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STUDENTS' FEEDBACK ON MODERN UNIVERSITY COURSE FEATURES

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Abstract: Significant development in the use of IT in education was the adoption of Learning Management Systems (LMS). They offer broad range of features that help administrate and organize students, material, knowledge verification and more. However, little is known about students preferences and reception regarding specific LMS features. This paper presents and discusses feedback obtained from students who used LMS and summarizes it with propositions for future research.

Keywords: educational technology, electronic learning, computer science education.

1. INTRODUCTION

An important milestone in Information Technologies use in education was the adoption of LMS [1]. They have become a part of everyday life for teachers and students. More organizations and teachers incorporate LMS in their courses. In 2011 money globally spent on e-learning was estimated to be about \$35.6 billion, while in 2014 it was a \$56.2 billion industry and expected to double by 2015 [2]. E-learning tools and strategies also help companies increase productivity, even by up to 50% [2]. This clearly shows the significance of LMS. Effects of using LMS are related to its quality and there are numerous ways to describe and measure it: from a general subjective feeling of an individual up to complex systems such as grouped factors that are structured into 30 different dimensions, seen from learners perspective, as described in [3]. In this paper however, focus goes on general reception of various LMS features. The aim is to gather and summarize data to answer question: how do students want LMS to be handled? How do they see different aspects of such systems?

The survey was organized for Automation and Robotics students (second and fourth semester) enrolled in two programming (C and Java) courses at Gdansk University of Technology. Total of 125 students were surveyed. The system used was MOODLE, which is among the top 3 most used LMS in the world [4]. All the students had encountered MOODLE in their education prior to the subjects that undergo the survey.

2. RELATED WORKS

Emergence of Learning Management Systems usage in all levels of education has led to increase in people's interest in their impact on various aspects of education. Researchers

undertake a wide range of aspects regarding LMS and their reception by students.

The most common are works regarding LMS effectiveness which mention good students' performance and satisfaction, money savings and other positive outcomes [5], [6]. Authors of [7] claim that it is worth to invest in LMS for a course and prove it with students' satisfaction data collected in their course. [8] focuses on high internal reliability and summarizes that MOODLE is as an effective system. These studies are also confirmed from students perspective - [9] shows that over 90% of surveyed students consider MOODLE as effective. Even non-educational environments such as corporations and business students claim that LMS enhances their course experience and increases satisfaction [10].

Some researchers compare MOODLE to other popular LMS, such as Blackboard [11]. It is mentioned that students appreciate the contribution of both LMS to their learning and consider them a good support. [12] on the other hand shows that there is no clear winner in comparison of Blackboard with MOODLE in terms of functionality, but other factors make MOODLE chosen 75% of the time. There are also other works in which LMS are compared to social networks, such as [13]. Its authors study teachers' and students' opinions on the matter and draw a conclusion that both classes of systems should be integrated.

Some studies focus on problems and fears related to LMS. [14] lists 12 common complaints regarding usage of such systems in various environments. Computer nature of LMS inevitably leads to the fact that problems are usually technical, such as a database compatibility, a lack of integration with other kinds of software, releases of new versions and therefore the need to update or a lack of support for MAC computers. [15] discusses more of social factors of a course that is fully hosted online and points out the biggest fears. Among them is a students' concern about studying quality and technical issues. However, despite the fears, students are still rather enthusiastic about adopting computer systems in their education.

Many of the works cover only a general perception or outcomes of using LMS, such as effectiveness or student satisfaction, without going into detail. Only a few authors approach specific LMS features and their impact.

3. PROBLEM STATEMENT AND MAIN CONTRIBUTION

Much of the research presented in Chapter 2 covers only the general perception of LMS or outcomes from using it, such as effectiveness or student satisfaction, without going into detail. Considerably less authors approach specific LMS features and their impact. Moreover, student surveys proposed in papers seem to possess one important flaw - answers which do not support a claim are usually aggregated into one 'generally negative answer', grouping those who are strongly against with people who just do not mind. The survey described in this paper however was deliberately designed to avoid it.

Knowing that LMS have impact on students and course quality, it is important to know what ways of course organization students prefer. This paper delivers students' feedback on various LMS aspects and components. Specifically, it aims to answer following questions:

- 1) What ways of studying students prefer?
- 2) What form of material do they want?
- 3) Do integrated forums help?
- 4) Is LMS accessibility on mobile devices desired?
- 5) What way of grading students prefer and think that should be used?

The main contribution of this paper are gathered and summarized students' opinions about some aspects of the LMS as well as various insights on its pros and cons. Observations, conclusions and possible new areas for a future research are included as well.

4. SURVEY DESIGN AND RESULTS

4.1. Survey design and realization

Survey was done among students of Automation and Robotics enrolled in C-language programming course (2nd semester) and Java programming course (4th semester) at Gdansk University of Technology. Both courses were hosted on MOODLE in a nearly identical fashion. For both the courses students were provided an electronic material (lecture slides, assignments, additional notes and material etc.). Students had to do weekly quizzes and upload homework assignments, usually source codes of their programs, for which they received grades. Subject rules were available on MOODLE along with administrative info (main teacher and teacher assistants names, contact info, availability hours etc.). There were also forums for both the courses with explicit encouragement to use them in case of administrative questions, problems with understanding material or other reasons.

The author's aim of the survey's design was to make it reflect major areas of an academic subject, therefore following question categories were chosen:

- general (about LMS),
- course material,
- homework,
- grading,

however not all the results fit into this paper - excluded ones will be released at later time.

The survey was designed to have questions and response choices cover the biggest range of possibilities, as it is recommended to design a survey properly [17]. Particularly valuable was the experience from author's previous work (described in [14]) which showed various flaws of a survey when working with students. Surprisingly,

the most problematic were questions with multiple-choice answers. All the above helped to design a survey that scored better fill percentage and students' classroom reactions.

Students were given printed surveys (instead of filling an e-form which one would probably expect to fit LMS better). The purpose was to let students disconnect from the research subject and avoid judging LMS while being on online on it. The total sample size was 125 people. There were no completely blank survey sheets, but a few contained missed questions or questions with answers that were unclear and therefore excluded from the results. This is the only reason if answers do not sum up to 125 further in this paper.

The survey consisted of 17 questions, with 3 of them being open-ended (requiring usually one or two-word answers) and 14 single-choice ones. However, only the most valuable were chosen and are covered by this paper. Some questions that were not included, because of being problematic or producing unexpected results, shed light on other issues that will be researched in the future.

4.2. Results from closed-end questions

The survey started with a question regarding students' general preference of using Learning Management System for university subjects (Fig. 1). The majority of students answered that they prefer a diverse (sometimes supported by LMS, sometimes not) management (52%), whereas only a little less prefer courses managed just by LMS (44%). It is notable that only 3 students (2.4%) prefer 'a raw' course, managed in the traditional way. It may be worthwhile to check what makes students prefer diverse way of course handling in future work.

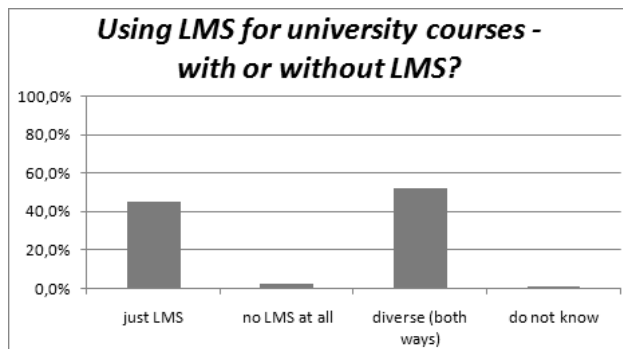


Fig. 1. Histogram of answers to the question about general usage of LMS in a university course

In the second question students were asked what form of learning course material is the most convenient and easy to use (Fig. 2). Possible answers were: *student's notes*, *paper (printed) material* (such as lecture slides or books), *electronic lecture* (presentation or PDF files), *other*, *do not know*. Unlike the first question, there was a strong winning option and it was the electronic lecture (71.2%). Second most chosen answer was a printed lecture (12.8%). It is interesting that on one hand, students were not so clear about using LMS, but on the other hand were very determined regarding digital material. Surprisingly, only 8% of surveyed students picked their own notes which is less than expected. It remains unclear if it was due to inability to make good notes, laziness or other reasons. This may be a subject for a future research.

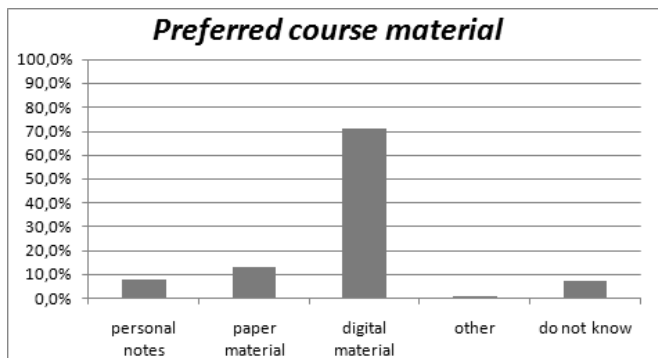


Fig. 2. Histogram of answers to the question about preferred course material

The third question, similar to the second one, regarded material handed out by a teacher (Fig. 3). It asked what is students' preferred form of course material distribution. Vast majority (88%) chose an electronic form, whereas only 5.6% chose printed and 4% hand-written forms. It is understandable, because digital material is the easiest to distribute and it is known that surveyed students used both internet forums and Facebook group for communication. This becomes even more clear if one looks at the answers to the next question.

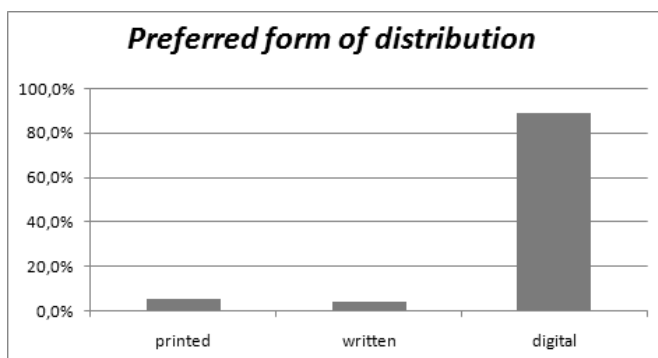


Fig. 3. Histogram to the question about preferred form of distributed material

These answers may be partially explained by the fact that students prefer digital content because it allows them to view it on mobile devices such as smart phones, laptops, tablets, etc. Figure 4. shows the results obtained from a question: 'Do you use MOODLE on mobile devices?.'

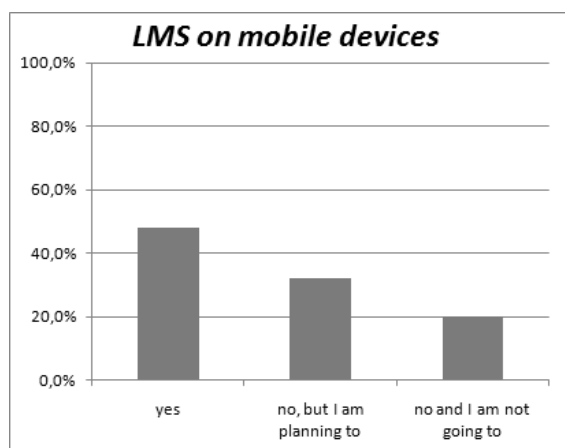


Fig. 4. Histogram of answers to the question about LMS availability on mobile devices

From three possible options 48% of students answered yes. It is not a lot, but still the most popular answer. 32% answered *no, but I am planning to*. It shows importance of providing such ability, because the whole possible target of this feature constitutes 80% of the surveyed group. Only 20% answered *no and I am not going to*. It is likely that percentage of people using and willing to use LMS on mobile devices will increase in the future.

4.3. Open-end questions

A few open-end questions were included in the survey. Their analysis requires more time and results representation poses a challenge, but these are the price for wider range of answers and students' answer diversity. To represent the gathered data on graphs, the students' answers were aggregated in a way that similar (synonymous) answers fell into one category.

In the first open-end question students were requested to write one advantage of MOODLE to convince a friend to use it. This way of putting down the question forced students to make up something that they consider the most convincing reason. It is assumed, that human nature on the other hand made them answer the very first thing that came to their minds. The most common answers are presented in the table 1.

Table 1. The most common answers to the question 'If you were to convince a friend to use MOODLE, what advantage would you tell them?'

Feature	Number of answers	Percentage of all answers [%]
Accessibility	51	40.8
One place for all material related to the subject	27	21.6
None*	13	10.4
Convenient layout	11	8.8
Mobility	7	5.6
Allows you to skip lectures	3	2.4

One unexpected category of answers was *none* (marked with * in the Table 1), meaning that a student sees no advantages of using MOODLE or failed to give a reason. There is no information about reasons behind not answering this question properly. More research is required as there may be valid reasons to dislike MOODLE, which made students answer *none*, and targeting them may help improve students' experience.

Other answers only had three or less supporters and these were not included in the Table 1. Among them were for example *a lot of content, clarity, chronology, convenience*.

Second open-end question asked about the opposite to the first one and that was a disadvantage of using MOODLE that students would use to discourage a friend from using it. Most popular results aggregated into five categories are shown in the Table 2.

The most common answer was *none*. It may be assumed that students would not simply discourage friends from using MOODLE. It can also mean that they did not want to think about negative features and just answered that they do not see any disadvantages. The second most popular answer (20% of all answers) regarded a handful

of technical issues which include webpage dropdowns (making it inaccessible) and server lags.

Table 2. The most common answers to the question 'If you were to discourage a friend from using MOODLE, what disadvantage would you tell them?'

Feature	Number of answers	Percentage of all answers [%]
None*	56	44.8
Technical issues	25	20.0
Password (its requirements, need to memorize it)	10	8.0
Inconvenient layout	9	7.2
Deadline control	4	3.2

Next in order (8% of the answers) were disadvantages resulting from password requirements, such as its length, characters it was supposed to include and the need to memorize it (some students occasionally forgot their passwords, which rendered frustration and delayed their participation in the class). A few students pointed out inconvenient layout, however it is yet to discover exactly which elements caused problems. Lastly, four students as the biggest disadvantage chose deadline control. MOODLE as a computer system is in fact very strict and precise about time and date. It is assumed that this feature causes pressure in those students and that is why they chose this as disadvantage that would work to discourage a friend from using the system. Among answers chosen by 1 or 2 people were features like *poor graphical design, inaccessibility after completing the subject or even a fact that viewing on a screen has a bad impact on eyesight.*

Another measured feature was students' attitude to the presence of online forums. In the beginning of the course, all students were encouraged to use forums as an open space to exchange solutions to common problems. They were informed that if they had any questions, about course administration or course material, it was advised to post them on the forums - as peers' and teacher's answers would be then publicly available. In the survey students were asked to finish following sentence: 'Presence of publicly available forums for students and teachers...' with a few possible options: *does not matter for me, helped me, bothered me* (meaning: caused any sort of problems), *have not used them but it is good they are available, do not know.* Results are shown in the Fig. 5.

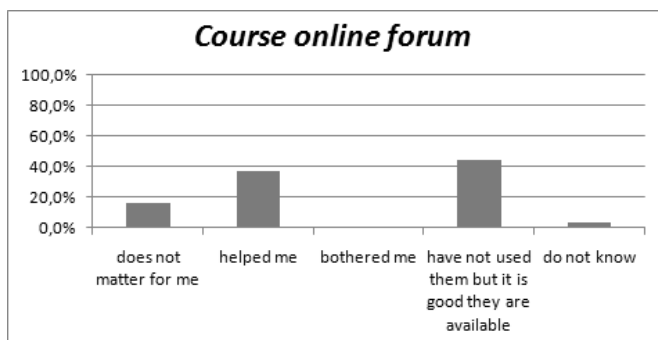


Fig. 5. Histogram of answers to the question about presence of online forums

Most students answered that they have not used the forums, but consider it good that they are available (44% of the answers). 36.8% responded that forums helped them.

Only 16% of students claim that forums do not matter for them, while 3.2% could not make up their minds. As was expected, none of them minded the forums. In summary, over 80% of students care about presence of such a tool. It can be concluded that forums constitute a valuable tool and teachers should strive to find new ways to use it in their work.

4.4. Continuation of e-grading perception research

Another very important feature of LMS and e-learning is an e-grading. This is a process in which students' knowledge is verified and graded by a computer system. The author's previous work was an introductory research to the students' perception of e-grading in an Informatics course [14]. The topic itself is important as e-grading brings many pros into learning. First of all, computer given grades follow the same algorithm for each student and are immune to teacher's mood changes or student affection. This improves fairness which is an important feature, as shown in [18] and [19]. Moreover, grading handled by a computer relieves the teacher of this time-consuming duty, so he is able to spend more time on other tasks. Research also shows that computer grading does not need to be a worse way of evaluating students' work as 'a well-designed computer feedback can be more effective than manually-graded homework assignments in producing significant differences in learning' [20].

The survey mentioned in this article continues previously mentioned research [14]. One flaw of the introductory research was too small size of the sample (35 students). The new survey has a considerably bigger sample, so the data can now be compared and discussed. Two questions regarding e-grading were the same as in [14]:

- 'Grading should be done by...' (sentence context suggested that the question was about 'the most appropriate way')
- 'Which way of grading would you prefer?'

with possible answers: teacher, computer, mixed. Results from previous and current surveys are presented in the Figure 6.

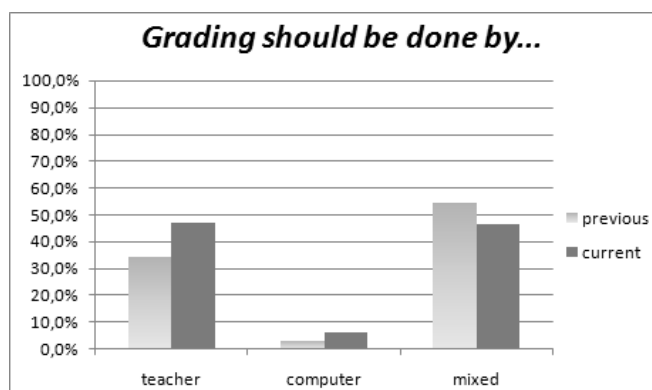


Fig. 6. Histogram of answers to the question regarding the best way of grading

The percentages of answers in Fig. 6. (previous and current ones) are comparable, however the winning option has changed. Previously the most students saw a *mixed* grading as the most appropriate one (54.3%), whilst in the current survey this value dropped to 46.4%. On the other hand, the percentage of teacher-given grade supporters increased from 34.3% to 47.2%. Percentage of students choosing *computer* as the appropriate source of grades

is comparable (previously 2.86%, currently 6.4%) and remains marginal. Monitoring of this trend will be continued in further work. Moreover, knowing the trust students put in a teacher as well as convenience of using computer grading, the mixed way of grading may be the best solution. However, very little research has been done on this, so its impact on various aspects of education is yet to be evaluated.

Answers to the second question "Which way of grading do you prefer?" from both researches are shown in the Fig 7.

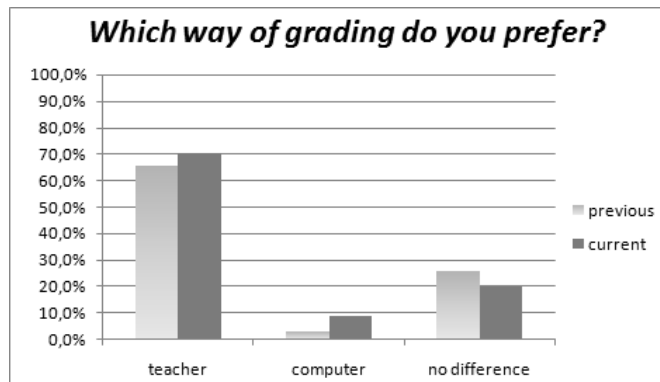


Fig. 7. Histogram of answers to the question about preferred way of grading

When it comes down to personal preference, the *teacher* option is a clear winner in both surveys (previously 65.7%, currently 70.4%). The next in order is *no difference* answer, so in total over 90% would not choose a computer as a preferred source of grades. The cause of this is discussable. Many questions arise - is this state desired? Is there any specific reason for it? Why students do not trust computer that after all uses a standardized algorithm which is set up by the teacher anyway? This should be looked into in further research.

To summarize, the sample of previous data was not enough to draw strong conclusions. Current study however mostly confirmed the previously achieved results. Further research may be considered to find reasons behind the current state of affairs.

5. CONCLUSION AND FUTURE WORK

This paper shows possible fields of improving LMS experience based on student's feedback. It shows that students' reception of it can be sometimes unexpected. Questions in the carried out survey sometimes not only did not provide answers, but also shed light on different aspects that require even more questions to be asked. However, it helped gather rich feedback and create a clear to-do list that will allow considerable improvement in the course quality. Summarized conclusions are presented below, as well as the ideas for the future research.

Improving course quality with LMS must start with a question - is a considered subject appropriate for LMS? It must be clear that adopting LMS into the course will help and simplify students' and teachers' work, rather than causing mess and confusing students.

Students highly value a digital form of all kinds of material, due to the ease of its distribution and accessibility. However, they also prefer a ready material from the teacher instead of their own notes, which makes one wonder if their ability to make those notes is sufficient enough. It is worthwhile to improve this ability, as making

personal notes has a positive impact on students learning [21]. It includes more recalled material if notes had been made [22], higher scores in various tests [23] and better performance on exams [24].

High interest in using mobile devices and access to LMS on such platforms suggests that such possibility should be provided. Important LMS pros, which were mainly accessibility and one place for all the material, makes one treat LMS as in fact the only source of all information, knowledge and material. Main issues pointed out by students regard technical aspects such as server stability and delays. There are the key issues of any LMS. Before launching a course on LMS, one should provide the most stable server as possible. Losing connection during a test or inaccessible server around homework upload deadline can cause a lot of unnecessary stress. Moreover, a teacher or an administrator must provide an appropriate redundancy and robustness, so no data can be lost in case of server faults.

Another technical issue pointed out by students regarded password restrictions. They considered it too complicated - numerous requirements prevented students from using passwords they already have (and therefore remember), which sometimes led to problems with forgetting the new 'complex' password. Stepping down with password requirements would eliminate some of minor troubles. However, it should be done with minimal decrease of account security level.

Presence of forums was appreciated by students, but the fact they do not use it much suggests that it may be worthwhile to work on paving such habit. Students intensively use outside communication platforms, so convincing them to use similar tool, but with a teacher 'spying on' them requires to provide strong reasons for this. Among a few possible ideas may be graded forum work or grade bonuses for those actively helping others in constructive ways. However, it may be a worthwhile idea for future work to explain why did students positively respond to the forums presence. How can this tool be used more intensively? Having student traffic go through the forums makes a student-end (students discussions, worries, doubts, problems, etc.) visible to the teacher, so he/she can react to it more accurately.

Last but not least was the question about using e-grading systems. Knowing the trust students put in a teacher as well as convenience of using computer grading, the mixed way of grading may be the best solution. This idea has yet to be researched further. However, at this point it already looks promising, as computer grading relieves teachers a lot and allows courses to scale better.

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OPINIE STUDENTÓW O ELEMENTACH WSPÓŁCZESNYCH PRZEDMIOTÓW AKADEMICKICH

Znaczący rozwój w wykorzystaniu systemów informatycznych w kształceniu stanowiło wdrożenie Systemów Zarządzania Uczeniem (LMS, ang. Learning Management System). Oferują one szeroki zakres możliwości, które pomagają w administracji i organizacji studentów, materiału, pozwalają na weryfikację wiedzy i wiele innych. Jednak, niewiele wiadomo na temat preferencji i odbioru studentów dotyczących poszczególnych elementów LMS. Niniejsza publikacja prezentuje i omawia opinie studentów używających LMS i podsumowuje je wraz z podaniem propozycji na przyszłe badania.

Keywords: technologie edukacyjne, nauczanie elektroniczne, nauczanie informatyki.