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*School on the Cloud: Connecting Education to the Cloud for Digital Citizenship*

# Case Studies of Personalized Learning

April 2016

[SchoolontheCloud.eu](http://SchoolontheCloud.eu)

Debasis

Σύννεφο

Nuvem

CLOUD

Wolk

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# **“School on Cloud: Connecting Education to the Cloud for Digital Citizenship”**

**European Commission: Lifelong Learning Program**

**ICT Key Action 3 European Project**

**543221–LLP–1–2013–1–GR-KA3- KA3NW**

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## **Case Studies of Personalised Learning**

**Working Group 3: Deliverable 4.2**

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**Editor:** MSc Luc Zwartjes  
Leader WG3

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**Abstract:** As technology has become an agent of immense change, it has forced upon the education system Cloud Computing which in the future will have significant ripple effect. In this new educational environment personalized learning should take a central place. To reach this we first need to analyse what personalized learning exactly is. Although there are many definitions and interpretations there is a consensus that personalized learning starts with the learner in the centre, actively designing the learning goals, deciding how to access and acquire information, and owning the learning. To make this possible the existing virtual learning environment (VLEs) must be transformed into real personal learning environments, using an adapted pedagogy thus making i-learning possible.

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<p>Working group 3 will produce a collection of annotated case studies on personalisation of learning afforded by Cloud technologies, apps and tools.</p> <p>This will be produced as an electronic publication (an e-book, app) using Cloud technologies to help integrate these case studies into training programmes.</p>			



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## 1 Summary

Deliverable 4.1, Literature review of personalised learning and the Cloud, started with an evaluation and synthesis of the definitions of personalized learning, followed by an analysis of how this is implemented in a method (e-learning vs. i-learning, m-learning and u-learning), learning approach and the appropriate didactic process, based on adapted didactic theories.

From this research a list of criteria was created needed to implement personalised learning onto the learner of the future.

This list of criteria is the basis for the analysis of all case studies investigated. – as well to the learning process as the learning place.

In total 60 case studies (all 59 case studies mentioned in D6.4 Education on the Cloud 2015 + one extra) were analysed. The case studies were compared with the list of criteria, and a score was calculated. As a result, the best examples could be retained.

On average most case studies were good on: taking different learning methods into account, interactivity and accessibility and usability of learning materials for everyone. All had a real formal education content, thus aiming at the core-curriculum, valuing previous knowledge, competences, life and work skills, also informal. Also the availability of an instructor / tutor or other network of peers, experts and teachers to guide and support the learning is common.

On the other hand, most case studies lack diagnostics tests as well at the start (diagnostic entry test), during the personalized learning trajectory and at the end (assessment at the end).

Also most do not include non-formal and informal learning aspects. And the ownership of personalized learning is not in the hands of the learner.

Five of the 60 case studies can as a result be considered as very good examples of real personalized learning.



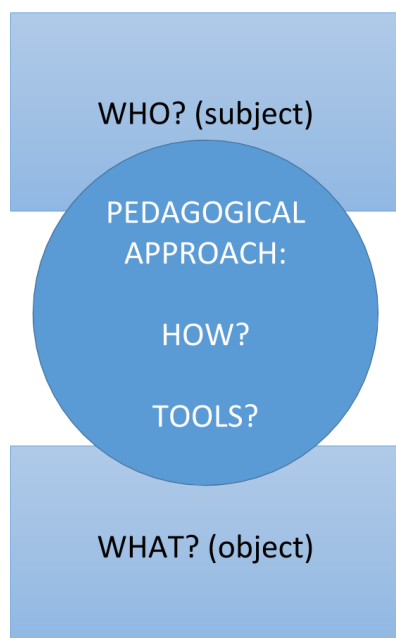
## 2 Criteria on personalised learning

The development of criteria on personalized learning, requires a review of didactic approaches in order to accomplish the new challenges in education. The investigated tools can be used to meet the needs of teachers/tutors and learners by making information more widely available. It is based on the fact that tools can facilitate the combination of numerous questions and answers through active inquiry as students are investigating their environment, in order to become an effective way to understanding the learning component via problem solving. At the same time, when the task of selecting the most “effective” tools is concerned they can create doubt and confusion for lack of **methodology, process and objectives**. As a result, several questions are raised: *to whom are addressed? What is the didactic process used? all tools are adapted? what is the goal? what is the object attempted?*

More specifically, the analyse is based on a “multi-level” and “multi-task” tools used to evaluate the efficiency of the learning approach (m-learning, u-learning etc.), developed by researchers in information technology, four kinds of materials were mentioned; the first one, focus on the didactic process ( **HOW** is the case study organised), the second one, targets the design conception (**What** TOOLS/software is used), the third one, evaluate the context of learning (**WHAT** is the content of the case study) and finally, the fourth one, intended for the actors (**WHO** is involved in the case study). As a result, using different weights, the tools reflect both dialectical and interactive relationship between methods and knowledge consensus action, thus bringing students into a learning-action.

### 2.1 Selection of the criteria

According to the research done by WG3 there are a lot of criteria we can use to weigh the quality of the case studies. The criteria can be divided into 4 categories, summarized into three categories as is shown in the figure below.



**1) The pedagogical approach or didactic process** is expressed by two main questions: how is the case study organized? What tools is used? That is, through diagnostic tests using different procedures, students should be able to participate in two related functions with respect to managing/processing knowledge via different methods. In other words, students are expected to be able through observing and recalling to acquire information, to arrange and organize them and finally to apply them. And in doing so, to be able to answer the fundamental questions of the knowing process mentioned

previously, as a result of having the necessary skills via assessment and portfolio. The second one, focuses to the accessibility and interactivity via the system and the methods adapted in order to achieve this goal.

*HOW* is the case study organised, focusing on the didactics?

- diagnostic entry test to start a real personalized learning trajectory
- diagnostic tests during the personalized learning trajectory
- m-learning or u-learning instead of e-learning
- take different learning types into account
- assessment at the end (via test and/or portfolio)

What *TOOLS*/software is used:

- social network or other form of contact with co-learners included
- interactivity
- accessibility and usability of learning materials for everyone
- monitoring via the system

**2) The object/content of learning:** This process is expressed by at least three questions: which form of education is applied?, “what is the object?”, “What is the cognitive process taken into account?”. In terms of didactic, therefore, the focus is on learner to be able to attribute meaning to what they apprehend and mainly to explain them. That, of course, involves the learning of all the analytical concepts and principles that provide them with the ability to comprehend, to see connections between diverse pieces of information and to use that information to explain and processes in learning. In other words, to understand the subject matter of the content.

*WHAT* is the content of the case study?

- formal education content, thus aiming at the core-curriculum
- possibility (not obligatory) to include non-formal and informal learning
- valuing all dimensions of the learner
- valuing previous knowledge, competences, life and work skills, also informal
- taking the cognitive background of the target group into consideration
- flexibility in the system (flexible content)

**3) The subject/intended for the actors:** This process is expressed by the well-known question: “How can knowledge and understanding be used to solve problems?”. This process involves forming problem-solving models, formulating solutions to problems and in general applying knowledge in a practical manner to real life situations that influence the world around us. As a result, students have to comprehend and deal with sophisticated contemporary issues by knowing their skills and understanding their subject matter to solve everyday problems. And in doing so, to interpret the world through their own perspectives

*WHO* is involved in the case study:

- ownership of personalized learning
- instructor / tutor or other network of peers, experts and teachers to guide and support the learning
- contact with peer group/ cooperative learning

## 2.2 Measuring the weight of each criterion

Each criterion got a separate weight, as not every criterion is as important. All of these were then recalculated to a total of 100 %.

Type	Indicator	Weight (Importance, 1=basic 100% , 2 = 150%, 3=200% )	% of total 100 %
HOW	Diagnostic entry test to start a real personalized learning trajectory	100 %	4.1 %
	diagnostic tests during the personalized learning trajectory	150 %	6.1 %
	assessment at the end (via test and/or portfolio)	100 %	4.1 %
	m-learning or u-learning instead of e-learning	150 %	6.1 %
	take different learning styles into account	100 %	4.1 %
TOOLS	social network or other form of contact with co-learners included	100 %	4.1 %
	Interactivity	200 %	8.2 %
	Accessibility and usability of learning materials for everyone	100 %	4.1 %
	monitoring via the system	150 %	6.1 %
	motivation (entertainment) tools	100 %	4.1 %
WHAT	formal education --> core-curriculum	100 %	4.1 %
	possibility (not obligatory) to include non-formal and informal learning	100 %	4.1 %
	valuing all dimensions of the learner	150 %	6.1 %
	valuing previous knowledge, competences, life and work skills, also informal	100 %	4.1 %
	taking the cognitive background of the target group into consideration	100 %	4.1 %
	flexibility in the system (flexible content)	200 %	8.2 %
WHO	ownership of personalized learning	200 %	8.2 %
	instructor / tutor, experts and teachers to guide and support the learning	150 %	6.1 %
	Contact with peer group/ cooperative learning	100 %	4.1 %

## 2.3 Applying the criteria to the different case studies

All case studies were evaluated in two rounds.

- Round one: in pairs 10 case studies were evaluated. For each criterion a score 0-5 was awarded, whereby 0 means: case does not address this indicator, 5 means: case fully addresses this indicator
- Round two: in groups of 4 all cases were re-evaluated, whereby no-one re-evaluates the same case studies of round one

Finally, each criterion was assigned its weight, this giving a final score.

## 3 Analysis of the case studies

### 3.1 First round, first drop-outs

In the first round already some case studies were not withheld, as they didn't fully include all aspects of personalised learning – the How, Tools, What and Who.

Some studies were not really examples of personalised learning, but were purer technological case studies (Tools):

- Case 06 Cooperative learning (BE) only focused purely on the teaching and is thus more an example for WG2 iTeacher.
- Case 07 Managing integrated cloud technologies (BR) is purely a technology project, using Office 365ProPlus.
- Case 11 Grammar School Nicosia – Microsoft IT Academy Programme (CY) is similar to case 07 a pure technical project.
- Case 19 CADMOS a personal learning tool with graphical personalisation (GR) is again focusing more on the use of a Moodle plug-in that improves personalized learning opportunities
- Case 27 Primary Online Database (POD) (I) is a database product that facilitates transfer of data
- Case 30 Inf@nzia Digi.tales 3.6 (I) is a project aiming to enhance the use of ICT (cloud computing, social media, open data, etc.) and of the newest paradigms of man-machine interaction
- Case 37 UBI Competence Centre (PO) is focussing on the development of an IT centre
- Case 38 Learn Portuguese Sign Language with an App (P) is purely a technology project
- Case 41 Electronic Text Books – an experience with tablets in school (P) is focusing on the development of electronic textbooks and ICT.
- Case 42 Adservio - Software educational technology (RO) is purely focusing on software for the classroom
- Case 49 University Library of Maribor and e-education (SLO) is a project integrating online environments to library systems

Other case studies were research projects, but as the project was finished it was impossible by any means to get to the material (How):

- Case 10 Living Schools Lab (CY) was a project promoting a whole-school approach to ICT use, scaling up best practices in the use of ICT between schools with various levels of technological proficiency. But as the project is closed it was impossible to get real information.
- Case 13 Providing Tools to Enable Next- generation Learning in Higher Education (CY) is a research project using the cloud, but no information about the application could be found.
- Case 14 Cloud Computing in education in the Czech Republic (CY) is more a research survey about the introduction of cloud computing in elementary schools
- Case 35 School on the Cloud – a model school (PL) is a project to help transforming the school using “cloudy” technologies, so mostly registering how IT is being used.
- Case 36 The Internet Atlas of Kujawsko-Pomorskie Province (PL) is more a study of a region.
- Case 39 Olá! Hello! Hola! Salut! Ciao! (P) is about improving communication between youngsters using technology (like Skype)
- Case 40 UJR: Junior University – Summer School for Kids (P) is again an example of how mobile education can be used in learning, in this case learning local heritage and history.
- Case 44 Field Work in ČRNUŠNJICA 2015 (SLO) is a project where the use of cloud computing in connection with field work was investigated
- Case 46 eContent for teachers: Renewable sources and energy efficiency (SLO) is a project on renewable energy, whereby pupils get access to an e-platform with all information, resources about renewable energy.

## 3.2 Second round and final scoring

In the second round 40 of the 60 case studies that got a score in round one were re-evaluated. If the score of this second evaluation diverged to much from the score in the first evaluation this was discussed plenary at the end of round two, creating a final score. This can be found on the next page.

### 3.2.1 General aspects

The average score for all 40 case studies is 58,6%, the median 56,7%. This is a rather low score, which can be explained as 13 case studies had a score below 50%.

On average the highest scores for all case studies lie in following criteria:

- 1) HOW is the case study organised, focusing on the didactics
  - take different learning types into account
- 2) What TOOLS/software is used:
  - interactivity
  - accessibility and usability of learning materials for everyone
- 3) WHAT is the content of the case study
  - formal education content, thus aiming at the core-curriculum
  - valuing previous knowledge, competences, life and work skills, also informal
- 4) WHO is involved in the case study:
  - instructor / tutor or other network of peers, experts and teachers to guide and support the learning

Again on average the lowest scores for all case studies lie in following criteria:

- 1) HOW is the case study organised, focusing on the didactics
  - diagnostic entry test to start a real personalized learning trajectory
  - diagnostic tests during the personalized learning trajectory
  - assessment at the end (via test and/or portfolio)
- 2) What TOOLS/software is used:
  - social network or other form of contact with co-learners included
  - monitoring via the system
- 3) WHAT is the content of the case study
  - possibility (not obligatory) to include non-formal and informal learning
  - taking the cognitive background of the target group into consideration
- 4) WHO is involved in the case study:
  - ownership of personalized learning

### 3.2.2 Lowest scores

The low score for many case studies – including the 13 that didn't reach 50% score - mainly lies in

- 1) HOW the case study is organised, focusing on the didactics:
  - A lack of diagnostics entry test
  - A lack of diagnostic tests during the trajectory
  - No assessment at the end of the trajectory
- 2) Also on the point of TOOLS/software used these projects score low:
  - Almost no use of social networks or other forms of communication with co-learners
  - Lack of monitoring via the system.
- 3) For the content (WHAT) of these case study mostly score low on:
  - Inclusion of non-formal and informal learning
  - Valuing all dimensions of the learner
  - Flexibility in the system
- 4) For WHO is involved in the learning most of these case studies score very low on:
  - Ownership of personalised learning
  - Support of the learning by tutor, expert or teacher
  - Contact with peer group

*Examples:*

*Case 26: FÍS film project*

In this case the weak points are: has no entry, interim and final assessment test, no any kind of form of contact with co-learners included, no monitoring via the system, while the strong points are: cooperative learning, includes motivation tools, instructor and teachers to support the learning, it supports formal education and is connected to the curriculum interactively, valuing all dimensions of the learner and taking different types of learning into account.

*Case 28: Glocal education for 2020*

The weak points of this case are: has no entry, interim and final assessment test, it doesn't take different learning types into account, it can't be monitored via the system, it doesn't value previous knowledge, competences, life and work skills and finally there is no personalized learning.

The strong points of the case are: it can include non-formal and informal learning, and tutors, experts and teachers to support learning, it includes forms of contact with co-learners, interactivity, usability, and accessibility of learning materials for everyone. Also, it values all dimensions of the learner and promotes cooperative learning.

Type	Indicator	Weight	CASE 01	CASE 02	CASE 03	CASE 04	CASE 05	CASE 08	CASE 09	CASE 12	CASE 15	CASE 16	CASE 17	CASE 18	CASE 20	CASE 21	CASE 22	CASE 23	CASE 24	CASE 25	CASE 26	CASE 28	CASE 29	CASE 31	CASE 32	CASE 34	CASE 43	CASE 45	CASE 47	CASE 48	CASE 53	CASE 54	CASE 55	CASE 56	CASE 57	CASE 58	CASE 59	CASE 60						
HOW	Diagnostic entry test to start a real personalized learning trajectory	4,1%	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3	4	4	2	3	4	5	0	0	0	0	0	0	0	3						
HOW	diagnostic tests during the personalized learning trajectory	6,1%	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	3	5	0	0	4	5	4	5	3	3	5	5	0	0	0	0	0	0	0	5						
HOW	assessment at the end (via test and/or portfolio)	4,1%	0	0	3	0	1	0	0	2	2	0	2	3	1	3	4	0	4	5	0	0	3	5	4	4	5	3	4	5	0	0	0	0	0	0	0	5						
HOW	m-learning or u-learning	6,1%	0	4	4	0	4	4	2	0	2	4	2	3	2	2	2	3	0	0	0	0	5	5	4	4	5	5	3	3	5	4	0	2	5	2	5	5						
HOW	instead of e-learning	6,1%	0	4	4	0	4	4	2	0	2	4	2	3	2	2	2	3	0	0	0	0	5	5	4	4	5	5	3	3	5	4	0	2	5	2	5	5						
HOW	take different learning types into account	4,1%	0	4	3	3	3	3	3	2	0	0	3	2	0	2	5	5	3	5	4	0	5	5	5	4	4	4	3	5	2	3	0	2	5	1	4	5						
TOOLS	social network or other form of contact with co-learners included	4,1%	0	5	5	5	3	5	0	0	0	4	0	4	0	4	0	0	5	4	0	4	5	5	5	4	5	5	3	5	0	3	0	3	5	5	3	5						
TOOLS	Interactivity	8,2%	0	5	3	3	0	5	5	4	4	4	2	3	2	3	5	5	5	5	4	4	5	5	5	4	5	5	5	5	5	5	1	4	5	4	3	3						
TOOLS	Accessibility and usability of learning materials for everyone	4,1%	3	3	1	5	0	5	5	4	3	4	0	2	2	3	5	4	3	4	3	4	5	3	5	5	1	5	3	5	5	5	3	4	5	3	4	4						
TOOLS	monitoring via the system	6,1%	0	4	5	0	0	5	0	0	0	0	0	4	0	1	4	0	5	0	0	0	5	5	4	5	5	3	4	5	0	3	0	4	4	4	4	5						
TOOLS	motivation (entertainment) tools	4,1%	0	5	0	0	3	3	5	2	4	3	2	2	3	4	5	2	5	3	5	2	2	4	4	5	5	5	3	4	4	3	1	2	5	0	3	5						
WHAT	formal education --> core-curriculum	4,1%	5	5	5	5	3	5	5	5	3	4	3	3	1	3	5	5	4	4	4	3	5	5	4	5	5	4	3	5	2	4	1	1	5	5	4	5						
WHAT	possibility (not obligatory) to include non-formal and informal learning	4,1%	0	5	3	5	3	5	0	0	2	4	4	2	1	3	5	4	0	4	3	5	2	3	4	5	5	5	4	5	0	0	1	3	5	3	2	5						
WHAT	valuing all dimensions of the learner	6,1%	0	5	1	5	0	0	0	1	1	3	1	3	0	1	4	3	3	4	4	4	5	5	4	5	4	5	4	3	5	0	0	2	4	0	2	3						
WHAT	valuing previous knowledge, competences, life and work skills, also informal	4,1%	0	3	3	5	3	5	0	0	2	3	2	3	3	2	5	4	3	4	0	1	0	5	4	4	4	4	4	3	0	3	5	3	4	4	5	5						
WHAT	taking the cognitive background of the target group into consideration	4,1%	0	5	3	1	0	4	3	0	0	3	1	3	2	1	4	4	0	3	2	2	5	5	3	4	4	5	3	5	4	2	1	4	5	2	2	3						
WHAT	flexibility in the system (flexible content)	8,2%	4	5	5	0	3	0	0	2	3	3	1	3	2	2	5	5	4	4	2	2	4	5	4	5	3	3	5	4	0	0	0	3	5	0	3	4						
WHO	ownership of personalized learning	8,2%	0	5	5	5	3	0	0	0	0	3	1	2	1	1	5	0	3	5	1	1	4	4	3	5	3	5	4	4	3	2	0	3	4	0	2	3						
WHO	instructor / tutor, experts and teachers to guide and support the learning	6,1%	0	5	5	5	5	5	0	3	2	4	3	4	2	3	3	5	4	5	4	5	5	4	5	5	5	5	4	5	0	4	3	3	5	5	4	5						
WHO	Contact with peer group/ cooperative learning	4,1%	0	5	5	5	5	5	0	0	0	2	4	3	1	3	5	5	4	5	5	4	5	5	4	5	5	5	4	4	0	1	0	3	5	3	5							
Total score (max 100 %)																																										85,3%		

### 3.2.3 Highest scores

On the other side of the spectrum five case studies can be considered as excellent examples of how a good personalised learning course should be organized.

Case 31 "Cloud computing at the Technical and Commercial Institute "L. Pacioli" Crema" got a score of 92,7%.

Case 34 "Edoc@work3.0" and Case 48 "Learning by using laptops or Netbook class" got a score of 91%.

Case 45 "Crowdsourcing web map of barriers for physically handicapped in Koper" and Case 60 complete the top 5 with a score of 84,9 and 85,3 %.

Strong points in all of these case studies are:

- 1) HOW is the case study organised, focusing on the didactics: attention for
  - diagnostic entry test to start a real personalized learning trajectory
  - diagnostic tests during the personalized learning trajectory
  - assessment at the end (via test and/or portfolio)
  - take different learning types into account

#### *Example*

##### *Case 34 EDOC@WORK3.0*

This is a research project to reformulate the teaching and learning approach from primary schools to universities through the use of 3.0 technologies in the region Puglia (Italy). The project is funded and monitored by the Ministry of Education and such follow formal education content. Although is not explicitly mentioned, we believe that diagnostic tests and assessments are included.

The technologies support the adoption of different leaning methods and collaborative learning. Students listen, read, use audio-visual, participate in discussion groups, and learn in a more autonomous way and thus more effective

##### *Case 60 "Cloud based Learning Materials for Inclusive Education"*

This is a study that focusses the very different needs of students due to their social and cultural backgrounds, their linguistic backgrounds, and their physical and intellectual abilities. The main research question is: How can cloud-based learning help to create the personalised learning materials that are needed in inclusive classrooms? The investigated website Planet school offers diagnostic tests during the personalized learning trajectory for every subject as well as assessment at the end (via test and/or portfolio).

- 2) What TOOLS/software is used:

- social network or other form of contact with co-learners included
- interactivity
- accessibility and usability of learning materials for everyone
- monitoring via the system

#### *Example*

##### *Case 34 EDOC@WORK3.0*

Innovative tools for distance learning and collaborative virtual environments, e-books and social spaces to overcome the physical barriers of the classroom by encouraging the sharing of experiences and methodologies are used.

Interactive whiteboards, readers and books, multimedia labs, software tutorial, word processing, hypertext are the new technologies that are coming into classes and moving the focus on the creative abilities of the students.

Teachers and students are possible to monitor the progress and benefits

##### *Case 60 "Cloud based Learning Materials for Inclusive Education"*

As members of the European Broadcasting Union (EBU), WDR and SWR cooperate with the educational producers of other public broadcasters both in Europe and around the world. Their editorial boards for science and education produce entertainment and learning programs for children. One of these is "Planet Schule", a combination of school TV and an internet platform with additional information. It hosts specifically produced movies, television broadcasts, interactive



learning and multimedia content. Teachers can access “Planet Schule” anytime and from wherever they choose, thereby broadening their scope for independent living ([www.planet-schule.de](http://www.planet-schule.de)). The website is only available in German. Many schools already use the platform for a wide range of subjects.

3) WHAT is the content of the case study

- formal education content, thus aiming at the core-curriculum
- possibility (not obligatory) to include non-formal and informal learning
- valuing all dimensions of the learner
- valuing previous knowledge, competences, life and work skills, also informal
- taking the cognitive background of the target group into consideration
- flexibility in the system (flexible content)

*Example*

*Case 34 EDOC@WORK3.0*

The project is funded and monitored by the Ministry of Education and such follow formal education content.

Technologies give strong motivation to learn and foster collaborative group dynamics, and ensuring that each student addresses the educational path with their own style of learning. Students find stronger motivation by experimenting with teachers and families, new innovative and non-formal ways of learning

*Case 60 “Cloud based Learning Materials for Inclusive Education”*

The multimedia content of the popular German website “Planet Schule” is developed especially for teachers by two public service broadcasters. However, as it stands today, “Planet School” is neither accessible by all students, nor does it meet the needs of the entire student population. This case study presents both the results of the evaluation of the learning platform in inclusive classrooms and first recommendations on how to offer variable content for students with special needs. The revised version of “Planet Schule” shall address different types of learners and offer accessible and usable materials, including movies, television broadcasts, interactive and multimedia content for students with very different prerequisites for learning.

4) WHO is involved in the case study:

- ownership of personalized learning
- instructor / tutor or other network of peers, experts and teachers to guide and support the learning
- contact with peer group/ cooperative learning

*Example*

*Case 34 EDOC@WORK3.0*

It involves students, teachers and families for sharing and active participating. It is a partnership between public and private organizations where everyone is giving its contribution: those who study and do research, those who design systems and technology services.

*Case 60 “Cloud based Learning Materials for Inclusive Education”*

The purpose of this case study is to collect qualitative data on the didactical requirements for inclusive education from a teacher’s and student’s perspective. Therefore, the study includes cooperative work of people with and without the experience of being regarded as disabled. The data thus gathered lay the foundation for the development of further research modules within the project with the producers of the content.

## 4 List of the case studies

For more information about each case study separate we refer to D6.4 of the School on the Cloud network, which can be found on <http://www.schoolonthecloud.net/>.

Only case study 60 was not in the publication, and will be mentioned in section 5.

### *Austria:*

Case 01: E-Books as part of digi4school

### *Belgium:*

Case 02: Scool

Case 03: Smartschool

Case 04: Learning with or despite computers?

Case 05: iPad school Sint-Pieters – Sint-Jozef Blankenberge

Case 06: Cooperative learning

### *Bulgaria:*

Case 07: Managing integrated cloud technologies

Case 08: VivaCognita

Case 09: Virtual Math Class

### *Cyprus:*

Case 10: Living Schools Lab

Case 11: Grammar School Nicosia – Microsoft IT Academy Programme

Case 12: Alphabets of europe

Case 13: Providing Tools to Enable Next-Generation Learning in Higher Education

### *Czech Republic:*

Case 14: Cloud Computing in education in the Czech Republic

### *Germany:*

Case 15: Dortmund Tablet Project

Case 16: Unit.schule.

### *Greece:*

Case 17: Flipped Classroom Literature

Case 18: Is skype the limit? EDMODO says, 'No'!

Case 19: CADMOS a personal learning tool with graphical personalisation

Case 20: Uses of the Cloud in the Greek educational system

Case 21: Exploring the kingdom of animals. Etwinning project

Case 22: Cloud mapping for the support of school geography and history

### *Ireland:*

Case 23: Scoilnet – the Department of Education's portal for Ireland

Case 24: MATHletes Challenge: to transform teaching and learning of maths in Ireland.

Case 25: EUfolio

Case 26: FÍS film project

Case 27: Primary Online Database (POD)

### *Italy:*

Case 28: Glocal Education for 2020

Case 29: ArdesiaTech

Case 30: Inf@nzia Digi.tales 3.6

Case 31: Cloud computing at the technical and commercial institute "I. Pacioli" crema

Case 32: Cloudschooling

Case 33: Aula 3.0

Case 34: Edoc@work3.0

### *Poland:*

Case 35: School on the cloud – a model school

Case 36: The Internet Atlas of kujawsko-pomorskie province

### *Portugal:*

Case 37: UBI Competence Centre

Case 38: Learn Portuguese Sign Language with an App

- Case 39: Olá! Hello! Hola! Salut! Ciao!
- Case 40: UJR: junior university – summer school for kids
- Case 41: Electronic text books – an experience with tablets in school

*Romania:*

- Case 42: Adservio - software educational technology
- Case 43: Eratosthenes experiment

*Slovenia:*

- Case 44: Field work in črnušnjica 2015
- Case 45: Crowdsourcing web map of barriers for physically handicapped in koper
- Case 46: Econtent for teachers: renewable sources and energy efficiency
- Case 47: kc class - cloud assisted services
- Case 48: Learning by using laptops or netbook class
- Case 49: University library of maribor and e-education

*Spain:*

- Case 50: Spanish humanitarian action and peacekeeping missions
- Case 51: Learning geography with web 2.0
- Case 52: Integration of geographic information systems on the cloud
- Case 53: Racma (augmented reality cultures in American museum)
- Case 54: Using ArcGIS Online and Google Earth Pro
- Case 55: A workshop: displaying georeferenced information on the web
- Case 56: Smart city learning (scl) with bike-sharing system
- Case 57: Rural school cloud - cloud computing for school networking

*Switzerland:*

- Case 58: Sharing learning in Solothurn: project work

*United Kingdom:*

- Case 59: Tablets for schools

*Not in Deliverable 6.4:*

- Case 60: Cloud based learning materials for inclusive education, Germany – see attached full description

## 5 Case 60: Cloud based Learning Materials for Inclusive Education

Ingo K. Bosse, TU Dortmund University, Germany

### 5.1 Application idea

Cloud Computing can be a key driver for innovation and transformation in learning and teaching. Besides the increasing use of media in classrooms, inclusive education is a global megatrend in the 21st century. Both provide stimulating profound changes for educational institutions. “A key characteristic of 21st century education is that classrooms are more diverse than ever.” [6] Students have very different needs due to their social and cultural backgrounds, their linguistic backgrounds, and their physical and intellectual abilities. Viewing education through the lens of inclusion implies adapting “[f]lexible teaching and learning methods [...] adapted to different needs and learning styles (...) with innovative approaches to teaching aids, and equipment as well as the use of ICTs.” [14]. How can cloud-based learning help to create the personalised learning materials that are needed in inclusive classrooms? Drawing on the research’s initial results, this article focuses in particular on the use of cloud-based technologies for the purpose of learning.

While there is consensus that media education offers special opportunities for inclusive classrooms, most of the blended learning platforms currently on offer are not accessible to and thus not usable for students with special needs. The purpose of the exploratory study presented here was to collect qualitative data on the didactical requirements for inclusive learning materials from the perspectives of teachers and producers. The subject of the study was “Planet School”, the most important blended learning platform available for schools in Germany.

Before describing how to design digital learning materials for inclusive education, it is necessary to clarify the term ‘inclusion’. UNESCO defines the term in the policy guidelines for inclusion in education as follows:

“Inclusion is thus seen as a process of addressing and responding to the diversity of needs of all children, youth and adults through increasing participation in learning, cultures and communities, and reducing and eliminating exclusion within and from education. It involves changes and modifications in content, approaches, structures and strategies, with a common vision that covers all children of the appropriate age range and a conviction that it is the responsibility of the regular system to educate all children” [14]

“A key characteristic of 21<sup>st</sup> century education is that classrooms are more diverse than ever”[6]. Students have very different needs due to their social and cultural backgrounds, their language backgrounds, and their physical and intellectual abilities. The central question with a focus on the use of learning materials and ICTs is:

“Do materials cater to the needs of all learners with learning difficulties”? [14].

UNESCO stresses the importance of the adequate design of learning materials. Education through the inclusion lens implies “Flexible teaching and learning methods adapted to different needs and learning styles. (...) Flexible teaching methods with innovative approaches to teaching aids, and equipment as well as the use of ICTs.” [14].

Learning platforms can represent an essential aid for the personalisation of ICT based learning materials and learning processes. One well known producer of web-based learning materials for schools in Germany is the public broadcasting station “Westdeutscher Rundfunk” (WDR). The WDR belongs to the ARD, a joint television network of nine state broadcasting organisations. It is the world’s second largest public broadcaster after the BBC. The mission of all public sector broadcast networks is to speak to all groups of society, providing them with information, education, and entertainment as well as with innovative and alternative programmes, especially for minority groups. One of these is “Planet School” ([www.planet-schule.de](http://www.planet-schule.de)). Television broadcasts and movies can be downloaded and watched in real-time. Detailed information, worksheets for creative lessons, and multimedia (e.g. educational games) can be found in these “Knowledge Pools” also. The content of the different media complement each other. “The website is currently only available in German. Many schools already use the platform for a wide range of subjects. The platform however is not specifically designed for students with special needs” [5]. The purpose of this study was to find out how this platform can

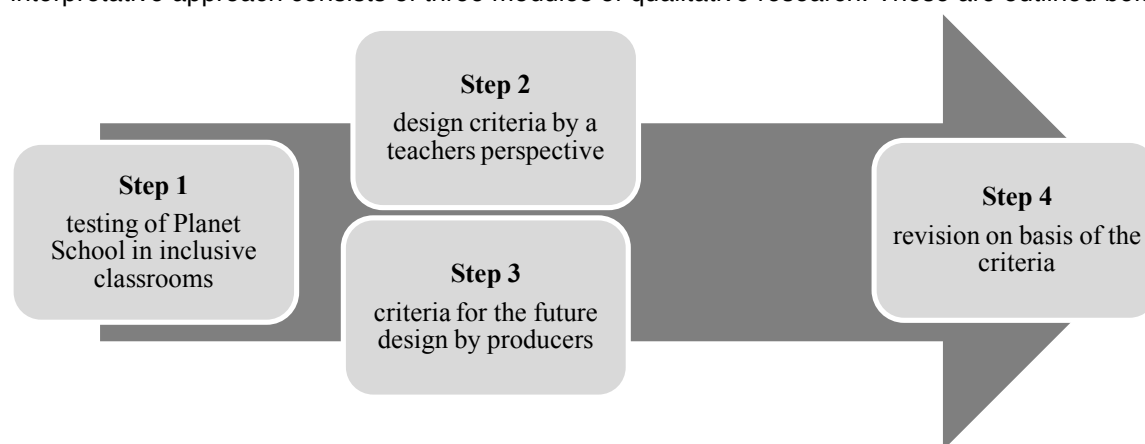
become appropriate for inclusive education and which design criteria for creating web-based learning materials are the most appropriate.

## 5.2 Personalised learning with the blended learning platform “Planet School” – research design

The aim of this study was to show how to meet the challenges of creating personalised media for inclusive learning. The main research questions were:

1. What distinguishes good inclusive digital learning materials?
2. Which quality criteria can be established?

Additional aims were to enable students to deal independently with media and to encourage cooperative learning. It was of key importance to link the perspectives of teachers and producers. The interpretative approach consists of three modules of qualitative research. These are outlined below.



**Fig. 1.** Research design

### **Step 1 (Dortmund University): Testing of Planet School in Inclusive Classrooms**

Analysis of international research shows seven essential factors for the creation of personalised learning materials for inclusive education. The multi-method research design consists of participatory observation and semi-structured interviews with teachers. The main focus was on the practical experiences with the learning materials provided by “Planet School”. Specifically, 11 experienced teachers at primary and secondary schools worked with different topics covered by “Planet School” in 2013 and 2014. The five schools belong to diverse German school districts and were randomly selected. All teachers had a wide range of students in their classroom. This included students with learning, intellectual, physical, emotional, and behavioural disorders. This also included students with dyslexia, dyscalculia, and special needs in language and communication. The sample contained 108 students. Twenty-six of them had special needs concerning learning and communication, as well as special social, emotional, and motoric development needs. A preliminary study ensured the quality of the interview guidance and the participatory observation.

### **Step 2 (Dortmund University): Design Criteria from the Perspective of Teachers**

The interviews with the teachers were analysed to form guidelines for the revision of the website. The first step was to transcribe the audio recordings of the interviews in full. Step two was to work on a summarizing content analysis with MAXQDA. The results were evaluated on the basis of core categories based on the desk research to create the interview guidelines. Finally, all interviews were summarised by core categories and interpreted in combination with the results of the participatory observation. This procedure led to scientifically sound guidelines for the revision of the website. The revisions were discussed with a focus group of television professionals from the editorial board for educational programmes.

### Step 3 (WDR): Criteria for Future Design by Producers

The results of the study stimulated an intensive process at the public broadcaster WDR concerning how to put the findings into practice. Beside technical questions about accessibility and usability, discussions about the copyright of the worksheets were of high importance. The process resulted in the development of criteria for producers of WDR school TV and for media agencies that create inclusive learning content for the broadcaster. These criteria are the foundation for revising parts of the website, especially for the production of new content.

### Step 4 (WDR): Revision on Basis of the Criteria

The developed criteria will lead to a revision of the platform “Planet School” with respect to the needs of inclusive instruction. Finally, each topic covered in “Planet School” is to be revised one-by-one. The recommendations will be especially important for new productions. Beside the novelties for the website itself, it is necessary to include the new findings into teacher training that is offered by the public broadcaster to promote the use of “Planet School” in classrooms.

## 5.3 Results

The importance of the design of digital media for the learning success of students, especially of students with special educational needs, is often discussed among teachers and the scientific community [8]. Although there is little data, the following basic principles can be established by analysing the international research.

### 5.3.1 Perspectives of Scientists: Criteria for Personalised Blended Learning Materials

The desk-based research identified seven factors that are essential for the creation of inclusive learning content with digital media. These include:

1. Text and language
2. Individualisation and personalisation
3. Same learning subjects
4. Respect for the complexity of lived-realities
5. Cooperative/collaborative learning
6. Activity-oriented instruction
7. Web accessibility and universal design

The results presented here are focussing the second point: **individualisation and personalisation**.

“Not every student has to achieve the same level!” [3]. The same learning outcomes apply to all students. However, these may be achieved at different times, in different methodological ways, with different forms of support from teachers, and with different learning materials. Individualised learning processes will address different types of learners and offer accessible and usable materials, including movies, television broadcasts, interactive, and multimedia content for students with different prerequisites for learning. Personalised learning enables students to achieve suitable educational qualifications and individual learning at the same time. The general education learning content in schools is expanded, decreased, or modified according to special educational needs. In addition to selection and modification, the design of teaching methods also arises from the individual learning prerequisites. “Inclusive teaching enables both: goal-differentiated and content-differentiated learning” [15]. Different learning materials have to be offered for five different levels, reaching from learning difficulties to special interests and giftedness. It is preventive because it counts on early interventions in cases of emerging learning disabilities and it is curriculum-based in that it is geared towards the methods and contents of classroom instruction [15]. Although working on the same subject represents the didactic core of inclusive learning [2]. In inclusive learning, it is also important to lead all students towards the highest possible curriculum goals. This optimal support of all students is best achieved through joint and cooperative working on the same subject. This subject is determined by the students themselves, is derived from the general curriculum, and is offered in a differentiated way accordingly [7]. In the Index for Inclusion, the well-known tool for quality assurance in inclusive schools, this point is highlighted by the following question:

“Does teaching assume a shared experience that can be developed in different ways?” [10]. It is important to design learning methods in such a way as to enable students to discover for themselves what the “crux of the matter” is. The relationship between commonality and difference can therefore not be described on the basis of vertical levels from simple to complex. In planning, the issue revolves around the question of possible similarities among the students’ approaches [12]. The Index for Inclusion tries to make clear that inclusive learning includes besides personalised learning forms as well cooperative ones [10; 4]. In connection with cooperative learning, a helper system is referenced. For school-work in collective learning, there is a wide range of helpers to choose from. These include partner classes or students, parents, colleagues and special needs educators. However, cooperative learning means much more than establishing a helper system. It refers to the voluntary collective bundling of individual experiences, knowledge, responsibilities, and group activities towards a common goal. Cooperative learning is a form of interaction with a common goal in which knowledge and skills are acquired together through exchange [13]. Ideally, all group members participate equally and take over joint responsibility. Non-disabled students can thus practise their social skills without falling behind in their subject-related academic performance [15]. Good teaching is well-organised, clearly structured teaching with a high task-related activity level and intensive use of learning time on the part of the students. In addition, good teaching uses diverse methods and includes cooperative as well as individual learning phases [9]. Cooperative learning is intended to result in students supporting each other mutually to achieve results together. Cooperative learning is organised in the classroom whereas collaborative learning involves the whole school and additional partners. Collaboration is one of the successful factors that favour the inclusion of parents/guardians in the classroom and within the teaching team [1].

### 5.3.2 Perspectives of Teachers: Criteria for Personalised Blended Learning Materials

The aim of this module was to collect qualitative data on the didactical requirements for inclusive education from the perspective of teachers (for special and for mainstream education). The structuring of the individual interviews forms the basis for the systematic interview comparison. Finally, the results of the individual assessments are examined in context to core categories and are summarized in a table. By using this method, we can make cross-case statements in which the specifics of the respective individual interviews are still explicitly considered. The overview shows the most frequently quoted statements:

Code	Number of Codes	Percentage of all Codes
General learning arrangements	36	22%
Text and language	32	19%
Personalisation and individualisation	27	16%
Good presence of lived-realities	16	10%
Cooperative and collaborative learning	10	6 %
Activity oriented learning	10	6%
Accessibility	5	3%

**Fig. 2.** Most frequent codes

“The results of the summarising content analysis underline the relative satisfaction of teachers with the usability of “Planet School” for inclusive classrooms. In general, the teachers thought that “Planet School” is appealing to children and that “Planet School” is easy for children to understand” [5]. The teachers greatly appreciate the possibility of being able to exert direct influence across the revision. The systematic comparison of the individual interviews was made along the described core categories for the design of digital media for inclusive education.

Among the most frequent ones were statement about the individualisation and personalisation. The teachers identified a strong demand for different levels of learning concerning complexity, timeframe, and speed. There seems to be a need for the different levels to be labelled more clearly. Some of the expressions currently used (for all, for experts, for professionals) have stigmatising effects. Neutral terms or the use of different colours would be more appropriate.



### 5.3.3 Design of Inclusive Blended Learning Materials

These recommendations were discussed in a focus group with television professionals who work at the editorial board for educational programmes. As such, a process of fundamental revision of the offer was initiated. This is still continuing. Since the WDR often has a large number of people involved in the design of materials, criteria (guidelines and checklists) was created for the design of inclusive learning and teaching materials specific to the different types of media.

## 5.4 Conclusion

The megatrends of mediatisation and inclusive education can compliment each other. Seven decisive factors were identified from the analysis of the state of research on the design of inclusive blended learning materials. In guided interviews with teachers who worked with the website “Planet School” in inclusive classrooms, it became clear what concrete optimisation requirements are necessary from their perspectives. From the analysis and interpretation of the interviews specific recommendations for the revision of media and materials became evident. The group discussion with producers initiated a process that ultimately led to the creation of criteria and checklists that the public broadcaster has set down as a quality benchmark for the design of appealing blended learning content for inclusive education. A number of revisions and new productions will still be necessary.

These example of a personalised learning with a blended learning platform show not only how cloud based education can enhance everybody’s ability to learn, but also that special education can be a key driver in proliferating cloud related learning. The main conclusion to date can be summarised as follows: in order for personalised learning to come to fruition, students need not only to be able to choose and personalise what tools and content they are going to use, but also to have access to the necessary scaffolding to support their learning [11]. In order to accomplish the educational goals, the ideal approach to teaching and learning is to find the right balance between giving students the choice to meet their needs and preferences whilst maintaining a structured educational framework provided by the teacher. Yet much more remains to be done going forward. Pedagogic change and a greater personalisation of learning are both essential components for student centred, self-regulated, independent and inclusive learning.

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## School on the Cloud: Deliverable D4.2

Wolke

Bulut

## Nuage

CHMURA

Nube

Nor

# OBLAK