International Journal of u and e-Service, Science and Technology
Vol. 9, No. 3, (2016), pp. 379-390
http://dx.doi.org/10.14257/ijunesst.2016.9.3.36

'Flipped MIS'. The Mobile Flipped Classroom Approach Shown In The Example Of MIS Courses

Birgit Oberer

Kadir Has University, Kadir Has Cad. Cibali, Istanbul, Turkey
[1]Birgit.oberer@gmail.com

Abstract

Education paradigms are shifting to include more online learning, blended and hybrid learning, and collaborative models. The flipped classroom is a pedagogical model in which typical lecture and homework sections of a course are reversed, offering the benefit that it rearranges face-to-face instructions, attempting to create a more efficient and enriched use of class time. In this study it was analyzed if the flipped classroom model, combined with mobile learning technologies, could stimulate students' participation and engagement in MIS courses. The results of the study revealed that the combination of flipped classroom model and mobile technologies have a direct impact on students' perception and learning outcomes, focusing on a five point course outcome scale.

Keywords*: Flipped classroom, mobile devices, higher education, learning, perception*

1. Introduction

Mobile technologies, which provide the potential to be used away from a fixed location, can be used to enhance learning experiences in a number of different ways. Learners' data and information can be dynamically integrated over time and space, thereby creating new forms of collaborative and integrative learning for both students and educators. The term 'mobile' refers to the possibility of taking place in multiple locations, across multiple times, and accessing content with equipment, such as smart phones or tablets [5-6].

Mobile learning is learning that is accomplished with the use of small, portable computing devices. Mobile learning can be used to enhance the overall learning experience for students and teachers. 'Through mobile support, learners' throughput rates might be improved and the quality of the learning experience enhanced. Active learning might immerse where previously inactive studying took place'. The field of wireless technologies is developing exceedingly fast. Most of the developments contribute to the greater feasibility of mobile learning and to the richness of the courseware that can be developed for mobile learning. All of this has greatly facilitated the development of mobile learning and has contributed to the richness and complexity of courseware on mobile devices [5], [7] and [14]. The European Commission has funded mobile learning projects with the aim to support vocational education and training using mobile devices for the delivery of learning content.

2. Literature Review

2.1 Mobile Learning Practices

In some countries, the use of m-learning for students located in remote places is taken as an advantage for communication and for media content development. A variety of devices are used and m-learning solutions are offered in companies and universities. Implementing mobile services in education as mobile learning modules is an innovative

ISSN: 2005-4246 IJUNESST

process at many levels of universities [1]. E-learning developers and course instructors must be aware of the changing user preferences, technological issues, and the new tools available in order to be able to determine how to benefit from them [2-3].

Mobile learning is learning that is accomplished with the use of small, portable computing devices, it can be used to enhance the overall learning experience for students and teachers. 'Through mobile support, learners' throughput rates might be improved and the quality of the learning experience enhanced. Active learning might immerse where previously inactive studying took place'. The field of wireless technologies is developing exceedingly fast. Most of the developments contribute to the greater feasibility of mobile learning and to the richness of the courseware that can be developed for mobile learning. All of this has greatly facilitated the development of mobile learning and has contributed to the richness and complexity of courseware on mobile devices [5-7]. Below there are summarized learning approaches with associated mobile learning activities, to give an overview on challenges of integrating mobile technologies in learning environments [4], [9].

Table 1. Learning Activities and Their Relationship to Mobile Technologies [9]

Learning Activity	Shortcut	Description	Mobile Learning Context
Behaviorist	Activities that promote learning as a change in learners' observable actions	Learning is thought to be best facilitated through the reinforcement of an association between a particular stimulus and a response. Applying this to educational technology, computer-aided learning is the presentation of a problem (stimulus) followed by the contribution on the part of the learner of the solution (response). Feedback from the system then provides the reinforcement.	Classroom response systems (*e.g.* 'Classtalk', 'Qwizdom') Content delivery by text messages to mobile phones
Constructivist	Activities in which learners actively construct new ideas or concepts based on both their previous and current knowledge	Learning is an active process in which learners construct new ideas or concepts based on both their current and past knowledge. Learners are encouraged to be active constructors of knowledge, with mobile devices now embedding them in a realistic context at the same time as offering access to supporting tools.	Most principles with mobile technologies come from a brand of learning experience termed 'participatory simulations', where the learners themselves act out key parts in an immersive recreation of a dynamic system.
Situated	Activities that promote learning within an authentic context and culture	Learning can be enhanced by ensuring that it takes place in an authentic context. Mobile devices are especially well suited to context-aware applications simply because	The museum and gallery sector has been on the forefront of context-aware mobile computing by providing additional

		they are available in different contexts, and so can draw on those contexts to enhance the learning activity.	information about exhibits and displays based on the visitor's location within them
Collaborative	Activities that promote learning through social interaction	Collaborative learning has sprung out from research on computer-supported collaborative work and learning and is based on the role of social interactions in the process of learning. Though not traditionally linked with collaborative learning, another theory that is particularly relevant to our consideration of collaboration using mobile devices is conversation theory, which describes learning in terms of conversations between different systems of knowledge.	Mobile devices can support mobile computer supported collaborative learning by providing another means of coordination without attempting to replace any human-human interactions, as compared to say, online discussion boards which substitute for face-to-face discussions
Informal and Life-long	Activities that support learning outside a dedicated learning environment and formal curriculum	Research on informal and lifelong learning recognizes that learning happens all of the time and is influenced both by our environment and the particular situations we are faced with. Informal learning may be intentional, for example, through intensive, significant and deliberate learning 'projects', or it may be accidental, by acquiring information through conversations, TV and newspapers, observing the world or even experiencing an accident or embarrassing situation.	Such a broad view of learning takes it outside the classroom and, by default, embeds learning in everyday life, thus emphasizing the value of mobile technologies in supporting it.
Learning And Teaching Support	Activities that assist in the coordination of learners and resources for learning activities	Education as a process relies on a great deal of coordination of learners and resources.	Mobile devices can be used by teachers for attendance reporting, reviewing student marks, general access of central school data, and managing their schedules more effectively. In higher education, mobile devices can provide course material to students, including

			due dates for assignments and information about timetable and room changes

2.2. Flipped Classroom

There is a pressure on all higher educational institutions to implement digital resources as part of regular courses, and also to develop and offer massive open online courses. Education paradigms are shifting to include more online learning, blended and hybrid learning, and collaborative models [15].“The first well-documented example of the flipped classroom is from 2007, when two chemistry teachers in Colorado wanted to support students who missed class when traveling to and from other school activities. The teachers recorded lessons live and posted them on YouTube. They found that this increased interactions in the regular classroom, and that it seemed to involve students in the learning activities in a more profound way. Since then, technology has improved and become easily accessible, and the idea of flipped classrooms as a way of organizing teaching and learning processes has become increasingly popular in higher education institutions” [15].

Ownership of learning is shifted from educators to students. Different learning resources are made available to students online before and after meeting on campus. On campus, time is mostly spent on students collaborating and working through problems in teams **[16].** Rather than the teacher using class time to dispense information, that work is done by each student after class, and could take the form of watching video lectures, listening to podcasts, perusing enhanced e-book content, and collaborating with peers in online communities.

Students can access this wide variety of resources any time they need them. Teachers can devote more time to interacting with each individual. After class, students manage the content they use, the pace and style of learning, and the ways in which they demonstrate their knowledge; the teacher adapts instructional and collaborative approaches to suit their learning needs and personal learning journeys.

The goal is for students to learn more authentically by doing. Beyond watching recorded video lectures, other technologies such as digital readings with collaborative annotation and discussion software enable instructors to be more in tune with their students’ learning patterns and needs [16].

3. The Study

3.1. Previous Studies

In a previous study, we analyzed how tablet devices could be used as educational tools to support innovative educational practice in a university in Austria. Institutions of higher education in Austria have experienced transformational processes in recent years, such as the transition, for example, to the Bologna system and the internationalization of studies being offered, in which the rankings are increasingly dominating the public perception of institutions of higher education.

All of these factors have an impact on the overall educational system. To be successful in a competitive environment, universities have to facilitate and promote academic excellence, which must be the deciding differentiating criterion for resource allocation within the universities. Qualification of and support for young academics is absolutely essential; young academics should be given the necessary freedom and opportunity for research [11].

The Lisbon Agenda has aspired to make Europe ‘the world’s leading knowledge-based economy by 2010’. The Barcelona European Council of 2002 and the European Council of 2005 re-launched the Lisbon strategy and are fostering universities as pivotal elements

for reaching this objective. If a knowledge-based economy is characterized by the production, transmission, and dissemination of knowledge, universities are unique in all these processes [12].

Institutions of higher education in Austria have experienced transformational processes in recent years, such as the transition, for example, to the Bologna system and the internationalization of studies being offered, in which the rankings are increasingly dominating the public perception of institutions of higher education. All of these factors have an impact on the overall educational system.

To be successful in a competitive environment, universities have to facilitate and promote academic excellence, which must be the deciding differentiating criterion for resource allocation within the universities. Qualification of and support for young academics is absolutely essential; young academics should be given the necessary freedom and opportunity for research [11].

The Lisbon Agenda has aspired to make Europe 'the world's leading knowledge-based economy by 2010'. The Barcelona European Council of 2002 and the European Council of 2005 re-launched the Lisbon strategy and are fostering universities as pivotal elements for reaching this objective. If a knowledge-based economy is characterized by the production, transmission, and dissemination of knowledge, universities are unique in all these processes [12].

'A comparison of teaching at the university level shows, when compared internationally, that Austrian universities have an excellent faculty-student ratio when one factors in the other academic staff. With regard to full professors in Austria, the faculty-student ratio tends to be below average – with a wide range among the universities. Compared internationally, the percentage of PhD students in the overall student body is high and there are only small differences between the individual Austrian universities. This indicates that teaching at Austrian universities is research-oriented to a considerable extent.' [13].

'A comparison of teaching at the university level shows, when compared internationally, that Austrian universities have an excellent faculty-student ratio when one factors in the other academic staff. With regard to full professors in Austria, the faculty-student ratio tends to be below average – with a wide range among the universities. Compared internationally, the percentage of PhD students in the overall student body is high and there are only small differences between the individual Austrian universities. This indicates that teaching at Austrian universities is research-oriented to a considerable extent.' [13].

Although the use of computers including laptops is established in schools, the integration of tablet devices is still at the innovation stage. Considerable debates remain regarding the educational benefits of tablet devices for learners and teachers. The introduction of tablet devices throughout the mentioned university provides an opportunity for a research study on the initial impact of tablet devices on learners and teaching; and the social, technical, and infrastructure related problems arising.

To analyze the impact of tablets on education, in 2011 a project was initiated by an Austrian university, which already has a strong commitment to information and communication technologies. The main focus was to use tablets in class and evaluate the impact on the educational performance.

The projects consist of a pilot project to be conducted at the university and follow up projects to be conducted. The pilot project was initiated in 2011 (duration 1 year); the first results are presented in this contribution. Students and educators were issued tablet devices in 2011 across the full spectrum of programs.

Mainly students from business, economics, technical studies, and information technology contributed to the study. Main courses teaching with the tablets issued were (1) Introduction to Marketing, (2) Introduction to Economics, (3) Business Process

Management, (4) Enterprise Information Systems, (5) Innovation Management, and (6) Geographic Information Systems.

For most courses, mobile modules were included in the course topics. With the integration of mobile learning modules (MLM), the teaching methods primarily used a focus on lectures and MLM, supported by MLM based field analysis and student projects. For mobile learning modules (MLM), the tables issued were used to reach the learning goals that were defined. In the Geographic Information Systems course, for instance, students used the tablet for the whole course to work on their mobile learning modules: this includes working on their individual assignments as well as on their group projects [10]. For the pilot projects, two different streams were important, the students' one and the stream considering the use of tablet devices by educators.

The students' stream includes the development of course designs, including mobile learning modules and focusing on collaboration issues and a technology focus. The mission of this project part was that (1) every student has his/her own learning device, (2) every student uses some kind of technology for every lesson, in class and at home; and (3) every student can improve his/her learning by using technology.

The educator's stream focuses on the motivation of educators to use the tablets not only in class for student active and passive work, but also for educators' active work, in data collection, preparing course content, presenting course content, collaboration with students, and collaboration among educators.

At the end of the 1-year period, surveys were used to assess the impact of the tablet devices' use on motivation, quality of work, collaboration, achievement, and other factors, both for students and educators.

Most instructors created and frequently used a course related circle on Google+ for communicating with all the students, and sub circles for all the student groups working on projects; Hangouts were used for the online office hours of instructors, explaining assignments, talking about projects, group work or communicating with students completing their projects, facing problems, or needing some kind of support.

Some instructors used sparks, which is a customized way of searching and sharing that follows an interest-based approach, to share results with the course circle or any sub circle or selected students.

More than 98% of all the students worked with their tablets on social media networks, mainly Google+, for group internal communication, and 40% of them had not used social media networks previously for communicating on course related issues. The results of this analysis revealed that 75% of the staff felt that student achievement appeared to have increased since the introduction of tablet devices, mainly in fine arts and business programs. 98% of the students and 64% of the faculty respondents felt that the tablet devices helped the students improve the quality of their work significantly.

The majority of educators use tablet devices regularly in their teaching. For IT related programs, the students' performance did not significantly increase by using tablet devices, but 87% of the responding students of IT programs felt that their levels of collaborative working improved.

Minor technical issues were faced, mostly due to user error, but were easily dealt with. The outcomes of this two-year analysis demonstrated the role that tablet devices could play in learning and teaching [10].

3.2. Course Design

Considering the outcomes of the previous study it was planned to establish a similar learning environment in a Turkish university but with a modified learning approach.

The main research question was: 'Could the flipped classroom approach create a positive leverage effect on student learning outcomes?' For students from two bachelor courses, (1) foundations of information systems and (2) introduction to management

information systems, the course syllabus was adopted to integrate mobile learning elements; additionally, the flipped classroom approach was applied.

The main benefit of flipped learning is the restructuring of class time, which is more of a pedagogical solution than a technological solution.

Nevertheless, in-class benefits are dependent upon the utilization of technology tools, like content creation tools, tablet software, document-camera based solutions and distribution tools [8-9]. Students had to watch lecture videos outside the classroom (no traditional in class teaching) and focused in class on group work activities, assessments and other online focused activities.

For every class the students brought their mobile devices and worked mainly in groups on course related topics. Basically, it was created the same learning environment like the one in the previous study: mobile learning modules (MLM) were created for each course section and integrated in the course syllabus. Like in the previous study it should have been analyzed how student learning changes with the integration of mobile learning elements (MLM) [9].

Table 2. Student Project, Including Mobile Learning Elements [9]

Student project: system analysis and design		
Topic	**Main question to be answered**	**To do list**
1	How can we use USE CASE MODELING?	Analyze the primary and secondary sources
2	What is included in a USE CASE SCENARIO?	Find out main categories, details, data types, sources
Use your tablet and find sample applications and evaluate them. Use your tablet and prepare a sample use case scenario. Use your tablet for sharing your designed map with your instructor and the other groups in your course.		

Table 3. Course Structure (for one sample week) Focusing on Flipped Classroom and Mobile Technology Integration. [9]

Week 9	content	Mobile/flipped
Outside classroom	Video lecture 1,2	M/F
In class activities	Case check: analyzing a given case study. Doing research online	M
	Reflection: topic of the week has to be critically discussed in group	F
	Hands on: prepare a strategy (related to the topic of the week) for a given company. Online research required	M

3.3. Empirical Data

Final course examination scores have been the primary criterion for establishing the validity of student evaluations; these scores reflect only a limited view of student learning outcomes, and more comprehensive indicators of student learning should go beyond a single exam score, reflecting only narrowly defined course objectives. Such indicators might include student perceptions of their increase in interest in the subject, critical thinking skills, interpersonal outcomes (*e.g.* cooperative abilities), intra-personal outcomes (*e.g.* self understanding) and other broad course outcomes [19].

In this study the main focus lies on analyzing student perception. The scale of course outcomes defined considers five items, which could provide criteria for examining the validity of student ratings, assessing more comprehensively student perception.

A set of empirical data was collected after the courses, in order to answer the research question presented in 3.2: a semi-structured questionnaire addressing all students. Out of 130 students 126 responded to the questionnaire, which was based on the five-point Likert scale. This was yielding a response rate of 96.9%.

Since in this study the attitudes and behaviors of students had to measured, the Likert scale is one of the most popular and reliable ways for measuring attitudes and behaviors. A Likert scale uses answer choices that range from one extreme to another.

Unlike a simple "yes / no" question, a Likert scale allows to uncover degrees of opinion. This can be particularly helpful for sensitive or challenging topics or subject matter. There were used attitude questions and belief ones.

Evaluation items:

(I) learning in the course increased
(II) Progress toward achieving course objectives
(III) Interest in the subject area increased
(IV) Helped to think independently about the subject matter
(V) the extent to which the course actively involved them in what students were learning

Students had to respond to each of the five evaluation items with a five point scale ranging from (1) "much more than most courses" to (5) "much less than most courses".

Attitude Questions

Likert 5 point agree/disagree scale w/middle option

Strongly Disagree
Disagree
Neither agree nor disagree
Agree
Strongly Agree
Not sure/not applicable

Belief Questions

Question Matrix/Table

	1=Poor	2=Fair	3=Good	4=Excellent	5=Not sure/not applicable
The ability to write clearly and effectively					
The ability to speak clearly and effectively.					
The ability to solve complex problems.					

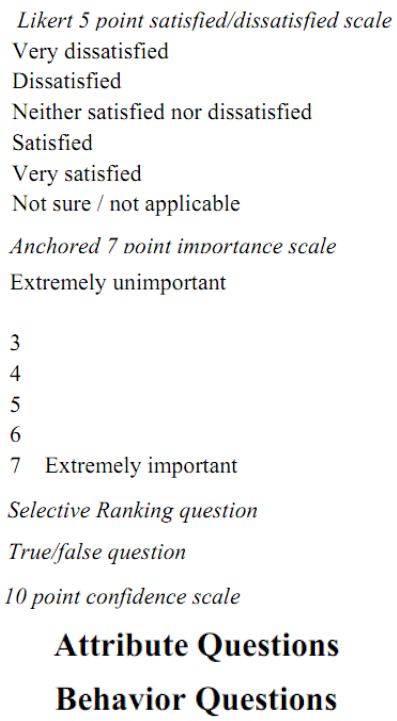

Figure 1. Likert Questions

3.4. Results

In the questionnaire, students (n=126) were asked how they viewed the learning potential of the online lectures. The majority of the students had found the online lectures to be a useful learning arena. 34.1% of the students answered 'to a very great extent', 38.9% answered 'to a great extent', 13.5% answered 'to some extent', 11.1% answered 'to a small extent' and 2.4% answered 'to no extent'. 85% of all students used their mobile devices outside classroom for class work 'to a (very) great extent.

Although the use of computers including laptops is established in schools, the integration of tablet devices in combination with flipped classroom activities is still at the innovation stage. Surveys were used to assess the impact of the tablet devices' use on motivation, quality of work, collaboration, achievement, and other factors.

With the integration of mobile learning modules (MLM), the teaching methods primarily used a focus on flipped classroom lectures and MLM, supported by MLM based field analysis and student projects. For mobile learning modules (MLM), the tables issued were used to reach the learning goals that were defined.

In the 'Foundations of Information Systems' course, for instance, students used the tablet for the whole course to work on their mobile learning modules: this includes working on their individual assignments as well as on their group projects.

For the project, two different streams were important, the students' one and the stream considering the use of tablet devices by educators. The students' stream includes the development of course designs, including mobile learning modules and focusing on flipped classroom activities, collaboration issues and a technology focus.

The mission of this project part was that (1) every student has his/her own learning device, (2) every student uses some kind of technology for every lesson, in class and outside the classroom; and (3) every student can improve his/her learning by using technology [18].

The educator's stream focuses on the motivation of educators to use the tablets not only in class for student active and passive work, but also for educators' active work, in data

collection, preparing course content, presenting course content, collaboration with students, and collaboration among educators. At the end of the project, surveys were used to assess the impact of the tablet devices' use and flipped classroom activities on motivation, quality of work, collaboration, achievement, and other factors, both for students and educators.

Most instructors created and frequently used a course related circle on Google+ for communicating with all the students, created lecture videos (on average two per week) and Google sub circles for all the student groups working on projects. Some instructors used sparks, which is a customized way of searching and sharing that follows an interest-based approach, to share results with the course circle or any sub circle or selected students Hangouts were used for the online office hours of instructors, explaining assignments, talking about projects, group work or communicating with students completing their projects, facing problems, or needing some kind of support.

99% of all the students worked with their tablets on social media networks, watched the course videos on their mobile devices before they came to class.

The results of this analysis revealed that 90% of the staff felt that student achievement appeared to have increased since the introduction of tablet devices and the flipped classroom activities. 100% of the students and 89% of the faculty respondents felt that the tablet devices helped the students improve the quality of their work significantly. All educators use tablet devices regularly in their teaching (outside and in classroom).

For both courses, the students' performance increased significantly by 9% on average; and 98% of the responding students felt that their levels of collaborative working improved.

Educators can be freed from heavy repetitive explanations of knowledge. They can devote more time with students in deep exchanges, understand students' doubts, and answer questions more effectively, thus truly improve their teaching quality.

The instructor is changed from the dominator of classroom teaching and imprinter of knowledge to the guide for learning. Not only the interactions between instructors and students are increased, but also the interactions inside the students become more than before, so that the teacher can learn more about student, and make the classroom more personalized. Students are changed from the passive recipient of knowledge to the dominants that process, absorb and apply the knowledge and information.

Therefore a teaching mode that the teacher is the dominant and students are the main body has been formed, which promotes students' independent learning and cognitive ability of ubiquitous learning [18].

Students reported that the combination of out of classroom lectures and assignments on the video sections - as a way of preparing for group and plenary discussions on campus - had stimulated involvement in the teaching and learning processes.

Table 4. Learning Potential and Mobile Learning Modules

N= 126	to a very great extent	to a great extent	to some extent	to a small extent	to no extent'	
Learning potential?	43	49	17	14	3	126
	34.1%	38.9%	13.5%	11.1%	2.4%	100%
Mobile outside classroom	67	40	15	3	1	126
	53.2%	31.7%	11.9%	2.4%	0.8%	100%
Learning?	20	67	22	12	5	126
	15.9%	53.1%	17.5%	9.5%	4%	100%

Students were asked their views on the coherence between the different parts of the course. 15.9% of the students answered ‘to a very great extent’, 53.1% answered ‘to a great extent’, 17.5% answered ‘to some extent’, 9.5% answered ‘to a small extent', and 4% answered ‘to no extent’.

7. Conclusions

The flipped classroom model is part of a larger pedagogical model that overlaps with blended learning, enquiry-based learning, and other instructional approaches and tools that are meant to be flexible, active, and more engaging for students.

It is a pedagogical model in which typical lecture and homework sections of a course are reversed. Short video sections are viewed by students outside classroom before class session, while in-class time is dedicated to exercises, group work, projects, or discussions.

In some countries, the use of m-learning for students located in remote places is taken as an advantage for communication and for media content development. A variety of devices are used and m-learning solutions are offered by companies and universities. Implementing mobile services in education in the form of mobile learning modules is an innovative process at many levels of higher education.

Almost any mobile service can be adopted for educational use. It requires some flexibility, mainly on the part of the instructors, to use mobile learning modules in education and to motivate students to use these modules, while not focusing on the restrictions, limitations, and additional workload, but rather on the benefits that these components could offer for use in education.

The results of the study revealed that the combination of the flipped classroom model and mobile learning modules in course design could encourage students to participate, could empower them and could lead to better results in terms of students’ projects because of the higher percentage of IT integration in education and learning.

References

[1] G. Dykes, and H. Knight, “Mobile Learning for Teachers in Europe. Exploring the Potential of Mobile Technologies to Support Teachers and Improve Practices”, United Nations Educational, Scientific and Cultural Organization (UNESCO), UNESCO Working Paper Series on Mobile Learning, France, **(2012)**,

[2] F. Shafique, M. Anwar and M. Bushra, “Exploitation of social media among university students: a case study”, Webology, , http://www.webology.org/2010/v7n2/a79.html, vol. 7, no. 2, article 79, **(2010).**

[3] N.Y. Asabere and S.E. Enguah, “Integration of Expert Systems in Mobile Learning”. International Journal of Information and Communication Technology Research, vol. 2, no.1, **(2012)**, pp.55-61.

[4] L. Naismith, P. Lonsdale, G. Vavoula, and M. Sharoples, “Literature Review on Mobile Technologies and Learning”, University of Birmingham, report 11, Futurelab, **(2004)**.

[5] L.J. Kurkela, “Systemic Approach to Learning Paradigms and the Use of Social Media in Higher Education”, iJET, vol. 6, **(2011)**, pp.14-20.

[6] D. Keegan, G Dismihok, N. Mileva, and T. Rekkedal, “The role of mobile learning in European education”, Work Package 4, 227828-CP-1-2006-1-IE-MINERVA-M, European Commission, **(2006)**.

[7] A. Sorensen, “Social Media and personal bloggin g: Textures, routes and patterns”, MedieKultur: Journal of Media and Communication Research, vol. 25, no.47, **(2009)**, pp. 66-78.

[8] J. Bergmann, J., “Flipped-learning toolkit: Lets talk tech”, edutopia.org, http://www.edutopia.org/blog/flipped-learning-lets-talk-tech-jon-bergmann, December 9 **(2014)**,

[9] B. Oberer, “Mobile Devices and Flipped Classrooms in Higher Education: An Impact Analysis on the Educational Landscape in a Turkish University”, Proceedings of the 8th International Conference on u- and e-Service, Science and Technology, South Korea, November 25-28 **(2015)**.

[10] B. Oberer, A. Erkollar. “Tablets as primary educational computing devices. An impact analysis on the educational landscape in an Austrian university”, World Conference on Educational Sciences, Procedia - Social and Behavioral Sciences, Elsevier, vol. 116, **(2014),** pp.477-480.

[11] J. Hahn. “Higher Education Research in Austria.: Challenges and Prospects”, in: Austrian Federal Ministry of Science and Research (2009). ‘Higher Education Research in Austria. Trends, requirements and underlying conditions’, **(2009),** pp. 2-5.

[12] S. E. Perez, "research policy measures for universities in Europe: common trends and challenges", in: Austrian Federal Ministry of Science and Research (2009). 'Higher Education Research in Austria. Trends, requirements and underlying conditions', **(2009),** pp. 12-16.
[13] M. Steiner, "The Austrian university landscape compared to other countries", in: Austrian Federal Ministry of Science and Research (2009). 'Higher Education Research in Austria. Trends, requirements and underlying conditions', **(2009)**, pp. 26-31.
[14] N. Pachler, "Mobile Learning towards a research agenda", WLE Centre, Institute of Education, occasional papers in work-based learning, **(2007)**, UK.
[15] Helgevold, N. and Moen, V., "The use of flipped classrooms to stimulate students' participation in an academic course in Initial Teacher Education", Nordic Journal of Digital Literacy, vol. 10, no. 1, **(2015),** pp.29-42.
[16] New Media Consortium. "Horizon Report, 2014 Higher Education Edition, Retrieved from http://cdn.nmc.org/media/2014-nmc-horizon-report-he-EN-SC.pdf, **(2014).**
[17] Yu, Ch., "Challenges and Changes of MOOC to Traditional Classroom Teaching Mode", Canadian Social Science, vol. 11, no. 1, **(2015)**, pp. 135-139.
[18] A. Erkollar and B. Oberer, " The effects of the flipped classroom approach shown in the example of a master course on management information systems", proceedings of the International Conference on Quality in Higher Education, Sakarya, Turkey, December 02-04 **(2015).**
[19] J. Koon and H.G. Murray, "Using multiple outcomes to validate student ratings of overall teacher effectiveness", Journal of Higher Education, vol. 66, no. 1, **(1995),** pp. 61-81.

