MOODLE-BASED ELECTRONIC LEARNING AND TEACHING SUPPORT PACKS APPLICABLE IN BLENDED LEARNING

E. Lavrushina[1], R. Bazhenov[2], D. Luchanonov[2], I. Shtepa[2], N. Chalkina[3], N. Vashakidze[4]

[1]*Vladivostok State University of Economics and Service (RUSSIAN FEDERATION)*
[2]*Sholom-Aleichem Priamursky State University (RUSSIAN FEDERATION)*
[3]*Amur State University (RUSSIAN FEDERATION)*
[4]*Sakhalin State University (RUSSIAN FEDERATION)*

Abstract

The aim of the survey is to develop a technology for using Moodle based electronic learning and teaching support packs (ELTSP) in blended learning. Testing, analytical and investigational studies of the findings of development, usage and actualizing ELTSP based on Moodle for humanitarian and economic fields of education were carried out when teaching students according to the national academic standards required. The time of holding the course with the electronic learning and teaching support pack given in the paper is 7 years (from 2013 to 2019) and covers the development since the first version has developed till the last actualization being held at present. The authors present the outcomes of a survey of teachers and students. 1188 people took part in the annual questionnaire of students after conducting a course using an electronic learning and teaching support pack to find out their learning satisfaction. The issues on the development and actualization of the course were dealt with considering from the perspective of students (surveys were held in 2013, 2016 and 2018, in which 102, 187 and 172 people took part, respectively). The total number of lecturers who took part in some way or another in working with the electronic learning and teaching support pack has amounted to 26 people over the years. The authors use a complex of conceptual and practical methods in the survey. They are the following: system approach, decomposition/partitioning and synthesis, survey, questionnaires and interviewing, data processing using statistical and mathematical techniques, analysis and synthesis of empirical data, theoretical studies review, obtained findings, summarizing the obtained educational experience, pedagogical experiment. In this paper, the authors give their reasoning of the content of electronic learning and teaching support packs for using in teaching students to different fields of study. The scholars observe the process of transitioning from ELTSP used as a subordinate component of learning to the arrangement of blended learning assisted by ELTSP.

Keywords: Electronic Learning and Teaching Support Pack, Moodle, blended learning.

1 INTRODUCTION

The world development trends of a contemporary society are the development of human-centered information technologies (promoting a smart society), the common transition to blended learning, the use of open educational resources, the courses development and performing at interuniversity e-learning sites.

The applicability of various information technologies in education system reflects social needs in improving educational forms, performing up-to-date teaching methods based on student independence, and providing various learning services.

The commitment to the international level involves a number of reformations, which are evidenced in restructuring the Russian education system. Almost every university in the country has already got one or another experience in blended learning applied.

The basis of e-learning, including it as an element of blended learning at a contemporary university, is the use of Learning Management Systems (LMS), which are a software and hardware system based on Internet technologies, teaching methods and organizational measures. The basis of an e-learning system is LMS Moodle [1] in most top higher education institutions.

In this regard, it seems very well-timed to propose the authors' experience in using this environment in blended learning based on their own electronic teaching materials for consideration.

1.1 Research Review

Blended learning has great potential for solving the problems of integrating educational and digital technologies. It allows one to make changes to the standard academic structure of the learning process, expands access to educational resources through their own development of electronic curricular courses and educational resources in the Internet [2], [3], [4].

The issues dealt with using electronic curricular courses in education based on various LMS, in particular, Moodle [5] are still relevant and concern not only the use of environment [6], filling it with various tasks and theory, but also students' perception of such courses [7], [8], [9]. The aspects connected to the training arrangement [10], the involvement of teachers in the development and application of electronic curricular courses [11], [12], readiness of teachers and students to share various LMS capabilities and the electronic academic courses [13] are also of much interest.

The studies [14], [15], [16] are devoted to studying satisfaction and individual needs of students using blended learning technology, increasing their motivational involvement in the system.

The tendency of developing electronic curricular courses based on artificial intelligence is a most interesting and urgent. This makes it possible to personalize the educational program by correcting the learning path based on student cause-consequence and motivating factor identification [17].

According to the authors' point of view, the main tendency of the research in this field can be considered an issue referred to teaching with e-learning environment effectiveness. It combines a variety of researchers' approaches [18]. It is inclusive both by using teaching methodologies and the ways of using information capabilities [19], [20].

Despite a fairly large number of studies on introduction of electronic curricular courses in the learning process, many issues require their further development, including those based on the results analysis that have already been obtained by certain researchers.

1.2 Purpose of study

This paper is devoted to the best practice of the authors' use of Moodle electronic teaching materials and making recommendations for their follow-on development when used in blended learning.

2 METHODOLOGY

When studying various aspects of utilization efficiency of current electronic courses and platforms in education, it is quite common practice to hold various surveys and questionnaires [11], [13], [21].

In the present survey, a questionnaire was developed that included 10 questions in order to study utilization efficiency of the developed course in Moodle environment for IT course. Between 3 and 6 markers corresponded to each question. The main criteria are information exhaustiveness, accessibility, user-friendly teaching materials across LMS Moodle electronic learning environment. When designing, several characteristics were taken into account. They are student independent work, teaching methods and tools that were used by a teacher, achievements during the competence development. This paper provides some (4 questions) of the research materials based on questionnaires.

Students were questioned annually through online testing after completing the course using electronic teaching materials. The article presents the average values of students' answers to questions distributed in annual segments (from one year to the next). In total, throughout the whole monitoring period, 1188 student surveys were processed.

In addition, every year (at the end of the course) a snap survey was conducted on general perception of the used electronic teaching materials among students and teachers. To assess perception, a three-level scale was used (positive, neutral, negative attitude).

When developing and actualizing electronic teaching materials, a group of authors was primarily guided by reasonable introduction of one form or another of using information technologies into the learning process. The gradual course transformation made it possible to adapt to a new approach in training the teaching staff, evaluate the benefits of Moodle environment, and enlarge the range of types of assignments and presentation of course materials constantly.

Providing sharing this approach can be monitored in the article [5].

The questions that preceded the development of an electronic academic course were asked to students both by means of a questionnaire and immediate interviewing and concerned primarily the readiness of students to blended learning and the necessary content minimum of this course. All in all, 102 students were surveyed in 2013.

To assess the impact of the blended learning on the learning outcomes based on the developed teaching materials, in the first year of studying the course (2013), the learning outcomes of two shifts/classes were compared. One of them used the educational milieu but the second did not.

What is more, a survey of students was carried out (123 people participated in it) on perception and user convenience of managing IT course powered by the Moodle platform.

Furthermore, the issues on the course restyling/innovation were decided taking into account the students' interests (surveys in 2016 and 2018 in which 187 and 172 people took part, respectively).

A five-point scale estimation technique suggested such markers of an electronic curricular course as correspondence to the subject content; correspondence of lecture content to their topic; correspondence of lectures to tutorials; learning and teaching support material; quality and sufficiency of additional course materials; test and learning activities completeness and quality; feedback quality with a teacher; laboratory supply. The amounts of theoretical and practical training on the subject, general perception of the operational comfort with the course; work availability with the course from various electronic devices were also estimated on a scale of comparison.

When interviewing students on restyling/ enhancements of electronic teaching materials, they were asked questions both multiple choice and open questions and students could make their doubts, suggestions and wishes known.

Similar studies were carried out by other teams of authors [8], [14], [22]. They admit a common approach to the assessment of educational technologies.

3   RESULTS AND DISCUSSION

Before introducing the elements of e-learning based on Moodle in IT subject in 2013, students were interviewed. It revealed 87% of respondents' will to use network information technologies in training. The main advantages of blended learning with an electronic curricular course were noted the opportunity to take tests anywhere and anytime - 52%; the opportunity to do assignments outside the classroom - 68%; a more complete presentation of reading materials - 39%; a good impression of conceptual and practical questions of the subject is 47%.

These facts were taken into account during the development and the produced author's course provided these opportunities.

A comparison of control groups from two lecture classes showed that the use of blended learning with an electronic curricular course affects both the overall performance of groups and the increase the number of grade awarded on the subject, and, consequently, the grades received by students. So, at average, the academic performance of the class without using blended learning was 72% compared to 82% with its use. The percentage of those well-performing students who made progress and got 'good' and 'excellent' marks was 28% and 42%, respectively.

Students also made a point of the following positive changes when managed with an electronic academic course. 18% of respondents stated that it contributed to resolve concerns because of the failure of mastering the lecture material in case of absence from classes. 25% emphasized the convenient access to the subject materials as well as 36% of students commented on the possibility to perform laboratory work at a time which suits them. However, some respondents introduced the following wishes. They would like the number of class hours for lectures to decrease, claiming it by the fact that they are now publicly available - 16%; make the group performance journal publicly available to review and reflect on their achievements - 9%.

During the development of the electronic course on IT, it varied according to the expansion of its InfoBase, the ability to evaluate students, the methodology of operating with the environment in the learning process. To study the perception of the course actualization, students twice assessed its performance. The results of student surveys in 2016 and 2018 are shown in Tables 1 and 2.

Table 1. Average values of markers of an electronic academic course evaluated on a five-point scale.

Estimated markers of the electronic academic course	Average values of markers of the electronic academic course arranged by the years	
	2016	2018
Correspondence to the subject content	4.67	4.72
Correspondence of lectures to their topics	4.79	4.82
Correspondence of lectures to practice	3.53	3.64
Methodological support	4.27	4.35
Quality and sufficiency of supporting materials on the course	4.28	4.57
Completeness and quality of practical activities	4.38	4.42
Completeness and quality of tests	3.42	4.33
Quality feedback with a teacher	3.22	3.36
Laboratory supply	4.23	4.15

According to the table, students assess quite positively the electronic academic course in general. Although, there are points for further improvement. So the most problematic areas requiring close attention are the adjustment of test assignments and questions, providing better feedback with students both due to the capabilities of LMS environment and the organization of the learning process, (correcting the time standards, changing approaches to schedule of hours, etc.), the expansion of reading material by including qualitative terminology in the practical application of certain information in their vocational activities.

The improvement of these values is caused the great methodological, educational and organizational teachers' work of the department whose results affect other values of the electronic course assessment indirectly, for example, shown in Table 2.

Table 2. Percentage sharing according to the selected scale of estimated factors of the electronic academic course.

Estimated factors of the electronic academic course	Grading scale	Years of student survey and percentage of performance evaluation	
		2016	2018
The amount of theoretical training on the course	Too big	21%	19%
	Sufficient	34%	46%
	Medium	26%	18%
	Insufficient	13%	12%
	Too small	6%	5%
The amount of practical training on the course	Too big	22%	18%
	Sufficient	45%	52%
	Medium	20%	17%
	Insufficient	12%	9%
	Too small	1%	4%
General perception of course operational	Too big	11%	13%
	Sufficient	43%	47%

comfort	Medium	25%	21%
	Insufficient	16%	12%
	Too small	5%	7%
Work availability in the course from various electronic devices	Too big	2%	3%
	Sufficient	15%	17%
	Medium	57%	62%
	Insufficient	20%	13%
	Too small	6%	5%

If you compare the record of the data from year to year, it becomes clear that actualization of the electronic teaching materials in IT was carried out quite successfully for all the markers considered.

Let the authors consider the formation of an electronic discipline course in Moodle environment in more detail.

Step-by-step development of the electronic study pack in IT is shown in Table 3.

Table 3. Development of electronic study pack stages.

Stage/Phase	Time range (years)	Highlights in the development of the electronic course
Initiation and development	2013-2014	Contents: a short course of lectures; lecture presentations; one option for laboratory work; glossary; final testing based on the university internal electronic system
		Training: conducted for 1 out of 5 lecture classes/shifts, for the other ones it is used as supporting material for learning
		Students' perception of the course as a whole: positive - 73%; neutral - 22%, negative - 5%; by teachers: positive - 58%; neutral - 26%, negative - 16%
Filling and Variability	2015-2016	Content: added supporting materials on the theory; expanded glossary; two options for laboratory tasks for practice are proposed; tests and self-check questions on the topics of classes in Moodle environment;
		Training: conducted at all lecture classes
		Perception of the course as a whole by students: positive - 64%; neutral - 26%, negative - 10%; by teachers: positive - 64%; neutral - 28%, negative - 8%
Capability enhancement	2017-2018	Content: added public forum; materials for independent work on topics of the subject; self-check tests on lectures and practical activities;
		Training: conducted at all lecture classes
		Perception of the course as a whole by students: positive - 68%; neutral - 28%, negative - 4%; by teachers: positive - 72%; neutral - 24%, negative - 4%
Course Expansion and its improvement	2019	Content: in order to provide the aims of meeting current educational standards and higher education programs, a division of the course into two modules was proposed (Module 1 and Module 2).
		Module 1 has not changed much in general, supporting practical assignments for independent and group performance by students have been added, which are not required for the subject, but allow students to expand their skills and abilities.

		Training: conducted at all lecture classes
		Perception of the course as a whole by students: positive - 74%; neutral - 22%, negative - 4%; by teachers: positive - 58%; neutral - 32%, negative - 10%
Developing and testing a new course module	2020	Content: A short lecture course has been developed for Module 2; lecture presentations; one option for laboratory work; glossary; public forum; questions and self-check tests; supporting practical activities for independent and group work of students.
		Training: it is planned to conduct classes at all lecture classes
		Perception of the course as a whole by teachers: positive –68%; neutral - 26%, negative - 6%. The second module in IT subject based on electronic teaching materials is planned for the spring semester of the 2019-2020 academic year

When reviewing the data in the table, it can be noticed that the perception from learning based on the electronic course for students was nearly always positive, whereas the teaching staff has controversial opinions about the use of the course. Reviewing the stages of the course development, it becomes obvious that teachers are afraid of changes connected with both methodological and organizational innovations. It was also found out from additional interviewing, the more got away the teacher is from developing the course and blended learning methodology, the harder for him reformation in the electronic course is.

The proposed version of reforming the electronic teaching materials in IT during the transition to the new standard of the Federal State Educational Standard (FSES++) takes into account students' mastering of general competencies in various fields of study. It involves its division into two components *Computer science Module 1 (Fundamentals of Information Technologies)* (Module 1) and *Computer Science Module 2 (Information and Communication Technologies)* (Module 2).

Meaningfully, Module 1 covers all the requirements for providing the development of information competencies of students in various fields of study. However, the general competence for the development of information and communication skills is not fully observed in it.

Module 2 contains a discussion of topics such as:

- Introduction to information and communication technologies. The history of the development and evolution of information technology. Technical facilities of IT-based management. The notions of information and information and communication technologies.

- World information resources. National and foreign information resources.

- Retrieval methods, information accumulation and storing.

- Search systems. National and foreign search systems.

- Methods of storing information. Database. Data stores. Database Management Systems.

- Methods of processing information (data).

- Methods of data visualization. Diagrams. Charts. Infographics.

- Information security methods.

- Cloud services and computing.

Such contents of the module helps students to manage with the present-day realities of working with information technologies completely, involved to a varying degree in nearly all fields of professional engagement.

The application efficiency of the course developed in Moodle environment on *Computer Science* was studied based on the annual questionnaire. Brief results of the study are given in Tables 4 - 6.

The most effective training can be only if a student is interested personally. Assessment of student's interest is introduced in the averaged data and is shown in Table 4.

Table 4. Data on attracted interest in the course.

Rank on a scale from one to five how much interesting this course was for you	Questioning time range					
	2013-2014 academic year	2014-2015 academic year	2015-2016 academic year	2016-2017 academic year	2017-2018 academic year	2019-2020 academic year
Interest caused by this course to the subject studied	4.82	4.56	4.32	4.33	4.28	4.24
Satisfaction with knowledge and skills	4.73	4.43	4.37	4.22	3.82	4.32
Wish to study other cognate courses	3.70	3.35	4.37	4.07	4.39	4.70
Use of additional resources while studying the course	3.24	3.32	3.16	3.67	3.84	4.25
Discussion of the course outside the preparation and completion of learning activities	4.58	4.47	3.36	3.28	3.25	4.37
The importance of discipline for your future career/job	3.80	3.35	4.07	4.21	3.97	4.63

Doing data analysis of the table, it can be noted that for nearly all the assessment selected criteria, there are either minor variations or their little growth. Moreover, the ranges are easily correlated with the stages of the electronic course development.

The use of blended learning leads to higher education requirements for classroom activities, since these are classes that accumulate direct communication, the development of communication skills of various environments and mastering skills of self-interpretation of the entire amount of knowledge and skills of a student on the discipline studied. Table 5 shows the average values from year to year of processed questionnaire details on the issue related to assessing the quality of organization and conducting Computer Science classroom activities.

Table 5. The quality assessment of organizing and having classroom lessons on the course.

Rank on a scale from one to five the quality of the organization and conduct of classroom lessons on the course	Questioning time range					
	2013-2014 academic year	2014-2015 academic year	2015-2016 academic year	2016-2017 academic year	2017-2018 academic year	2019-2020 academic year
Availability of Content presentation	3.62	3.27	4.31	4.73	4.56	4.48
Using information technology in training	4.78	4.82	4.56	4.63	4.38	4.43
Using innovative and / or interactive forms and methods of having classes (panel discussion, panel session, etc.)	3.32	3.38	4.07	4.42	4.56	4.37
Originality of the presented material	4.32	4.07	4.22	4.63	4.21	4.82

Use of current sources of information, data	4.81	4.54	4.42	4.53	4.28	4.47
Knowledge and practical skills makeup work	4.82	4.37	4.34	4.62	4.73	4.46

Observing the changes in the values of each selected markers from one year to the next, it should be noted that students are no longer impressed by using various information technologies as they are. The tendency to receive new, latest knowledge at classes is steady. Classes with discussions and panel sessions used are becoming more important, as well as and the available way of presenting materials in laboratory and lecture classes and a practical focus of such classes.

It was found out from the processing of personal data that throughout the observations the average amount of time spent studying the electronic course was from 1 to 3 hours per week. From 72% to 83% of respondents gave such an answer in different years. The smallest category of respondents (from 3% to 5%) spent up to 5 hours of time during training based on the course. Less than an hour from 7% to 15% of students spent on mastering the subject, and from 7% to 12% of students engaged in mastering the subject based on the electronic course from 3 to 5 hours a week.

As it was mentioned before, the use of various electronic courses and information resources in training is not a problem for a student nowadays. Blended learning also masters skills of self-educational activity. Table 6 presents the results of processing questionnaire details on the issue related to the assessment of learning difficulties based on the electronic course

Table 6. Estimation of difficulties people have with particular aspects of learning based on the electronic course.

Rank on a scale from one to five the difficulties that you experienced during the learning this course	Questioning time range					
	2013-2014 academic year	2014-2015 academic year	2015-2016 academic year	2016-2017 academic year	2017-2018 academic year	2019-2020 academic year
Short of theoretical material for passing tests	2.34	2.12	2.43	2.16	2.15	2.26
Short of theoretical material for laboratory works and creative tasks	2.34	2.17	2.42	2.18	2.07	1.89
Technical challenges when operating an electronic environment	2.53	2.4	2.17	2.54	2.16	2.71
Difficulties in understanding the requirements for completing assignments	2.72	2.13	2.15	2.07	2.33	2.13
Short of live/real-life communication with a teacher	3.41	3.02	2.86	2.34	2.18	2.21
Short of live/ real-life communication with other students studying the course	1.89	2.31	1.84	2.52	1.99	2.07

When studying possible difficulties during the training period according to the collected material, it should be noted that there are no ratings exceeding 3.5 points nearly by no criterion at the time range presented and those that prove possible problems for any students' major. By all criteria, one can observe a consistent pattern associated more with the personal perception of a small number of respondents than with significant shortcomings of the developed electronic teaching materials. Actually, further development of blended learning based on this course should lead to a decrease in these values but this work is not a high priority for the authors so far.

In the future, the authors are going to apply metrology developed according to proposals [7] and [18] to the data collected while questioning in order to obtain an effectiveness model of technology use and factor analysis that can improve the results of using Moodle in training.

4 CONCLUSIONS

The obtained research results argue for the prospects of using blended learning technologies based on electronic courses of subjects. The developed electronic teaching materials of subjects should be constantly improved in order to meet the growing needs of both students and teachers most.

When organizing the learning process, one should remember to provide its efficiency, as well as a proper quality of training. All of these things are impossible without providing feedback with students, obtaining information about those points that ought to be corrected, improving the available information resource such as an electronic learning and teaching support kit.

REFERENCES

[1]   V.J.Shurygin, and F.M. Sabirova, "Realizacija smeshannogo obuchenija fizike sredstvami LMS Moodle [Performing blended physics learning with LMS Moodle]," *ANI: pedagogika i psikhologiya,* vol. 5,no. 4, pp. 289–296, 2016.

[2]   N.P.Goncharuk, and E.I. Khromova, "Integratsiya pedagogicheskikh i informatsionnykh tekhnologiy v obrazovatel'nom protsesse [ntegration of educational and information technologies in the learning process]," *Kazanskiy pedagogicheskiy zhurnal*, no. 4, pp. 32-37, 2018.

[3]   D. Badarch, *Informatsionnye i kommunikatsionnye tekhnologii v obrazovanii [Information and communication technologies in education]*. Moscow: IITO UNESCO, 2013.

[4]   L.K. Raitskaya, *Didakticheskie i psikhologicheskie osnovy primeneniya tekhnologiy Veb 2.0. v vysshem professional'nom obrazovanii [Didactic and psychological bases of Web 2.0 technologies application in higher education]*. Moscow: MGOU, 2011.

[5]   F. Paragina, S. Paragina, A. Jipa, T., Savu, and A. Dumitrescu, "The benefits of using MOODLE in teacher training in Romania," *Procedia-Social and Behavioral Sciences*, vol. 15, pp. 1135-1139, 2011.

[6]   L. Çelik, "Evaluation of the views of pre-service teachers taught with Moodle during the course named 'Instructional technology and material design' on the use of teaching materials," *Procedia-Social and Behavioral Sciences*, vol. 9, pp.1793-1797, 2010.

[7]   P. Ifinedo, J. Pyke, and A. Anwar, "Business undergraduates' perceived use outcomes of Moodle in a blended learning environment: The roles of usability factors and external support," *Telematics and Informatics*, vol. 35, no. 1, pp. 93-102, 2018.

[8]   C. Costa, H. Alvelos, and L. Teixeira, "The use of Moodle e-learning platform: a study in a Portuguese University*," Procedia Technology*, vol. 5, pp. 334-343, 2012.

[9]   M.A.R. Lopez, "Student's perception about quality of a blended learning environment with MOODLE assistance," *Pixel-bit-revista de medios y educacion*, no. 53, pp. 193-205, 2018.

[10]   D.G.H. Divayana, "The Implementation of Blended Learning with Kelase Platform in the Learning of Assessment and Evaluation Course," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 14, no. 17, pp. 114-132, 2019.

[11]   S. Caliskan, and H. Bicen, "Determining the perceptions of teacher candidates on the effectiveness of MOODLE used in flipped education," *Procedia Computer Science*, vol. 102, pp. 654-658, 2016.

[12]   S.A. Voloshynov, "Implementation of blended learning in professional training of future marine specialists," *Information Technologies and Learning Tools*, vol. 70, no. 2, pp. 104-120, 2019.

[13]   Y. Afacan, "Exploring the effectiveness of blended learning in interior design education," *Innovations in Education and Teaching International*, vol. 53, no. 5, pp. 508-518, 2016.

[14] N. Popovic, T. Popovic, I.R. Dragovic, and O. Cmiljanic, "A Moodle-based blended learning solution for physiology education in Montenegro: a case study," *Advances in physiology education*, vol. 42, no. 1, pp. 111-117, 2017.

[15] R. Francis, and S.J. Shannon, "Engaging with blended learning to improve students' learning outcomes," *European Journal of Engineering Education*, vol. 38, no. 4, pp. 359-369, 2013.

[16] N.M. Sabah, "Motivation factors and barriers to the continuous use of blended learning approach using Moodle: students' perceptions and individual differences*," Behaviour & Information Technology*, pp. 1-24, 2019.

[17] V. Caputi, and A. Garrido, "Student-oriented planning of e-learning contents for Moodle," *Journal of Network and Computer Applications*, vol. 53, pp. 115-127, 2015.

[18] T. Escobar-Rodriguez, and P. Monge-Lozano, "The acceptance of Moodle technology by business administration students," *Computers & Education*, vol.58, no. 4, pp. 1085-1093, 2012.

[19] F. Lazarinis, C.V. Karachristos, E. C. Stavropoulos, and V. S. Verykios, "A blended learning course for playfully teaching programming concepts to school teachers," *Education and Information Technologies*, vol. 24, no. 2, pp. 1237-1249, 2019.

[20] I. Novo-Corti, L. Varela-Candamio, and M. Ramil-DíAz, "E-learning and face to face mixed methodology: Evaluating effectiveness of e-learning and perceived satisfaction for a microeconomic course using the Moodle platform," *Computers in Human Behavior*, vol. 29, no. 2, pp. 410-415, 2013.

[21] G.C. Oproiu, "A study about using e-learning platform (Moodle) in university teaching process," *Procedia-Social and Behavioral Sciences*, vol. 180, pp. 426-432, 2015.

[22] A. Filippidi, N. Tselios, and V. Komis, "Impact of Moodle usage practices on students' performance in the context of a blended learning environment," *Proceedings of Social Applications for Life Long Learning*, pp. 2-7, 2010.