gross et al. (2016) is that students select learning materials on the basis of both exogenous and individual factors. Individual characteristics play a more important role, but the role of exogenous factors, such as social norms, is also relevant, as they limit the range of possible tools to be used. Thus, they can serve as a precondition. In context of our research, this is - especially in light of the subsequent studies in other countries - very important. A comparison could and should be made between e.g. the possible relationship between social differences and choice of media.

Another study by Thoring et al. (2015) gives interesting insights into the use of digital media by students. The researchers found that the degree of digitalisation in their studies was perceived very differently by the participants depending on aspects of their study life. About half of the participants still worked in the traditional way by using paper copies, although many participants did not want to change this situation because they preferred to read printed copies instead of digital copies. From the students' point of view, the online provision of literature (especially essays and books) was still insufficient. According to the participants, all literature should be available online. The study shows that student sample had a rather conservative understanding of digitalisation. Essentially, digitalisation addresses the online provision of material and online registration options. New forms of learning such as Massive Open Online Courses (MOOCS), interactive class systems or virtual reality seem to be irrelevant, and mobility is also not a big issue. Students still learn mainly at home with a PC or a book. They also do not expect any changes in the upcoming years. Mandatory lectures are also considered appropriate and future-oriented. Infrastructural aspects (e.g. audio-visual equipment of the auditorium, WLAN) are given little importance. Investigations in Norway show similar results. Both students and staff use information and communication technology

(ICT) for teaching and studies with little variation and primarily as support for traditional instruction and as a means of communication (Norwegian ICT Monitoring; Kjeldstad et al. 2014).

A hungarian study on ICT-use in higher education (Benedek and Molnár 2015) shows that Google+, YouTube, Instagram and Pinterest are the most frequently used social media tools. Moodle - as one with direct university context, is on the sixth position. The third most common ICT activity is connected to the usage of online curriculum. However, more than half of the investigated students actively use mobile communication devices during their teaching activities. Numerous digital, internet-based services appear at the moment just with their basic functions. Beside the traditional educational elements, digital methods increasingly gain in importance. Against this background, the research questions of this short paper are the following:

1) In context of digitalisation and the "digital turn", how can the learning behaviour of university students be described focussing on place, time and method of learning?

2) Which constraints do university students face while learning in the context of digitalisation?

In order to answer these questions, we present and discuss the results of a non-participatory observation and a quantitative study among Mongolian students. In the following, the reasons for choosing Mongolia as a country of investigation will be explained and the topic of the digital divide in this context will be discussed.

Why Researching Students in Mongolia?

Mongolia has useful characteristics that makes research on digital media in education worthwhile: The population is rather small (3 mio. citizens) and young (59% being under the age of 30) and every university is located only within the capital area (Ulaanbaatar - UB). As an emerging country, Mongolia finds itself between a traditional nomadic and a modern-digitized lifestyle. Observing issues with electricity, cultural differences and inequalities or other parts of daily (student) life, makes it easy to spot obstacles and patterns. The general assumption refers to learning as a universal process. Using a certain digital medium to acquire a skill or knowledge should work the same everywhere. The difference lies within the mentioned constraints, provided by different settings and cultures. Technology can help to negate those constraints (e.g. money, gender imbalance, logistics etc.). The study sheds light on how and where students learn and what constraints they have to cope with, on an intraindividual and intercultural basis. To the best of our knowledge, using the method of a non-participatory observation paired with a survey and interviews in order to understand students in the digital age is a new research approach to this topic.

Within Mongolia, different aspects are viable and visible when it comes to imbalances. On the one hand, the pressure to study is palpable due to the narrative of a better life and income that comes with a graduation. On the other hand, education comes at a cost: The financially strong elite of the country tries to send their children abroad. The rest is studying in UB, which is accompanied by a significant financial burden for students, because their families are likely to be located in another part of the country. This makes housing an expensive part of life. In addition to financial factors, social circumstances and relationships also play a role: The Mongolian society relies heavily on the family structure as a whole, utilizing different generations and their experience. Studying in the capital usually means leaving this family construct. Another logistical aspect lays within the educational landscape. Earning a degree is restricted to the area of UB. This centralization offers less chances and opportunities when it comes to learning. Additionally, the capital is known for its pollution and near-drought water levels. The rest of the country is less polluted, less populated and suffers from less traffic congestion. All these side effects apply to Mongolian students and shape their all-day learning experience. The challenges continue even after graduation, due to a system of corruption within the political and economic elite. In our opinion, all these aspects indicate that there are inequalities in access to education in different parts of Mongolia as well as in comparison to other countries. Some of the factors observed such as large financial differences (e.g. Chinn and Fairlie 2007) are an indicator of a global digital divide. Although this topic is not the focus of our paper, we will also discuss it in the course of further cross-country studies that are already planned.

Description of the Method

The research questions were addressed by using an explorative-descriptive research method, including 1) an online survey, 2) a non-participatory observation among Mongolian university students, followed by discussions with teaching and administrative staff. The full survey can be found online [https://bit.ly/2U1L9GQ]. In order to address different aspects concerning the learning process, the research questions were split in 12 different categories: Demographic (10 questions), IT related (4 questions), Where students learn (1), What students learn (4), Skills students have and their proficiency (7), Problems and constraints (2), how the University uses digital education (4), questions about the information system curriculum (5) and finally, one age category for post-analysis. The categories were not mutually exclusive; thus, one question could fit more than one category: "Search engines" for instance qualifies as an answer for the categories "How to find information?" and "Medium". This non-mutually exclusive approach was chosen deliberately. All relevant variables for the quantitative study were measured in the evaluation survey. Besides demography, IT skills and platform related questions, the focus of the questionnaire was on place, time and method of learning.

Having started with 45 questions, a refinement and adjustment phase led to 35 questions, including both closed (binary and Likert-scale) and open questions. The questions originate from an inductive approach covering the students' perspective in teaching and researching and the intuitive process of learning itself: Information gathering, study phase, assessment, student skills, evaluation and additional university parameters (such as the technological foundation and e-learning usage). Two pilot groups led to further adjustments which increased the surveys usability; word changes were made and two questions were changed regarding the answer type. The test survey as well as the actual survey were conducted anonymously, only timestamps were taken to identify outliers in terms of the response time.

The collection of responses started in March 2019 with two pilot groups (total n=47), who took the survey in order to test the questionnaire in Mongolia. By then, the survey was available in English and Mongolian. The student sample was recruited by promoting the study at 12 different universities using handouts and hang posters with the survey link. As an incentive, students were offered to participate in a voucher lottery. By the time of submitting this paper, 181 completed and 52 partial completed surveys were collected, totalling in 233 responses.

Due to the independence of the above-mentioned categories, partial submissions were accepted, if 18 out of 35 questions were answered. As the methodology of the empirical social science allows different handling of "missing values", we decided to keep those entries (Little and Rubin 1989). Due to filtering (outliers, inconsistent or extreme answers) and the fact that no question was mandatory, the n-value for the questions varies.

Analysis and Results of the Mongolian Sample

The analysis is structured along the four main parts of the questionnaire: (I) demographic information (II), current offline learning behaviour (III), digital learning experience (IV) and the (future) digital skillset.

Demographic Information

In Mongolia, the proportion of female students in universities is slightly higher compared to male students. This is also represented in the study cohort. Asking lecturers and students, their responses showed that rather girls attend universities while boys tend to pursuit hands-on training and apprenticeships. The average age of the sample was 21.13 years (SD=3.69). The majority studied in a bachelor program (85.84%). The top four majors were Business, Engineering, Computer & Mathematics and lastly Education. 73% of the participants stated that their syllabus is related to IT or computer science, but only 15.52% of the majors studied "Computer & Mathematics". This number represents the high digital orientation of students; the average student was aware of the impact of digital tools and formats. Hardware-wise, the majority could use digital learning channels due to a high usage of smartphones (97.84%). Asking for the overall study satisfaction, 64.09% stated that they were either satisfied or rather satisfied, while (10.5%) were rather not satisfied and 6.08% were totally not satisfied. When it comes to the overall amount of digital device usage, the biggest part of the sample (40%) indicated that they used online devices approximately 3 to 6 hours a day, followed by 26,6% of the participants, using the devices 6 to 9 hours a day. The third position was

shared by users at the extremes of the scale with approximately 15% of users reporting more than 9 using hours a day and also 15% of users reported a usage amount of 0 to 3 hours.

Current Offline Learning Behaviour

The second cluster of questions aimed at examining the students' offline learning behaviour. In its essence, the data imply that learning happens at various locations, primarily within the own room (68.24%), followed by the university (40.77%) and at work (25.75%).

Regarding the learning constraints and obstacles, our data imply four key messages: 1) Earning money was the primary learning issue in our sample. 2) While the distance between school and home was an obstacle, distant learning via internet is constrained due to connectivity issues. 3) The lack of motivation was part of students' obstacles – regardless of the digital era. 4) External factors such as weather and traffic played a minor role, although the general distance between university and home was challenging for the Mongolian students. Additionally, general problems with the learning platform (technical problems) could not be categorized with distinction due to a widespread range of answers. Short electrical shortages happen from time to time. Such events appear to be no learning constraint for the present sample. One could argue, that the widespread usage of smartphones covers for the lack of cable-powered electricity and spontaneous use of mobile connectivity (2G/3G/4G).

When it comes to media usage and formats in the context of learning and examination, the students had a clear perception of both topics. When students were able to select their way of learning and testing, they would either choose approaches that entailed learning applicable (practical) skills such as workshops by using video formats, or they would choose traditional textbooks or (oral) exams. Within the dataset, the digital transformation with regards to media was present, but traditional formats were still part of the present student generation.

Digital Learning Experience

The topic of using tools in order to find information and to start a learning assignment was the focus of the third part of the survey. We assumed that most students would use a search engine for these tasks. The students were asked about their search engine preferences first (question no. 16) . The majority stated that they use Google often (88%), followed by other providers with significant distance (Bing 4.29%; Baidu 8.59%). In a follow-up question (no. 18), we asked for other additional sources and formats. The learning journey started for 81.5% with YouTube, followed by Wikipedia (70.5%).

Established channels like instant messenger, blogs, forums and meetups ranged between 10 and 30%. Emerging platforms with a strong focus on IT and digital skills like Reddit, Git/GitHub and Stackoverflow were less agreed upon. Within the "Other" free text answer, some students replied "Facebook" and other social networks (e.g. "Quora", "Pinterest") as their favourite start to learn something new (12.88%).

Students were also asked about the university's official use of digital tools and whether they know what underlying technology was used by the university. The results of both questions suggest, that the biggest use case was the mere file distribution (51%), followed by assignments (45.06%) and evaluation usage (39.06%). Extra curriculum (27.9%) and administrative tasks scored lowest (12.88%), implying a clear overall usage in primary educational contexts and less in secondary support processes. In terms of maturity and a holistic usage of infrastructure, the findings indicate potential for future usage. Combined with the students' wish to watch videos (either live or recorded), it is debatable whether the universities are actually able to handle videos or other media with this simple status quo usage. Possibly, universities use dedicated platforms, but the students might not be aware of it. As a result, knowledge about online learning platforms would be insufficient from the student side. If the universities actually use shared folders or a website with such a dominance, the competency to establish useful learning management systems (LMS) is insufficient from the universities' perspective.

The acceptance of videos was measured by asking whether the students would use online lectures instead of face-to-face classes. Combined with the specification, whether it "would help to see the lecturer's face or not", a majority either agreed to both questions (43.14%), while only 17% disagreed both times. Again, data indicate a solid awareness of students regarding the video format. Across various questions, "video" as a

medium always ranked within the highest scores and was accompanied by traditional formats or other digital tools.

The majority of students prefer videos as a useful contribution to the classroom without losing the personal contact and applicable lecture content. The responses regarding different statements (e.g. "I need technology", with an agreement score of 7.39 on a 10-point Likert-Scale in part 4) of the questionnaire about the digital transformation underline this impression.
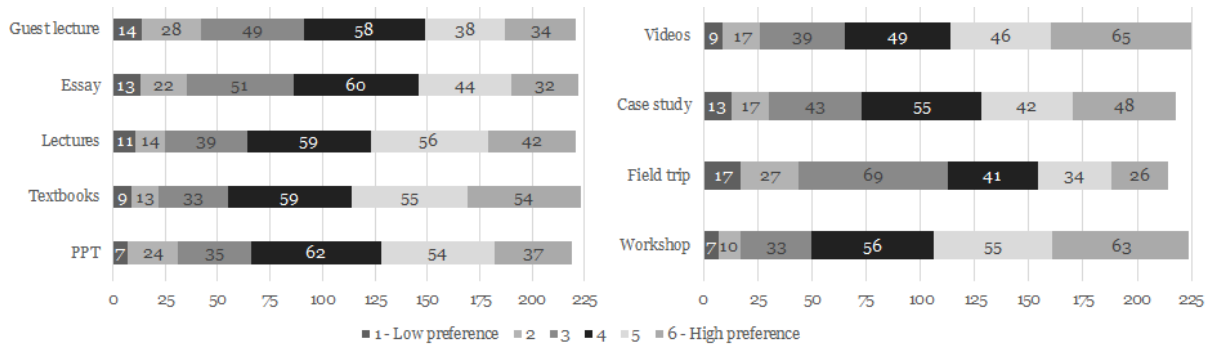

Figure 1. "Preferences of learning and assessment" (n=233 multiple answers allowed)

Conclusion and Outlook

In the present work, we examined how, where and when Mongolian students learn in the context of digitalisation and which constraints they face during this process. By means of a survey among 233 Mongolian bachelor and master students and an on-site non-participatory observation, different conclusions with regard to the research questions can be drawn:

Mongolian students are aware of the media video and they would like to use it (more) in their studies; 52% even prefer a video instead face-to-face lecturers; at the same time, they demand practical and applicable skills throughout their studies. Furthermore, they are aware of the chances provided by the digital transformation. At the same time, students are confident about their IT-skills. Mongolian students struggle most with a) their working and learning schedule b) the distance between school and university and c) the internet connectivity. For all these constraints, appropriate and qualitative (official) e-learning and digital education formats could be used to improve their situation.

On the basis of these conclusions, the following takeaways for universities and lecturers can be formulated:

Broad usage of media and digital formats increase the attractiveness and accessibility of digital education and follow the general trend of a digital education institutes. The data implies that a balance between off- and online learning is the desired state for students and their learning behaviour. The combination of face-to-face lectures and online channels could be one structure to achieve this state. Universities and academic planners are advised to include digital media and especially videos in their teaching toolkit in order to meet students' expectations. Already a few lessons or subjects with this approach are likely to improve students' motivation. These suggestions are in line with a state-of-the art analysis by Bitzer and Kassel (2004) in which they identified several determinants for a learner's study success and satisfaction when it comes to digital media use. They found that both high levels of interaction during the learning process as well as high quality e-learning technologies influence student's learning success. However, even if traditional media and formats are used, professors and lecturers are advised to incorporate at least some practical or applicable proportion into their seminars, lectures and teaching.

Researching how students learn in the digital age and which obstacles they encounter give useful insights about the strong awareness of the present student body concerning the topic. This underlines the importance of digital education - not only for students but also for lecturers and institutions. Curriculum planners gain more knowledge about their target group, extend their media variety and students value the additional digital content, especially when it comes to video formats. From a university point of view,

keeping personal extracurricular events, conducting practical skill sessions and keeping in mind the above mentioned inequalities, seems to be a golden rule in this digital era.

The present work represents a first step in a process of ongoing research. Since March 2019, we are conducting the same study in Germany. By the time of ICIS 2019, we expect more than 250 responses from Mongolia and Germany, totalling in 500 completed responses from university students by the end of September 2019. As a next milestone, the present mongolian dataset and results will be compared to the German dataset in order to follow the approach of an intercultural comparison between digital learning approaches. The Mongolian sample revealed various aspects, that seem to be familiar from an educator perspective. The country provides various learning constraints and inequalities. Additionally, we plan an in-depth analysis of various open questions and other question types that are not included in the present study, regarding the information systems (IS) curriculum and the student way of information collection. We expect to come to pioneering new conclusions with regards to how different student bodies use and learn with digital technology in the university context.

References

Afreen, R. 2014. Bring your own device (BYOD) in higher education: opportunities and challenges. International Journal of Emerging Trends & Technology in Computer Science, (3:1), pp. 233-236.

Alexander, B., Ashford-Rowe, K., Barajas-Murph, N., Dobbin, G., Knott, J., McCormack, M. and Weber, N. 2019. EDUCAUSE Horizon Report 2019 Higher Education Edition, pp. 3-41. EDU19.

Alismail, H. A., & McGuire, P. 2015. 21st Century Standards and Curriculum: Current Research and Practice. Journal of Education and Practice, (6:6)), pp. 150-154.

Attwell G. 2007 Personal Learning Environments - the future of eLearning? eLearning Papers 2.

Baer, W. S. 1998. Will the internet transform higher education?. Rand.

Becker, S.A., Brown, M., Dahlstrom, E., Davis, A., DePaul,K., Diaz, V. and Pomerantz, J. 2018. NMC Horizon Report: 2018 Higher Education Edition. Louisville, CO: EDUCAUSE, 2018.

Benedek, A. and Molnár, G. 2015. E-teaching and Digitalization at BME, in New Technologies and Innovation in Education for Global Business: 19th International Conference on Engineering Education-PROCEEDINGS. Zagreb, pp. 20-2015.

Bitzer, P. and Janson, A. 2014: Towards a Holistic Understanding of Technology-Mediated Learning Services - A State-of-the-Art Analysis. European Conference on Information Systems (ECIS), Tel Aviv, Israel

Brooks, C. 2015. ECAR Study of Faculty and Information Technology: Research Report. Loisville, CO. Retrieved from ECAR website: https://li-brary.educause.edu/~/media/files/library/2015/8/ers1510r.pdf . Retrieved May, 1, 2019.

Brown-Martin, G., and Tavakolian, N. 2014. Learning {re}imagined: How the connected society is transforming learning. London, UK, New York, NY, USA: Bloomsbury Academic, an imprint of Bloomsbury Publishing Plc.

Bull, G., Thompson, A., Searson, M., Garofalo, J., Park, J., Young, C. and Lee, J. 2008. Connecting Informal and Formal Learning Experiences in the Age of Participatory Media. Contemporary Issues in Technology and Teacher Education, 8:2, 100-107. Waynesville, NC USA: Society for Information Technology & Teacher Education. Retrieved May 1, 2019 from https://www.learntechlib.org/primary/p/29328/

Chien, J. 2012. How digital media and Internet is transforming education. In E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education, pp. 69-77. Association for the Advancement of Computing in Education (AACE).

Chinn, M. D., and Fairlie, R. W. 2007. The determinants of the global digital divide: a cross-country analysis of computer and internet penetration. Oxford Economic Papers, (59:1), pp. 16-44.

Christensen, C. M., Horn, M. B., Caldera, L., and Soares, L. 2011. Disrupting College: How Disruptive Innovation Can Deliver Quality and Affordability to Postsecondary Education. Innosight Institute.

Connaway, L. S., Hood, E. M., Lanclos, D., White, D., and Cornu, A. L. 2013. User-centered decision making: a new model for developing academic library services and systems. IFLA journal, (39:1), pp. 20-29.

Garrison, D. R., and Kanuka, H. 2004. Blended learning: Uncovering its transformative potential in higher education. The internet and higher education, (7:2), pp.95-105.

Gikas, J., and Grant, M. M. 2013. Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. The Internet and Higher Education, (19), pp. 18-26.

Gross, P., Schmid, A., Gettinger, J., Melzer, P., and Schoop, M. 2016. "How Do University Students Select and Use their Learning Tools? A Mixed-Method Study on Personalised Learning," in UK Academy of Information Systems Conference Proceedings 2016 (UKAIS 2016),

Hanna, N. 2016. Mastering digital transformation: Towards a smarter society, economy, city and nation (First edition). Innovation, technology, and education for growth. Bingley: Emerald Publishing.

Higher Education Forum Digitalization 2017: The Digital Turn – Pathways for Higher Education in the Digital Age. Working paper 30. Berlin: Higher Education Forum Digitalization

Isaacs, E., Walendowski, A., Whittaker, S., Schiano, D. J., and Kamm, C. 2002. The character, functions, and styles of instant messaging in the workplace. In Proceedings of the 2002 ACM conference on Computer supported cooperative work, pp. 11-20. ACM.

Johnson, L., Adams Becker, S., Cummins, M., Estrada, V., Freeman, A., and Hall, C. 2016. NMC Horizon Report: 2016 Higher Education Edition.

Josefsson, P., Hrastinski, S., Pargman, D. and Pargman, T. C. 2016. The student, the private and the professional role: Students' social media use. Education and Information Technologies, (21:6), pp. 1583-1594.

Junco, R. (2012). In-class multitasking and academic performance. Computers in Human Behavior, (28:6) , pp. 2236−2243.

Kam, H.-J., and Katerattanakul, P. 2010. "Collaborative Learning with Web 2.0 Technology: Synchronicity Dimension," AMCIS 2010 Proceedings (132).

Kaplan, A. M., and Haenlein, M. 2016. Higher education and the digital revolution: About MOOCs, SPOCs, social media, and the Cookie Monster. Business Horizons, (59:4), pp. 441-450.

Kjeldstad, B., Alvestrand, H., Elvestad, O. E., Ingebretsen, T., Melve, I., Bongo, M. and Landstad, B. 2014. MOOCs for Norway: New digital learning methods in higher education.

L. Brooks, D. Wainwright and D. Wastell (eds.), Oxford, UK. 11.-13.04.2016, Paper 21.

LaRose, R., Lin, C.A. and Eastin, M. 2003. Unregulated Internet usage: Addiction, habit, or deficient self-regulation? Media Psychology, (5:3), pp. 225−253.

Little, R. J., and Rubin, D. B. 1989. The analysis of social science data with missing values. Sociological Methods & Research, 18(2-3), pp.292-326.

Martin, S., Diaz, G., Sancristobal, E., Gil, R., Castro, M., and Peire, J. 2011. "New Technology Trends in Education: Seven Years of Forecasts and Convergence," Computers & Education (57), pp. 1893-1906.

Melzer, P., and Schoop, M. 2018. The Interplay of Presence and Online Learning in a Personalised Flipped Classroom.

Postman, N. 2011. The end of education: Redefining the value of school. Vintage.

Robinson, B. 1995. Mongolia in transition: a role for distance education?. Open Learning: The Journal of Open, Distance and e-Learning, (10:3), pp. 3-15.

Sevillano-Garcia, M. L., and Vázquez-Cano, E. 2015. The impact of digital mobile devices in higher education. Journal of Educational Technology & Society, (18:1), pp. 106-118.

Thoring, A., Rudolph, D., and Vogl, R. 2017. Digitalization of higher education from a student's point of view. EUNIS 2017–Shaping the Digital Future of Universities, pp. 279-288.

Tsui, E., & Dragicevic, N. 2018. Use of scenario development and personal learning environment and networks (PLE&N) to support curriculum co-creation. Management & Marketing, (13:2), pp.848-858.

U.S. Department of Education. 2010. Transforming American Education: Learning Powered by Technology: National Educational Technology Plan 2010, http://www.ed.gov/sites/default/files/NETP-2010-final-report.pdf. Retrieved April 2019.

Wan, Z., and Fang, Y. 2006."The Role of Information Technology in Technology- Mediated Learning: A Review of the Past for the Future", AMCIS 2006 Proceedings (253).

Wilms, K., Meske, C., Stieglitz, S., Decker, H., Fröhlich, L., Jendrosch, N., Schaulies, S., Vogl, R. and Rudolph, D. 2017. Digital Transformation in Higher Education – New Cohorts, New Requirements?

Wijesooriya, C., Heales, J, Rohde, F., and Clutterbuck, P. 2018. "Understanding Formal and Informal Learning Systems in Contemporary Learning Environments", PACIS 2018 Proceedings (290).