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TRANSFERRING STUDY PROCESS INTO VIRTUAL ENVIRONMENT: WHY IS IT NEEDED?

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Abstract. *The paper presents a comparative analysis of the opinion regarding the advantages and disadvantages of virtual environment Moodle among lecturers and students in 2015 and in 2018 and correlations with increased use of Virtual Learning Environment (VLE) to improved study outcomes. The study has revealed that virtual learning environments are beneficial for the study process as they create new learning opportunities, increase access to learning material and allow time and space flexibility. The purpose of this study is to examine the use of Moodle in a college type higher education institution in 2018 and compare the results of the survey to those obtained in a similar survey in 2015 in the same college, as well as relating the change in the use of Moodle to the change in the study outcomes. The interviewees were the lecturers and students who answered questions related to the use of Moodle. The implemented learning environment includes 14 feature creation functions and 7 resources. The evaluation results indicate that Moodle is commonly used to deliver course content, develop a course plan, evaluate, create activities, and communicate with course participants. Among many functions offered by Moodle only some of them are considered to be very important and commonly used, such as tasks, reviews, tests and workshops.*
Keywords: *e – Learning, Learning Analytics, Moodle, Virtual Learning Environment.*

Introduction

E-learning and teaching is gaining momentum in the academy, which inevitably leads to the use of all kinds of information, computer, telecommunication technologies and electronic multimedia for educational purposes. An increasing number of educational institutions use virtual environments to create the best possible conditions for students.

The intensifying trend to use virtual learning environments in the study process is due to the fact that neither lecturers nor students are limited to being in one place, in other words, it is a more convenient way to study regardless of time and place. In addition, virtual learning environments are not hardware-dependent. The only requirement is to have an Internet connection, and the operating system used is completely irrelevant. Virtual learning environments

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are installed in many universities and schools. Among many VLE one of the most popular is the *Moodle* environment.

Majority Lithuanian universities and colleges have opted for partially distance teaching methods due to the growing demands of contemporary students, a large number of whom cannot attend classes on daily basis, as they live and work abroad, study at several institutions at the same time, have a job and do not want to drop out of the working community, etc.

Although various virtual learning environments, especially Moodle, have been analyzed extensively, the scholars mainly focused on the use of various VLE functions at a given time, and not a lot of studies looked into the change of VLE use over the period of time at the same institution.

The purpose of this study was twofold. First, the research aimed to find out the students and lecturers' present perceptions about the use of *Moodle* environmental elements, and compare the results of the study with those obtained three years ago in the same study. For this purpose, the methods of questionnaire survey and comparative analysis of the received data were used. Second, the research touched upon the application of Learning Analytics to *Moodle* system data. For practical Learning Analytics, the database stored in the *Moodle* system was used, as well as statistics of students' performance during autumn semester in both 2015 and 2018.

The first quantitative research was carried out in 2015 and 116 questionnaires were filled in. Ninety full-time students (86% of the second year, 14% of the first and third) and twenty six lecturers from one higher education institution took part in the survey. The second survey was conducted in 2018, and this time 173 respondents from the same college completed questionnaires. 144 full-time students (31% of the second year, 48% of the first and 20% of the third year) and 29 lecturers participated in the study.

Questionnaires, which consisted of 15 questions, were submitted to the students and teaching staff of the college. The questions were of both types, closed and open, which allowed for more detailed answers and information that is more reliable. Most questions for lecturers and students were the same, and only a few differed slightly as they were aimed at the specific target group. For example, the question for students "Have you had to write a test or exam in the *Moodle* system?" was formulated in a slightly different way when referring to the lecturers: "Have you ever submitted a test or exam assignment in the *Moodle* system?"

Having compared the results of the two surveys, the paper also presents the information on study results in 2015 and in 2018, as well as compares the data on the frequency and scope of using *Moodle* during both years. The analysis of *Moodle* usage via log data allows to better understand students' learning patterns and even predict their possible learning achievement (Yu & Jo, 2014).

Literature Review

E-learning and teaching is an advanced form of study organization that facilitates independent learning activities and satisfies learners‘ needs (Bourne, 2005). It has been known for some time that an interactive knowledge assessment using computer technology is also a very successful practice (Hewson, 2012). According to Zoran Milevski and Zoran Zdavev (2013), the goal of the virtual learning environment is to provide effective learning methods, allow users to obtain the necessary learning resources at any time convenient for them, to solve emerging problems, to evaluate work done, and so on.

In many cases, the use of virtual learning environment is utilized as supplementary part of otherwise traditional learning process, when study process, organized in a brick and mortar way, is combined with the use of various electronic multimedia. For example, Bucharest Polytechnic University has just started to use the *Moodle* environment, the use of which is not yet mandatory. However, it is noted that the use of a virtual learning environment contributes to a more effective communication and learning process for students and lecturers (Oproiu, 2014).

Possibility to retrieve information that is received in real time is also among many benefits of Learning Analytics. Since a lot of academic interaction take place online, students inevitably leave a wide footmark of their activities, which can later be analyzed as an important data in order to improve the study process. Thus, the rocketing popularity of virtual learning environments in the study process has triggered the need for more sophisticated methods of evaluating the effectiveness of learning management systems (LMS) that is non-intrusive and requires no instructors’ intervention. New analytical methodologies, particularly Learning Analytics, have made fulfilling this requirement possible. Learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs (Siemens & Baker, 2012). Possibility to retrieve information that is received in real time is another benefit of Learning Analytics.

Thus, Learning Analytics has been an increasingly important area of research for quite a while. Information is stored in student databases and is later analyzed in order to understand and improve the student's learning process's performance. Its aim is to better understand how students learn and to determine the parameters under which they are learning and to improve their educational outcomes, gain insights into and explain educational phenomena (Romero & Ventura, 2013a). Larusson & White (2014) analyzed the latest theories, findings, strategies, tools and case studies, and focused on such issues as enhancement of student performance, improvement of student understanding of course material,

identification and support of struggling learners, achievement of accuracy in grading and more efficient use of resources at the institutional level.

There is a recent increase in the use of educational software. Accordingly, the amount of data on students' learning in databases is also increasing. This educational information is used to improve understanding of learners and the learning process and to develop methodologies to improve this process. The production of educational data is a growing field of research involving representatives from various fields around the world. A great deal of effort has been made in this area and a number of articles have been published on the subject of the production of educational data (Campagni et al., 2015).

Typically, learning institutions define learning programs by laying their own regulations on how students should participate in the learning process. Given current practice, students have a high degree of freedom of choice, so it is important to help them choose courses appropriately, discover training models and improve programs based on student feedback. This is an important educational challenge that Sunita B. Aher (2014) is studying. In fact, studies have shown that there is a correlation between LMS usage with students' performance (Filippidi et al., 2010; Jo et al., 2014; Macfadyen & Dawson, 2010; Whitmer, 2012).

Results and Discussion

This study describes experience of integrating *Moodle* to support study process at a College that provides higher professional education. The paper assessed students' and lecturers' feedback on the *Moodle* site usage patterns, compared it to the results obtained in a similar study three years ago, and touched upon students' academic performance in the light of the trend to use *Moodle*.

One of the first questions, which lecturers and students, the target groups of this research, were presented, was what type of lectures they would choose given a choice. The diagram (Fig.1) shows that the students' opinion in 2018 is similar to the one in 2015, while lecturers' preference of the combination of virtual and traditional lectures has grown by fifteen percent in three years (54% in 2015, 69% in 2018). No lecturer, however, has opted for virtual lectures and only students would like to study in a virtual environment only.

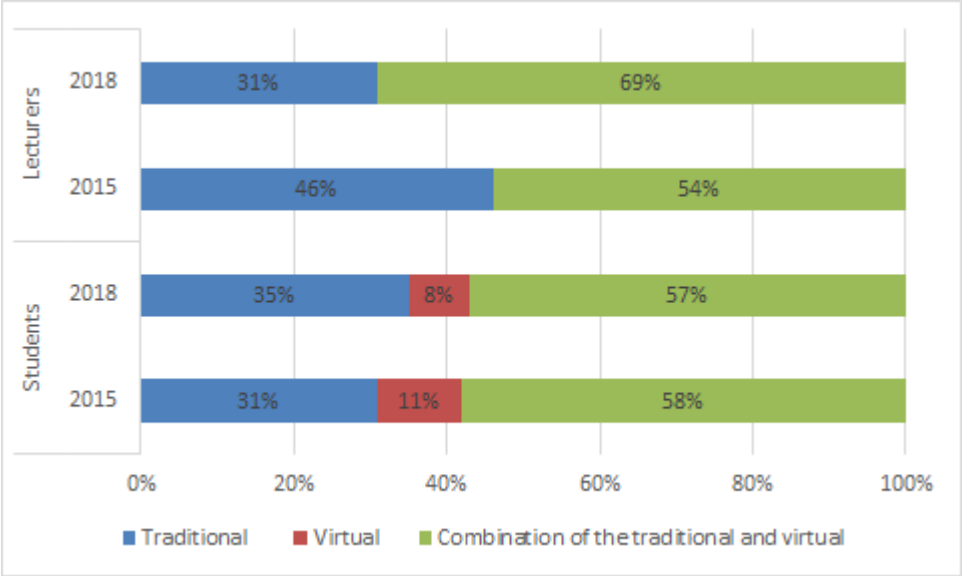

Figure 1 ***Choice of lecture types for VLE***

The question of whether the *Moodle* system is useful in the study process (Fig.2), students answered positively and, compared with 2015, as many as 98% believe it to be beneficial. Meanwhile, a survey of lecturers shows that although there were no and there are no lecturers who believe that a virtual environment brings no benefits to the study process, in 2015 as many as 32% did not have an opinion on the subject. Although the survey in 2018 shows that number has shrunk by 25%, there are still a few of those who admit not using the system.

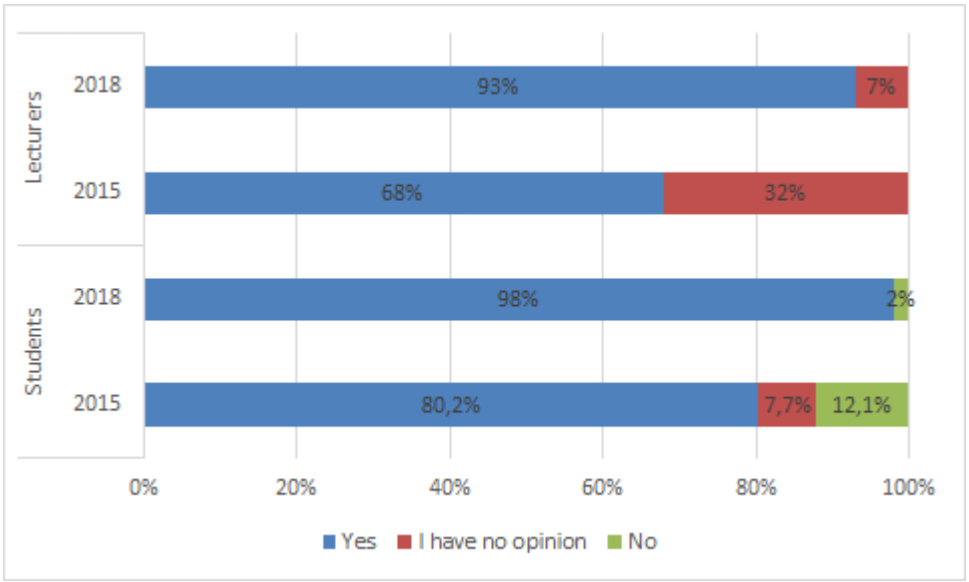

Figure 2 ***Moodle usefulness***

Both target groups positively answered the question whether they were taught how to use the *Moodle* system. However, the question about "friendliness" of *Moodle's* environment received very different reaction from lecturers and students. More than two thirds of the students in both surveys said that they found the system easy to use, while the lecturers' opinion was completely different in terms of the years - in 2015 as many as 76.9% of them felt that it was difficult to use this environment, however, now only 24.1% of them think so.

Moodle offers a wide variety of different tools to facilitate a study process. The most frequently mentioned tool among both students (2015 – 66%, 2018 – 92%) and lecturers (2015 – 75%, 2018 – 93%) appeared to be file sharing, and in both groups the use of the tool has increased by about 25%. Another popular element was the sending of tasks to the *Moodle* system, and the use of this function almost doubled in both groups (36% in 2015 and 69% in 2018 – students; 48% in 2015 and 71% in 2018 - lecturers). Other *Moodle* elements appeared to be rarely used by respondents, they admitted using only the calendar (6% in 2015, 7% in 2018 among students and 17% in 2015, 9% in 2018 among lecturers), private messages (in 2015 - 2%, in 2018 - 8% among students and in 2015 -3%, in 2018 - 5% among lecturers, the forums are enjoyed by neither students nor lecturers. These results imply that that the more interactive communication *Moodle* elements require, the less likely they are used because they are usually replaced by other communication tools (e-mail, facebook, etc.).

Positive students' reaction towards taking a test or an exam in *Moodle* tripled in three years (26% in 2015, 89% in 2018). Only student group received a question if they liked the experience of being assessed online, and vast majority of them (93%) were satisfied with this opportunity. Likewise, a survey of lecturers revealed that similar attitude is shared by lecturers, as the number of those lecturers who did not create any control or exam assessment tasks in the *Moodle* environment has shrunk five times in the last three years, from 84.6% in 2015 to 16% in 2018. Such finding suggests that some lecturers still avoid making evaluative tasks in the online environment. The most common concerns among lecturers appeared to be high cost of time, difficulty in developing tests, because these activities require computer knowledge and skills; difficulty to interpret the answers to open questions.

When asked about the outstanding benefits that *Moodle* provides, the respondents usually name ability to study at a convenient time, at the right pace and in a convenient place as the greatest advantage of *Moodle*, which means that the students are interested in the issue of employment and the possibility to combine studies and work (Kyburiene & Juodeika, 2015). Table 1 presents a list of the benefits that were considered by the students of the college. The respondents also named other advantages of the *Moodle* system: accessibility

and clarity of the information, pilot testing, user friendliness of the environment, the view that interactive evaluation is more objective than traditional, etc.

Table 1 ***Advantages of Virtual Learning Environment (student opinion)***

Advantages	2015	2018
Innovative learning method	53%	33%
Ability to study at a convenient time in a convenient place	56%	94%
Opportunity to save time	37%	73%
Information accessibility and clarity	42%	68%
Pilot tests	12%	64%
Interactive assessment is more objective	45%	89%

Lecturers distinguished other advantages of *Moodle's* environment than students. Among the benefits of using *Moodle* in education (Table 2), lecturers highlight the easier accessibility to students attending courses without the need for further search for other means of communication (e.g. email). It is enough to place courses, workshops or literature on the environment, and students can access it. In addition, lecturers appreciate the opportunity to see student data and evaluate them in the environment. Lecturers also name opportunity to add information, clarify it; there is no possibility to forget students or for a student to claim that the lecturer did not provide some information. It is convenient for the lecturer because the study material can be adjusted at any time, supplemented by new information, new sources of information, while it is not possible through traditional printed textbooks. Lecturers, like students, say that one of *Moodle's* environmental benefits is its reliability. When placed into the environment, a student's work will not disappear. In addition, the tutor can also write an assessment and comment, which will only be seen by the student - the author of the work.

Table 2 ***Advantages of Virtual Learning Environment (lecturer opinion)***

Advantages	2015	2018
Innovative teaching method	61%	37%
Easy to reach students	43%	49%
Visibility of student data	37%	88%
Possibility to adjust data	51%	79%
Study process monitoring	56%	91%
Convenient assessment	33%	67%
Possibility to change design	21%	43%

In a virtual learning environment, it is much easier for a lecturer to manage the process of independent learning compared to when the traditional teaching takes place and the student activity becomes invisible when leaving the audience. The tutor can track all student actions on *Moodle*, the frequency of the connections, timely provision or activation. In addition, the *Moodle* interface (design) can be modified by adapting it to the specifics of the subject. It activates students, acts as a preventive measure for monotony (Caliskan & Bicen, 2016).

The survey also addressed drawbacks of *Moodle* environment. (Fig.3). The survey revealed that apart from the drawbacks mentioned in the chart, students also miss some lecture material, since not all studying material is available in the *Moodle* environment, studying independently on *Moodle* requires a lot of stamina and self-motivation, students also claim that due to technical limitations and frequent requirement for a password using *Moodle* sometimes isn't very convenient.

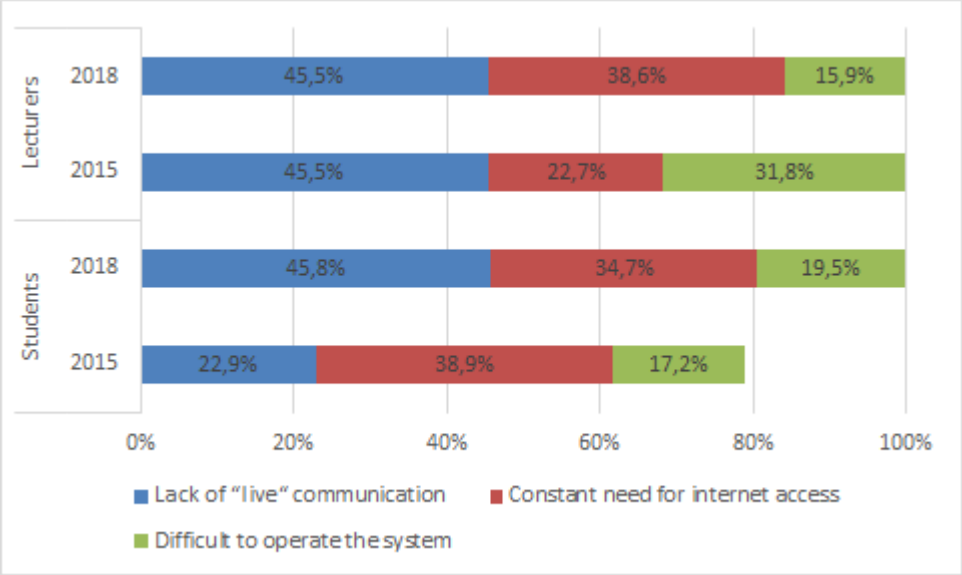

Figure 3 ***Drawbacks of Moodle***

Part of the lecturers expressed concerns that students may stop attending the lectures if all the material is placed in the *Moodle* environment, by claiming that they can find all the necessary material on *Moodle*, so there is no need for students to sit in lectures, write, listen, etc.

The opinion of students about the quality of theoretical material provided by lecturers has improved significantly in three years. In 2015, a bit less than half (47.3%) of the students evaluated the information provided on *Moodle* system positively, almost the same number (42.9%) - rated partly positively, and nearly one tenth (9.9%) of respondents were not satisfied with the quality of

material available on *Moodle*. In contrast, positive evaluation of the material increased by thirty percent in 2018 (77.5%), only 16.8% of respondents rated it partially positively, and the number of those dissatisfied shrank almost twice (5.7%). Lecturers, however, were much more critical when asked to evaluate their methodological material. In 2015, none of the respondents evaluated their material as complete, almost half of them admitted that the material is incomplete, almost half (45%) respondents admitted their material was placed chaotically, quarter (25%) of the lecturers failed to include video and/or sound, almost a third (30%) of them thought that the material they provided on *Moodle* was still lacking self-control tasks and pilot tests). The situation in this year's survey is much better: 36% of teaching respondents think that the methodological material is fully and properly prepared, 51% who still admit that it is incomplete and lack of video and sound, 13% answered that there is a lack of self-monitoring and control tasks.

The question if the *Moodle* was useful for the study process received surprisingly similar answers from the students in both surveys. Almost all students responded positively (about 90%) to the question about the usefulness of the methodological material provided by their lecturers in the system. However, among the lecturers the utility of the *Moodle* system was judged much worse. Although the number of respondents who consider *Moodle* to be a beneficial part of the study process increased by almost ten percent (38.5% in 2018 compared to 46.2% in 2018), it still means that *Moodle* is used by less than a half lecturers in their teaching process.

After comparing the results of surveys carried out in 2015 and 2018, the study also looked at the learning results of students. The research did not aim at analyzing the log files or specific groups of students that exported them, neither it focused on the types of actions possible in *Moodle*. Rather, it was important to look at the use of Moodle via quantitative data collected in the autumn semesters of 2015 and of 2018 and relate it to the learning outcomes (Table 3).

Table 3 ***Correlation between log-ins and average students' score***

	2015	**2018**
Total login count in autumn semester	14503	44359
Time spent in Moodle in autumn semester	21381	147514
Average score of students	6,8	8,1

The results presented in the Table 3 imply that there is a correlation between *Moodle* use and students' performance. The number of students' logins increased more than three times, and the time they spent in the VLE sky-rocketed seven times. At the same time, the average learning score of students also improved by 1.3 point. Of course, such a change in numbers might be a

result of complex reasons, e.g. the use of the *Moodle* platform may be gaining momentum due to the increasing number of working students who cannot participate in every traditionally organized lecture. However, the use of *Moodle* system as an e-learning tool cannot be discarded, as the results of the students improved simultaneously with the growing applicability of the VLE.

Conclusions

The evidence of this study suggests that the integration of the *Moodle* platform into teaching clearly provided many advantages and benefits. The use of *Moodle's* virtual learning environment is gaining momentum every year. This VLE is user friendly, has many interactive features that could enhance the students' learning experience, and allows more flexibility in teaching, lets students to decide where and when they want to engage in learning. The structure of the courses, learning resources and other important elements can be chosen by the compiler according to their needs. The introduction of *Moodle* has also improved student performance, suggesting that it had a positive impact on student learning outcomes. However, the feedback from the students and lecturers indicates that despite being strongly supportive of *Moodle* usage as an adjunct to the traditional style of teaching, they were largely apprehensive of its potential as a substitute to face-to-face teaching. It means, that the use of VLE is indispensable part of study process, but it shouldn‘t replace a brick-and mortar classroom.

Transferring study process into virtual environment in the future will permit collection of students data which, in turn, can further be used for analyzing their behavioral and cognition processes, as well as allow the creation of personalized learning scenarios for each identified student group according to their needs and peculiarities of information acquisition.

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