

PRE–SERVICE TEACHERS’ LIVED EXPERIENCES WITH TAKING COURSES THROUGH LEARNING MANAGEMENT SYSTEMS: A QUALITATIVE STUDY

Esra ERGUL SONMEZ
Faculty of Education
Suleyman Demirel University
Isparta, Turkey

Dr. Mustafa KOC
Faculty of Education
Suleyman Demirel University
Isparta, Turkey

ABSTRACT

Learning management systems (LMS) are web–based platforms used for enhancing and supporting classroom teaching or delivering online instruction. Much of the earlier research has focused on their technological features and implementations into instruction. However, investigating what and how teachers and students think about and experience with LMS based on their actual usage is needed to realize educational potential of these systems. This study aimed to investigate pre–service teachers’ lived experiences about taking courses through Moodle LMS. The research was designed as a qualitative study. Data were collected through semi–structured interviews and analyzed through content analysis technique via Nvivo 7.0 software. The sample included 25 college students majoring in Computer and Instructional Technology Education at a state university in Turkey. Majority of the participants indicated that Moodle was user–friendly, beneficial and enhancer for interaction with both instructor and course content. Participants identified “assignments”, “resources”, and “forum” as the most effective instructional modules. On the other hand, some argued that Moodle could not provide face–to–face interaction like in the classrooms and thus it was not suitable for certain math and non–math courses requiring such interaction. They also found registration to course website as the biggest technical challenge.

Keywords: Learning management systems, lived experiences, teacher education, qualitative study.

INTRODUCTION

Delivering course materials through a subject–specific website supported by internet technologies is a method that can increase the effectiveness and permanence of course contents in higher education. The quality of course accessibility and educational experiences can also grow via the help of internet technologies (Karaman et al., 2009; Yapici & Akbayin, 2012; Weigel, 2002). While such tools as Blog, Wiki, Podcast, WebQuest can be used for these purposes, learning management systems (LMS) designed for instructional purposes are more popular among educators. The reason for this is that LMS allow more learner–learner, teacher–learner and learner–environment interaction and are based mostly on constructivist learning

principles (Cuellar et al., 2011; Lonn et al., 2011). They provide learners with interactive tools to access information resources, complete and submit learning tasks, collaborate with peers online, and they also help teachers to support management of student progress (Alario-Hoyos et al., 2015).

Evaluation of these virtual learning environments and their built-in services provides valuable feedback to designers and educators on how to improve their educational potential (Stojanov & Dobrilovic, 2016). As in the case of all learning environments, learner expectations and preferences hold great impact in developing, selecting and using LMS in educational settings. Recent research based on the technology acceptance model revealed that user variables (e.g., perceived usefulness, ease of use, challenges) influenced the process of accepting and using LMS (Escobar-Rodriguez & Monge-Lozano, 2012; Essel & Wilson, 2017; Trayek & Hassan, 2013). Learners' previous interactions with LMS and beliefs about LMS' roles in their learning performances shape their attitudes and intentions to use LMS. In fact, such factors are also important for educators and software developers to choose or develop those LMS that well serve their students' need. Within this context, the main purpose of our study is to deeply explore pre-service teachers' views and experiences with regards to taking courses through Moodle, which is an open-source LMS. We believe that studying pre-service teachers can propose important implications for future utilization of Moodle because they will play a key role in technology integration into schools and most likely use Moodle in their future works.

Moodle LMS

Moodle is an open-source LMS that can be downloaded freely under the General Public License (GPL). It was originally developed by Martin Dougiamas to help educators create modular online courses with a focus on interaction and collaborative construction of content, and is in continual evolution. Moodle can be installed easily on any computer that can run PHP and is compatible with most operating systems and databases (Dougiamas, 2004; Itmazi, 2005). It is one of the most widely used LMS all over the world particularly in higher education institutions as it supports more than 70 languages.

Blending advanced Internet technologies with social constructivist learning as a theoretical foundation, Moodle allows instructors to design and implement customizable courses or supplementary materials in a flexible online environment (Rice, 2006). In this way, it helps learners become active and collaborative participants and responsible for their own learning and share their works with others (Lakhan & Jhunjunwala, 2008). In order learners to fulfill such functions, Moodle offers various interactive module activities such as assignments, chat, exam, forum, survey, quiz, wiki and so on. Instructors can employ these tools to explore and take into account students' educational needs, enhance the interactions between teachers, students and course content, implement audio-visual materials, support student learning at anytime and anywhere, and evaluate learning outcomes. A recent study shows that news, forum and assignment are considered to be the most important Moodle tools and mostly used among the students (Zainuddin, Idrus & Jamal, 2016). Another study revealed that assignment module as an extrinsic motivator significantly impacted perceived learning outcomes from Moodle (Waheed et al., 2016). In addition to these built-in tools, most LMS offer the ability of integrating external communication and instructional tools to enhance student learning (Thompson & McGill, 2014). For example, Paschalis (2017) designed and implemented a collaboration script into the Moodle to create a compound environment in order to support collaborative project-based learning. His results showed a better level of collaboration and cognitive performance of students and guidance role of tutors. Similarly, Alario-Hoyos et al. (2015) instantiated and enacted a collaborative learning situation in Moodle at a LMS-mediated distance learning setting and found that it led to a significant improvement in student grades and motivation as compared to an equivalent face-to-face setting.

Besides such advantages, Moodle has several limitations as well. Because it is open–source software, it should be secured greatly and continuously updated. In case security holes in the software are detected by those with evil purposes, they might unveil the details of learners and instructors, remove or edit resources, change the marks of students, and give more admin powers to students (Reis et al., 2012). Nevertheless, Moodle appears more promising in terms of security while its competitors rank much below the average rates (Chavan & Pavri, 2004; Reis et al., 2012). It seems difficult to install and manage for normal users without computing expertise because there are many technical words and tasks in the installation and user guide. Therefore, course instructors are urged to work with computer experts and technicians to expect productive outcomes from the system.

User Characteristics

It is a well–known fact that learners have various needs, perceptions, motivation, cognitive skills, and learning styles (Graf, 2007). These distinct characteristics should be taken into consideration in planning teaching activities and determining tools and materials. Learning environments that are designed based on the characteristics of learners shall enhance the speed, effectiveness and permanence of learning (Simsek, 2002). Hence, learner analysis has great importance for instructional design.

Previous research studies suggest that personal and behavioral factors affecting technology use in education are substantially associated with knowledge, proficiency, attitude, perception, belief and commitment while environmental variables are associated with opportunities, hardware, professional development and support (Inan & Lowther, 2010; Mahmud & Ismail, 2010). Although some of these factors have been fading away as a results of improvements in access to technology and professional development in the schools, teachers' belief systems including perceptions, views, and conceptions are still persisting in effecting technology integration (Koc, 2013). These affective and psychological attributes usually start developing during individuals' initial engagement with given technology and reinforce based on their levels of (dis)satisfaction with its usage. Upon strengthening through similar subsequent experiences, they become resistant to change and impact future practices. This suggests exploring pre–service teachers' experiences with technology so that future curricular activities and technology revisions can be incorporated to change their beliefs and uses of technology in a positive manner.

Developing a model to understand and predict the continuous usage of Moodle, Sharma et al. (2017) found technology experience and personal innovativeness as significant predictors among the individual characteristics. A study of student engagement with Moodle identified insufficient consideration for accessibility, limited focus on the pedagogical benefits of LMS and narrow understanding of students' needs in online learning as main barriers for its usage (Parsons, 2017). In a comparative study, Shi (2016) identified the enjoyment of the flexibility of learning as the strongest motive for students to use Moodle–mediated e–learning and observed higher rate of course attendance and homework submission compared to traditional teaching. She concludes that students expect automatic check for homework, more online tests, friendly learning environment and quick feedback from the e–learning platform. Similarly, Krasnova and Vanushin (2016) found that students' satisfaction with Moodle courses was impacted by their perceptions of flexibility of learning, ease of use, clarity of design, and convenience. Focusing on the user points of view, Baytiyeh (2015) revealed that both instructors and students rated community influence, satisfaction, service quality, learnability and technical quality as significant determinants of acceptance and use of Moodle. These studies highlight the importance of gathering ongoing feedback from users with regards to their experience on LMS usage in order for the development and implementation of LMS–based courses.

Purpose of the Study

Although LMS usage is ubiquitous, much research has focused on their technological features and implementations into instruction. However, investigating what and how teachers and students think about LMS based on their actual usage is needed to realize educational potential of these systems (Lonn & Teasley, 2009; McGill & Klobas, 2009). Perceived benefits or limitations can shed some lights on how to improve LMS designs and help teachers and students to realize the best ways to integrate LMS into teaching and learning (Stojanov & Dobrilovic, 2016). Such research is still sparse and has been mostly designed by quantitative methodology with predetermined survey items, focused on comparing different LMS platforms, and called for further research and case studies to look more deeply at learners' LMS experiences (Lonn & Teasley, 2009; Carvalho et al., 2010). Therefore, our research question posed in this study is "How do pre-service teachers perceive and describe the experience of taking courses through the support of Moodle LMS during their undergraduate education?"

METHODOLOGY

Research Design

We designed our study as a phenomenological inquiry within the qualitative research paradigm because our goal was to describe a particular phenomenon (i.e., taking courses through Moodle) experienced by several individuals (i.e., pre-service teachers in this case) from their perspectives. Phenomenology seeks to explore opinions, attitudes or perceptions of persons with respect to a phenomenon (e.g., event, program, emotion) through their lived experiences (Mertens, 1998; Yildirim & Simsek, 2011). As such, it avoids pre-defined assumptions or hypothesis and emphasizes participants' knowledge, interpretation, and subjectivity. We decided that such an approach was very suitable for our specific purpose of examining lived experiences of pre-service teachers in taking courses through Moodle from their own perspectives.

Study Group

As in the case of most qualitative research, the phenomenon under study designates the participants. We employed purposive sampling in accordance with the aim of our study. Looking for those who took course supported through Moodle, we selected 25 volunteer college students enrolled at the Department of Computer and Instructional Technology Education at a state university in Turkey. Therefore, they were pre-service teachers that could be appointed as information technology teachers to public schools after their graduation. Approval for the use of human subjects for this study was obtained from the administrative committee of the college. At the beginning of the interviews, all participants gave a written consent in which they were informed about the purpose of the study and ensured that their answers were used anonymously for research purposes only.

Of the participants, 44% were female and 56% were male. Their age ranged from 19 to 23 with an average of 21.4 (SD=2.45) years old. Participants completed at least one of these courses through Moodle: Math, Programming Languages, Graphics and Animation in Education, Web-based Programming, Database Management Systems, Scientific Research Methods, and Project Design and Management.

Data Collection

The main method of data collection in phenomenological studies is interviewing with those experiencing the phenomenon under study (Yildirim & Simsek, 2011). Thus, we collected data through semi-structured in-depth interviews with open-ended questions. We formed several framing questions to ensure coverage of research scope but allowed for flexibility in responding additional questions or probes that emerged during the interviews (Mertens,

1998). This enabled both participants to freely share and expand on various issues that they thought was important and us to get as rich information as possible.

We formulated framing questions particularly to elicit participants' lived experiences with Moodle LMS in accordant with nature of qualitative research. The questions mainly asked participants to express their feelings and observations about Moodle LMS and its activities with regards to their instructional rationales, implementations, usefulness, usability, difficulties, and so on. We had two colleagues, who were experts in the field of educational technology, review these questions and then made revisions based on their suggestions. We conducted interviews as face-to-face, reciprocal, and one-on-one dialogue and audio-taped all conversations with permission of participants. Each interview took place in an unoccupied office without environmental and physical interruptions (e.g., background noise), which is important for audio recording.

Data Analysis Process

We transcribed recorded interviews by using Sespro software and analyzed them based on content analysis technique by using qualitative data analysis software called Nvivo 7.0. The overall analysis process followed a three-step inductive approach as suggested by Miles and Huberman (1994): data reduction, data display, and conclusion drawing/verifying. At the beginning, we carefully read and all transcripts to get familiar with consistent and contradictory comments and thus anticipate possible code labels to be used for conceptualization. Next, we coded relevant and salient issues in each transcript reflecting the views and opinions of participants. The coding units (i.e., text segments) ranged from a sentence to a whole paragraph. Nvivo enabled us to select a coding unit and then assigned it a code label by either defining a new one or selecting an existing one from those already defined. Having coded all the data, we formulated conceptual themes by considering similarities and differences among the emerged code labels. Nvivo allowed us to organize themes in "tree nodes" and code labels under themes in "sub nodes". The program automatically counted the number of references (i.e., frequencies) for sub nodes and then provided us with visual models, similar to concept maps, representing hierarchical relationships between a tree node and its sub nodes.

Establishment of Validity and Reliability

In order to ensure trustworthiness (i.e., validity) and reliability of the results, we employed peer debriefing and member checking (Patton, 2002; Yildirim & Simsek, 2011). We held review meetings with an expert in distance education and qualitative research methods to present our data and approach to analyze them. The expert asked questions regarding the processes, reviewed the core data and analysis of the data, and given feedback regarding the appropriateness of the processes. To ensure participant confirmation (i.e., member checking), we sent the final version of outcomes and study report to five of the participants via e-mail. Those five participants reported that the outcomes of study aligned with their views completely. They have all stated that the report reflected their true opinions regarding pros and cons of Moodle.

Another strategy conducted in this stage was ensuring the reliability among the coders. A colleague was asked to analyze the content of five interview records selected randomly. The

outcomes of his analysis were compared with ours. Identifying the same sub-code for an answer was defined as "Consensus" while identifying a different sub-code has been defined as "Disagreement". The inter-coder reliability ratio for each interview was calculated using the formula $(\text{Consensus} / (\text{Disagreement} + \text{Consensus})) * 100$. The lowest ratio was 0.89 while the average ratio was 0.94, suggesting that the data analysis process was highly reliable.

Furthermore, we described our participants, the way how we selected them, and both data collection and analysis processes in detail so that the credibility and transferability of our findings can increase. We also presented adequate direct quotes from the participants in the results section to make our findings and conclusions more convincing.

RESULTS

In this section, we presented the findings obtained from the interviews with 25 information technology pre-service teachers. We organized the section in the course of emerged conceptual themes and related categories which were also summarized in Table 1.

Reasons for Using Moodle in Classes

All participating pre-service teachers stated that Moodle was an application of great benefit for teaching courses. Reasons why they find it beneficial and the number of references for those reasons were given in Table 1. The most commonly referred reason was "quick and easy access to course resources and instructors regardless of time and place" (64%). Representative comments on this issue include:

Of course, it [Moodle] is beneficial because well, there are our assignments there; the teacher puts our assignments there. For example, I forgot my notebook at home during the festival in the semester break. I logged in Moodle and completed my assignments. In a word, I was at ease...Really comfortable for me. (F, 19)

We can attain knowledge there [on Moodle] without visiting the instructor...when the instructor shared course materials or resources, we can access them whenever we would like to study. Even if we lose them or do not print them out, we will always access them on Moodle again. (F, 27)

I do not find it [Moodle] unnecessary because we are a very crowded class. Therefore, it is useful...When the teacher gives the resources to one person, it might sometimes be a problem to take them from that person. However, we could log in Moodle whenever we want and get the information we are looking for. According to me, it is very beneficial. (F, 20)

I think it is useful especially for making the use of time well...we can do all the works including assignments in the shortest time possible...no need to wait at the teachers' door [to submit projects, homework, etc.]. (M, 21)

Participants viewed Moodle as “helping the consolidation of topics” (28%). The possibility to see the summary of topics covered in a course in the weekly summary section allows for going over the course. Some of the participants’ comments which highlight this view are as follows:

Covering a course with Moodle is a useful thing. Courses are covered with it. If necessary, an assignment, a task given during a course might be followed later, after the course...After this following, the possibility of going over the topics covered in the course is provided. (M, 25)

Covering courses on Moodle is useful because we continuously write reflections there and give out our projects. This is going over the topics in a way. (M, 20)

Another frequent reason for which the participants found Moodle as beneficial was that it offered “better communication opportunities” (24%). They think that Moodle is a virtual environment which provides permanence for interaction between student–teacher and student–student. They stated their points of view related to this issue based on their own experiences of courses they took with the support of Moodle. Some of the participants expressed their points of view on this as follows:

[Moodle is useful] because it is a collectively shared website...For instance, our instructor send messages to us via forum and we all could see this message all together and decide whether we will attend future activities at the same time. (M, 21)

It [Moodle] provides the opportunity to see the information that other students have sent. Namely, it supplies a multi–learning environment. It is crucial from this aspect...we can consult other people’s points of view there. Perpetual communication among friends attending the same course is possible...Instead of considering a topic only from one perspective, students can put themselves in the shoes of others; therefore it [Moodle] offers a broad and diverse learning experience. (M, 25)

We cannot always be at the school. In this case, Moodle is the only platform through which we communicate with each other. (F, 20)

Other reasons participants mentioned included Moodle “is a open–source code”, “provides cumulative review of course content and revision opportunities”, “prevents from paper wastage”, “is up–to–date”, “makes feedback easy”, and “is required in our profession as we are studying in technology education department”.

Table 1. Conceptual themes and concepts obtained from the interview analysis

Conceptual Themes	Frequency (f)	Percentage (%)
<i>Reasons for using Moodle in courses</i>		
It provides quick access to resources and instructors	16	64
It helps students consolidate the topics	7	28
It offers better communication opportunities	6	24
It is an open–source code	4	16
It provides cumulative viewing and revision opportunities	3	12
It prevents paper wastage	3	12
It is up–to–date	2	8
It provides easy feedback opportunities	2	8
It is required in our profession	2	8
It gives time to prepare for the class	2	8
<i>The most influential activity in Moodle</i>		
Assignments	17	68
Resources	9	36
Forums	7	28
Exams	6	24
All have the same effect	4	16
Surveys	2	8
<i>Suitability of Moodle for courses</i>		
It is suitable for information technology courses	13	52
It is suitable for all courses	8	32
It is not suitable for pedagogical courses	8	32
It is suitable for non–math courses	7	28
It is not suitable for math–courses	6	24
It is not suitable for non–math courses	2	8
<i>Usability of Moodle</i>		
It has very simple interface	15	60
It has limited uploading capacity	3	12
Synchronous communication is not sufficient	2	8
Its interface is not that simple	2	8
Security and reliability problems for online exams	2	8
Insufficient typing tools	1	4
Insufficient warning system	1	4
It is supposed to own relevant course site map	1	4
It needs visual enrichment	1	4
<i>Challenges of using Moodle</i>		
I had no difficulty	12	48
I had difficulty in signing up	6	24
I was not familiar with the system	5	20
I had difficulty in sending my assignment	2	8
I could not change my password	1	4

The Most Influential Activity in Moodle

We asked participants to explain which instructional Moodle activities including but not limited to assignments, forums, resources, exams etc. they have found the most influential. As can be seen in Table 1, participants loaded most on the “assignments” activity (68%). Sample of statements in relation to this findings are as follows:

I think the system of assignments is the most influential because we are not going after the teacher, we are sending just there. It is much easier. There are specific due dates and we adjust ourselves accordingly. (M, 21)

I think assignments for us. For example, in the programming class...The teacher was sending assignments continuously and we were responding. He was giving feedback. It was very helpful to us. (F, 20)

We can send our works to assignments module and store them in this space...when we save homework in a USB flash drive, it might be infected by viruses and thus become damaged...we cannot present it in the class. On the other hand, it [Moodle] keeps the assignments securely and shows them whenever teachers and students want. (F, 20)

Participants identified "resources" as the second most influential type of activity after assignments in Moodle (36%). Following are some remarks about why the participants find 'resources' influential:

[Teachers'] indication of resources...I think it is more influential because we all may not have the relevant course books. The teacher already summarizes what we will learn in that lesson, which makes our job a lot easier. (F, 22)

Resources, because I could access the articles and other texts more easily from there...Instead of searching other websites, I could search from there more comfortably and safely. (F, 19)

Resources section is the most effective especially for those of us who occasionally miss the lectures because of a job or important appointment. We know that Moodle can give us the lecture notes as the teachers load them on it. (M, 23)

Some of the participants (28%) found "forums" the most influential activity. The discussions about the lessons on Moodle enable free thinking, expression of thoughts, social interaction with peers as in the brainstorming technique in the classroom environment, so these may influence this decision of participants. Some of the teachers' comments referring to this view are as follows:

Well, you are presenting valuable information through discussing with friends. If you have any mistake, they are correcting it, if they have any, you are correcting...that is why I find forum more influential. (M, 19)

Discussion forum is truly informative. Everyone can express their opinions on the topics, and we could all see them...that is even if we agree or disagree. When we read the comments there, we also gain specific knowledge. (F, 20)

A few participants (16%) indicated all the activities available on Moodle effective. They believe that these activities should be considered "as a whole" for a course because they all can be used for communicating and sharing ideas.

Suitability of Moodle for Courses

We asked participants whether a grouping of courses could be made based on the suitability of Moodle for their courses. Some argued that such a grouping was not possible because they think every lesson may be taught via Moodle (32%). On the other hand, some others made a

grouping. The courses thought to be not suitable for teaching via Moodle included “pedagogical courses” (32%) and “math courses” (25%) whereas the suitable ones were “technology education courses” (52%) and “non–math courses” (28%).

Since we are studying at Computer Education and Instructional Technologies Department, I think we should keep up with technology in courses from almost all fields. When we learn something new, we are constantly trying to establish this union, so for me...it could be used in all courses. (M, 20)

Many math courses are not suitable for Moodle because they require asking questions to teacher and getting instant answers. You know that learning is slightly delayed when answers are not immediate, but non–math courses may be taken comfortably with Moodle. For example, it is not suitable for science because it is a math course which requires direct calculation and asking instant questions. (F, 19)

This semester we are studying physics. I think that has little to do with Moodle...Actually the math lecturer shared some subjects through Moodle in the last semester. We selected topics from there and studied them but that was not so beneficial. It was not necessary indeed. (F, 20)

In terms of the excess of projects and assessments, it is more influential to use Moodle in our major area courses...in a computer course; for example, instructional design or MySQL course...Moodle is more influential in the implementation of Internet–based programming or such. (M, 23)

Usability of Moodle

We asked the participants whether Moodle is easy to use and which aspects of it should be improved. More than half (65%) expressed that the design of Moodle is clear and comprehensible enough. Some of the participants’ statements referring to this view are as follows:

[Moodle’s interface] is clear. It is also simple to use. Well, even a person who has not seen it before could also use it easily. (F, 22)

Well, it is highly appropriate for every level of education...It is a system with simple interface...everything is obvious. (F, 20)

While participants had generally positive attitudes towards the usability of Moodle, some touched upon its limited sides, too. Some leading problems they stated included “it has limited uploading capacity” and “synchronous communication is not sufficient”. Other issues that they think should be improved are also given in Table 1. Representative negative comments about usability of Moodle are as follows:

When we submit homework or projects, we cannot send files that are more than 20 megabyte in capacity. However, our project assignments sometimes might take up more space. (M, 20)

The users should have face–to–face interaction with each other. For instance, when the teacher is online, students are able to ask questions or receive feedback. The message system on Moodle is not like that, though. It is similar to SMS...when one sends a SMS to us we cannot see it unless we look at the phone...same with Moodle. (M, 21)

Technical Challenges of Using Moodle

A little more than half of the participants (52%) reported that they experienced some technical difficulties in using Moodle. When they were asked to elaborate on their challenges, almost one fourth (24%) indicated "sign in problems" and one fifth (20%) indicated "unfamiliarity with the system". In what aspects the participants experienced such problems with the Moodle are exemplified as follows:

One time, I signed up for a course that I do not know and I could not cancel my subscription. I had such a challenge. I wanted to sign out after sign-up because it was not my class. (M, 20)

[During sign-up] I could not get a user name. (M, 21)

We went through difficulties only in the first year and the first week in terms of being acquainted with the system. Later on, as we used the system more, we were acquainted with all forums, resources, messages, etc. As we get accustomed to these, we only had problems of system unfamiliarity. After we had been acquainted with the system, this problem was solved. (M, 23)

DISCUSSIONS and CONCLUSION

All participants believe that the use of Moodle is beneficial for learning and teaching. This finding is consistent with positive attitudes and perceptions about LMS usage obtained in previous studies in the literature (Alario-Hoyos et al., 2015; Karaman et al., 2009; Lonn et al., 2011). Therefore, students should be given the opportunity of taken some courses with the support of Moodle so that they can benefit from this educational technology in order to increase the quality of their education. This also increases their familiarity with various opportunities offered by Moodle and what they can do to enhance their future students' learning. Follow-up research can be conducted to monitor whether they maintain and reflect these positive attitudes in their future teaching careers.

The participants think that the most important advantage of the courses offered through Moodle is trouble-free access to both course resources and instructors. One possible reason for this thought is that learners can compensate the lecture topics and notes when they miss the class sections. Since it is not necessary to be in the classroom in order to access the resources, some students may regard the use of Moodle as an advantage. Similar studies exist in the literature with an emphasis on the fact that Moodle facilitates accessibility to the resources (Black, 2008; Karaman et al., 2009; Krasnova & Vanushin, 2016). Waheed et al. (2016) identified communication, course content and course delivery features of Moodle as intrinsic motivation factors that significantly influenced students' perceived learning effectiveness. Insufficient consideration for accessibility was shown to inhibit student engagement with Moodle (Parsons, 2017).

Some participants find Moodle useful for the fact that it increases the interaction between student-teacher and student-student. Thus, they think that Moodle is a learning environment that supports social interaction or creates instructional collaboration. The fact that Moodle has components supporting synchronous and asynchronous communication such as message system, forums and chat modules might be influential in the perspectives of participants to see these services as the benefit of Moodle. Such components support learners' commitment to the course and process of following the course content. Tosun and Taskesenligil (2011) reached the conclusion that students enjoy contacting with friends via these tools to talk about the problematic situations on the web and participate in online class discussions. If those

educators using Moodle in their courses utilize all of these communication tools and give students assignments in this regard; students might gain awareness of ensuring effective communication in the virtual environments and it might meet the need of social interaction required for their courses. Recent studies identified built-in tools in Moodle as limited for complex collaboration, problem-solving and project-based learning situations, and called for integrating external tools to accomplish these activities (Alario-Hoyos et al., 2015; Paschalis, 2017). Using a variety of integrating architecture available, instructors can embed scripts, social networking, gamification, 3D content, virtual reality, remote labs etc. in order to improve collaboration and active involvement. Future research should focus on the functionality and effectiveness of such integrations.

Whereas participants state that the "exam" module is an effective tool, some also think that it may cause reliability problems in measuring and evaluating student performance. The fact that results of the exams carried out on Moodle could be seen immediately after the exam (instant feedback) is a key element enabling participants to find this module effective (Shi, 2016; Tosun & Taskesenligil, 2011). However, since students' cheating attempts cannot be avoided completely during the exam, an unfair measurement result might occur. This possibility seems to make some participants abstaining from using exam module. To eliminate such cheating potential, the exams can be performed in a hall with a supervisor. The sequence of questions in the exam as well as the sequence of choices in each question can be arranged differently for each student in the exam settings (Kaleci et al., 2011). If the contribution of exam scores on Moodle to the overall course grade is kept lower, students' insecurities in this regard may also be reduced. Furthermore, participants view the "assignments" as the most influential activity on Moodle. Similar findings exist in the literature (Zainuddin, Idrus & Jamal, 2016). The possible reason for this may result from the fact that teachers use this module most especially for project assignments of technology education courses. Further research can explore the validity, reliability, and security of online assessment tools available in the Moodle and investigate both students' and instructors' perceptions about their actual usage.

When we asked participants which courses should be carried out with the support of Moodle, the most preferred those consisting of hands-on activities. Therefore, this result is expected because projects and assessments are carried out mostly in these types of courses. Since practices and project assignments given in technology education courses carried out in computer environment, both resources and projects are digital data. The fact that Moodle has an important place in the delivery of these digital data could be seen as a reason for the statement of views in this direction.

Our study suggests a few technical challenges of using Moodle experienced by the participants. The greatest difficulty appears to take place in the stage of signing-up. Some of the participants stated that they had difficulties in sign-up for the system with the user key given to them by their instructors. Orientation education should be given particularly to novice students in order to prevent from such problems could speed up the adaptation to Moodle process. Furthermore, informing students about the general use of Moodle might hinder their problems of "feeling out of the system" from the very beginning. Technical quality has shown to be a significant determinant of Moodle acceptance and usage from the perspectives of students (Baytiyeh, 2015). Ongoing research is needed to assess the technical usage of Moodle as it continues to develop with new technological additions.

Regarding to the usability of Moodle, participants believe that it has a simple and user-friendly interface design. This finding corroborates previous studies (Essel & Wilson, 2017). For example, Melton (2006) found that Moodle meets such usability rules as having a simple interface, including minimum amount of words, presenting rollovers which provides extra information, and providing small icons together with the words. On the other hand, there are

also some situations which the participants see Moodle as lacking about its usability and would like them to be corrected. The first is about increasing the capacity of file uploading which causes problems for submitting some project assignments. To solve this problem, students can be referred to alternative file uploading sites. Another wish of the participants is the development of the reminder system on Moodle. For instance, as an assignment is a bit of a deadline or when a discussion topic is introduced in the forum, reminder can be sent to students' e-mail addresses. In this way, they can be prevented from missing assignment deadlines and unawareness of the discussions in the forum. One another problem that the participants mentioned is that they cannot send their assignments when they have a short time of five minutes left for the assignments' due. According to Cevik (2008), this problem might be solved via correct local time setting after the configuration of Moodle. If local time is reported to the server correctly, starting and ending dates of the activity might be arranged the same for all users.

On the whole, our study has some practical implications and suggestions for those teacher educators who would like to use Moodle in their courses and researchers who would like to conduct further research on Moodle. At the beginning of a semester, teachers should initially inform students about registering their courses' websites on Moodle and related information should be published on the Internet for a longtime. Students should be taught at least fundamental knowledge and skills related to Moodle in technology education courses. Teachers should use all activities on Moodle as much as possible. Students can interact both their and peers' authentic ideas through various communication tools. Also, the use of various activities can prevent students from perceiving Moodle as just a website to submit assignments. The design and administration of exams and quizzes on Moodle should be done in a way that reduces justice and reliability concerns among students. As far as future research is concerned, gender differences in students' study habits and learning styles with regards to online learning can be informative for interpreting students' thinking about the suitability of Moodle for math, non-math or other courses. The sample of our study consisted of student teachers studying technology education. Hence, future research should focus on different populations to allow for further elaboration and comparison of findings. Since Moodle is an open-source code platform, new features and modules or revisions have been developed and freely offered for usage. Researchers can either design and incorporate such enhancements on their own or follow the existing ones and then explore their potential for teaching and learning.

BIODATA and CONTACT ADDRESSES of AUTHORS



Esra ERGUL SONMEZ was born in Isparta, Turkey in 1987. She received her B.A degree in Computer Education and Instructional Technology from Anadolu University, Turkey and M.A degree in Educational Technology from Suleyman Demirel University, Turkey. She is currently working as a Research Assistant at the Suleyman Demirel University. She is pursuing a Ph.D degree in Computer Education and Instructional Technology in Gazi University, Turkey. Her current academic interests include distance education in teacher education, learning management systems, technology integration into schools.

Res. Assist. Esra ERGUL SONMEZ
Faculty of Education
Suleyman Demirel University, 32260, Isparta, Turkey
Phone: +90 246 2114582
E-mail: esraergul@sdu.edu.tr



Mustafa KOC was born in Konya, Turkey in 1977. He received his B.A degree in Mathematics Education from Selçuk University, Turkey. He received his M.Ed and Ph.D degrees in Educational Technology from the University of Missouri-Columbia, USA and University of Illinois at Urbana-Champaign, USA respectively. He is working as an Associate Professor at Faculty of Education, Suleyman Demirel University, Isparta, Turkey. His current research interest include new media literacy, learning analytics, technology integration into schools, technology use in teacher education, and social and psychological aspects of technology use.

Assoc. Prof. Dr. Mustafa KOC
Faculty of Education
Suleyman Demirel University, 32260, Isparta, Turkey
Phone: +90 246 2113865
E-mail: mustafakoc@sdu.edu.tr

REFERENCES

- Alario–Hoyos, C., Gomez–Sanchez, E., Bote–Lorenzo, M. L., Asensio–Perez, J. I., Vega–Gorgojo, G., & Ruiz–Calleja, A. (2015). From face–to–face to distance LMS–mediated collaborative learning situations with GLUE!. *Computer Applications in Engineering Education*, 23(4), 527–536.
- Baytiyeh, H. (2015). Users' acceptance and use of Moodle: The community influence. In I. Management Association (Ed.), *Open source technology: Concepts, methodologies, tools, and applications* (pp. 596-612). Hershey, PA: IGI Global.
- Black, E. L. (2008). Toolkit approach to integrating library resources into the learning management system. *The Journal of Academic Librarianship*, 34(6), 496–501.
- Carvalho, A., Areal, N., & Silva, J. (2010). Students' perceptions of Blackboard and Moodle in a Portuguese university. *British Journal of Educational Technology*, 42(5), 824–841.
- Cevik, A. (2008). Moodle öğrenme yönetim sistemi yönetimindeki karsilasilabilecek olasi sorunlar ve cozum onerileri [Potential problems confronted while using Moodle learning management system and suggested solutions]. In *Proceedings of the 8th International Educational Technology Conference* (pp. 31–34). Eskisehir, Turkey.
- Chavan, A., & Pavri, S. (2004). Open source learning management in Moodle. *Linux Journal*, 1(2), 78–97.
- Cuellar, M. P., Delgado, M., & Pegalajar, M. J. (2011). A common framework for information sharing in e–learning management systems. *Expert Systems with Applications*, 38, 2260–2270.
- Dougiamas, M. (2004). Moodle: Virtual learning environment for the rest of us. *The Electronic Journal for English as a Second Language*, 8(2), 1–8.
- Escobar–Rodriguez, T., & Monge–Lozano, P. (2012). The acceptance of Moodle technology by business administration students. *Computers & Education*, 58, 1085–1093.
- Essel, D. D., & Wilson, O. A. (2017). Factors affecting university students' use of Moodle: An empirical study based on TAM. *International Journal of Information and Communication Technology Education*, 13(1), 14–26.

- Graf, S. (2007). *Adaptivity in learning management systems focusing on learning styles*. Unpublished doctoral dissertation, Vienna University of Technology, Austria.
- Inan, F. A., & Lowther, D. L. (2010). Factors affecting technology integration in K–12 classrooms: A path model. *Educational Technology Research and Development*, *58*(2), 137–154.
- Itmazi, J. (2005). *Flexible learning management system to support learning in the traditional and open universities*. Unpublished doctoral dissertation, Granada University, Spain.
- Kaleci, D., Akinci, S., Basbogaoglu, U., & Kapidere, M. (2011). *Acik kaynak kodlu ogrenme yonetim sistemi olan Moodle'da sinav yonetimi* [Exam management in Moodle as open–source code learning management system]. Paper presented at the meeting of Akademik Bilisim'11 Conference, Inonu University, Malatya, Turkey.
- Karaman, S., Ozen, U., Yildirim, S., Kaban, A. (2009). *Acik kaynak kodlu ogretim yonetim sistemi uzerinden Internet destekli (Harmanlanmis) ogrenim deneyimi* [An Internet–supported learning experience through open–source code learning management system]. Paper presented at the meeting of Akademik Bilisim'09 Conference, Harran University, Sanliurfa, Turkey.
- Koc, M. (2013). Student teachers' conceptions of technology: A metaphor analysis. *Computers & Education*, *68*, 1–8.
- Krasnova, T. I., & Vanushin, I. S. (2016). Blended learning perception among undergraduate engineering students. *International Journal of Emerging Technologies in Learning*, *11*(1), 54–56.
- Lakhan, S., & Jhunjhunwala, K. (2008). Open source software in education. *Educase Quarterly*, *2*, 32–40.
- Lonn, S., & Teasley, S. D. (2009). Saving time or innovating practice: Investigating perceptions and uses of learning management systems. *Computers & Education*, *53*, 686–694.
- Lonn, S., Teasley, S. D., & Krumm, A. E. (2011). Who needs to do what where? Using learning management systems on residential vs. commuter campuses. *Computers & Education*, *56*, 642–649.
- Mahmud, R., Ismail, M. A. H. (2010). Impact of training and experience in using ICT on in–service teachers' basic ICT literacy. *Malaysian Journal of Educational Technology*, *10*(2), 5–10.
- McGill, T. J., & Klobas, J. E. (2009). A task–technology fit view of learning management system impact. *Computers & Education*, *52*, 496–508.
- Melton, J. (2006). The LMS Moodle: A usability evaluation. *Language Issues*, *11/12*(1) 1–24.
- Mertens, D. M. (1998). *Research methods in education and psychology*. Thousand Oaks, CA: Sage Publications.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publication.
- Parsons, A. (2017). Accessibility and use of VLEs by students in further education. *Research in Post–Compulsory Education*, *22*(2), 271–288.
- Paschalis, G. (2017). A compound LAMS–MOODLE environment to support collaborative project–based learning: A case study with the group investigation method. *Turkish Online Journal of Distance Education*, *18*(2), 134–150.

- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd Ed.). Thousand Oaks, CA: Sage Publications.
- Reis, A. Z., Baktir, H. O., Celik, B., Erkok, M. F., Ozcakil, F. C., Ozdemir, S., et al. (2012). Acik kaynak kodlu ogrenme yonetim sistemleri uzerine bir karsilastirma çalismasi [A comparison study on open source learning management systems]. *Egitim ve Ogretim Arastirmalari Dergisi*, 1(2), 42–58.
- Rice, W. H. (2006). *Moodle e-learning course development. A complete guide to successful learning using Moodle*. Birmingham, UK: Packt Publishing.
- Sharma, S. K., Gaur, A., Saddikuti, V., & Rastogi, A. (2017). Structural equation model (SEM)–neural network (NN) model for predicting quality determinants of e-learning management systems. *Behaviour and Informational Technology*, 1–14.
- Shi, X. (2016). A comparative study of e-learning platform in reading and translating course for engineering students. *International Journal of Emerging Technologies in Learning*, 11(4), 120–125.
- Simsek, N. (2002). BIG16 ogrenme bicemleri envanteri [BIG16 learning styles inventory]. *Educational Sciences & Practice*, 1(1), 33–47.
- Stojanov, Z., & Dobrilovic, D. (2016). Qualitative evaluation of software maintenance services integrated in a virtual learning environment. *International Journal of Engineering Education*, 32(2A), 790–803.
- Thompson, N., & McGill, T. J. (2014). The application of affective computing technology to e-learning. In M. Thomas (Ed.), *Pedagogical considerations and opportunities for teaching and learning on the Web* (pp. 109–128). IGI Global.
- Tosun, C., & Taskesenligil, Y. (2011). Probleme dayali ogrenme yonteminde Moodle ogrenme yonetim sisteminin kullanimi [Moodle learning management system use in problem-based learning method]. *International Online Journal of Educational Sciences*, 3(3), 1021–1045.
- Trayek, F. A. A., & Hassan, S. S. S. (2013). Attitude towards the use of learning management system among university students: A case study. *Turkish Online Journal of Distance Education*, 14(3), 91–103.
- Waheed, M., Kaur, K., Ain, N., & Hussain, N. (2016). Perceived learning outcomes from Moodle: An empirical study of intrinsic and extrinsic motivating factors. *Information Development* 32(4), 1001–1013.
- Weigel, V. B. (2002). *Deep learning for a digital age: Technology's untapped potential to enrich higher education*. San Francisco, CA: Jossey-Bass Publishing.
- Yapici, U. I., & Akbayin, H. (2012). Harmanlanmis ogrenme ortaminda Moodle kullanimi [Moodle use in a blended learning environment]. *Journal of Research in Education and Teaching*, 1(2), 92–100.
- Yildirim, A., & Simsek, H. (2011). *Sosyal bilimlerde nitel arastirma yontemleri* [Qualitative research methods in social sciences]. Ankara: Seckin Yayınevi.
- Zainuddin, N., Idrus, R. M., & Jamal, A. F. M. (2016). Moodle as an ODL teaching tool: A perspective of students and academics. *The Electronic Journal of e-Learning*, 14(4), 282–290.