STUDY PROCESS VISUALIZATION IN MOODLE

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Abstract

The learning process uses different forms of learning (face-to-face, e-learning, webinar, MOOC) to maximize the students’ knowledge, skills, and competencies. Today, the benefits of the digital environment, including learning platforms, need to be exploited in a meaningful way. In particular, the functionality of the learning platform is used when adding teaching materials, tests, homework submissions, discussion forums, calendar notifications, wiki, dictionaries, surveys, etc. By analyzing the data on learning from the learning platform, we can provide information on both students’ knowledge and learning habits and style.

The research aim is to find out how the study process can be visualized in Moodle. Qualitative research of lecturer’s know-how on the study process visualization is carried out. Student’s habits on the issue are analyzed.

The results show that Moodle in some way provides the study process visualization, but students’ habit analysis suggest that there missing personalised knowledge management tool for the study process visualization in a way to motivate learners, help them follow up their success and visualize the study process in a more dynamic way.

Keywords: Moodle, visualization, learning process, learning analytics.

1 INTRODUCTION

The learning process uses different forms of learning (face-to-face, e-learning, webinar, MOOC) to maximize the students’ knowledge, skills, and competencies. Today, the benefits of the digital environment, including learning platforms, need to be exploited in a meaningful way. In particular, the functionality of the learning platform is used when adding teaching materials, tests, homework submissions, discussion forums, calendar notifications, wiki, dictionaries, surveys, etc. By analyzing the data on learning from the learning platform, we can provide information on both students’ knowledge and learning habits and style. It is a useful tool for lecturers and students because learning analytics helps to get knowledge and tools to motivate learners, to find out weak and strong parts of the learning process and learning materials, to help learners to follow their progress, as well as be exploited as a personal knowledge management tool.

The aim of the article is to research the possibilities of the digital learning environment, in this case, Moodle, to visualize study process to help a learner to follow his/her learning process.

Moodle (Open-Source Learning Management System) statistics show that there are 108684 registered sites in 228 countries (https://moodle.net/stats/). It is one of the most used learning platforms in the word. It is used also by Liepaja University. In one of the annual surveys made at the University, lecturers and students opinion about Moodle was that it is “lifeless” learning environment. This opinion initiated research on how to make the digital learning environment more interactive and more user-attractive.

2 BACKGROUND

2.1 Learning process visualization

The learning process can be described in various ways. Information in Merriam-Webster online dictionary states that learning is (1) the act or experience of one that learns; (2) knowledge or skill acquired by instruction or study, (3) modification of a behavioural tendency by experience (such as exposure to conditioning) (https://www.merriam-webster.com/dictionary/learning). In this case, the learning process consists of three main activities - getting experience, acquire knowledge or skills and make changes in behavioural tendency.
E-learning environment most often is used as a place to provide knowledge or skills acquisition more rarely to provide an experience (in wider meanings). If students say that Moodle is “lifeless” it means that they experience it in a not corresponding way. Lecturers, instructional designers, the administration must think of ways to make students experience Moodle more positively. One of the solutions is visualization.

A good visualization helps the users understand the data, confirms what the users already know (Kuosa, et al, 2016), helps to see what they have done, helps to be oriented within the course and chose next steps as well as creates experiences. Learning analytics tools supports learners in their learning process.

EDUCAUSE Horizon Report: 2019 Higher education edition authors writes that “understanding how to use learning analytics to inform student progress may be elusive for campus leaders and faculty alike because the need to distinguish between different types of learner data is a relatively new skill” (Alexander, et al, 2019). Learning analytics is seen as a possibility to understand and optimise learning and the environments by using data about learners and their contexts (2011, https://tekri.athabascau.ca/analytics/)

Researchers A.Nguyen, L. Gardner and D. Sheridan (2017) state that learning analytics is having an impact on personalized education, objective evaluation, and institutional decision making. Authors offer Multi-layered Taxonomy of Learning Analytics Applications. Researchers analyzed different Learning analytics applications to find out their usability. Authors structured Learning analytics applications in nine categories - visualization of learning activities, access learning behaviour, predict students’ performance, individualize learning, evaluate social learning, improve learning materials and tools, assessment of personal learning environments, support educational decision making, sophisticated evaluation of gamification.

Researchers from Brasil - A. Barbosa, N. Araujo, J.P. Pordeus and E. Santos (2017) - made research on learning analytics and visualization usage for curricula structure evaluation in higher education. Researchers in the discussion part of their article admit, that there weren’t results they expected because learning analytic method they employed (The Synthetic Control Method) used only grades and it wasn’t enough to assume the relations between courses. Authors state that other aspects of curricula - methodologies, professors, the amount of theory versus practice are not being considered in their work and may have a significant impact on the results (A. Barbosa, N. Araujo, J.P. Pordeus and E. Santos, 2017). In Moodle and other learning management systems grades is one of the learning process visualizations. Grades are very important in students’ life - it visualizes their knowledge, skills. Students are used to grades from early school ages. But grades show an assessed side of knowledge and skills; they do not visualize the learning process itself, however, it is one of the possible parts of the learning process visualization.

To make the experience in Moodle and other learning management systems more attractive and dynamic visualization is an answer. Kuosa et al (2016) in their research shows that students’ reaction on visualization (in this case discussion forum as the main source) was very good. Students’ responses were that narrative visualization presented information in an enjoyable, interesting format that was easy to understand. Visualization made an enjoyable and interesting format of information.

2.2 Moodle possibilities and disadvantages

There are several possibilities built in Moodle (in standard version) for study process visualization for students and teachers - Logs, Activity, Activity completion, Live logs, Statistics, Participation, Course overview, Course completion status, Events list, Activity results block, Gradebook.

Gradebook is Moodle feature that allows students to follow up their study process in the means of grades or points. Not all activities and content resources allow grading. Grading is not possible for the content resources, so students can’t get any feedback or data (in means of grade or points) on their learning process by using content resources (Book, File, Folder, IMS content package, Label, Page, URL). For example, if a student reads learning’ material, there is no possibility to get feedback or notification through Grade tool. They have to remember on their own which resource they have read or use other tools to follow-up their progress.

Grades can be used for several activities - Assignment, Database, Forum, Glossary, Lesson, Quiz, Workshop. In the end, students can get feedback on their learning, in means of grade, in seven cases out of thirteen. All other activity tools (Chat, Choice, External Tool, Journal, Wiki, Survey) do not offer
this possibility. The exception is if lecturer adds grade item independently from activities and resources, for example, the possibility to earn some bonus points.

Activity reports allow the user to view their own activity reports via their profile page. Activity reports are available for each participant that shows their activity in the course. As well as listings of their contributions, such as forum posts or assignment submissions, these reports also include access logs. Student can see all discussion he/she published as well as discussions they participate in. In an access log, students can see their active sessions. Activity report allows students to see their Blog entries and Learning plans. But in an overall Activity report is not a very useful possibility for students to follow-up their learning process within the course or courses.

Activity completion allows for a student to manually mark as complete items they have read or done. In case Activity completion is set, students can see a checkbox in line with every resource and activity used within the course. It is easier for a student to follow their progress in means of “I think I have done it”. But not all lecturers set this possibility and not every student uses it.

Other possibilities mostly can be used by teachers or site administrators. Moodle version 3.4 as core element offers Analytics tool to predict student dropping out (https://docs.moodle.org/36/en/Analytics).

In this paper research is made on Activity completion tool usage by students and lecturers’ know-how issues.

Possibilities of visualization in Moodle are researched by several researchers. Kuosa, et al. (2016) offers their developed visualization tools - one that is used to analyse students’ activity from automatically recorded user log data and to build interactive visualizations; the second tool analyses forum content and automatically identifies discussion topics. Leony, et al. (2012) developed an embedded visualization tool (a browser extension) in Moodle to provide students with self-awareness of their performance and comparisons with the group performance. K. Dobashi (2017) in the article describes methods to analyze and visualize students’ behaviour according to course materials views in Moodle. M. Olsson, P. Mozelius and J. Collin (2015) suggest that visualization help students to stay motivated and increase their control over learning. They used students’ individual progress bars based on activities marked as completed. Authors admit that not all students used progress bars and some of those that used weren’t very enthusiastic about them. Students in this case study admitted that there was a lack of feedback.

3 METHODOLOGY

There were two methods used to find out the answer to the research question - qualitative research on lecturer’s know-how on the study process visualization and data analysis on students’ habits. Qualitative research based on semi-structured interviews of lecturers that use Moodle most actively, so called, advanced users.

Students’ habits analysis was made by using data available in Moodle courses. For analysis were chosen the 20 most active courses in a one-week line segment. In each course, there is a possibility for lecturers to get Activity completion of students and this report was used to analyze students’ habits in using this feature of Moodle - check resources and activities as completed by students themselves.

Semi-structured interviews consisted of 6 questions like - Is it important in your course that students can follow up their learning process, how important it is. Are you satisfied with Moodle options in learning process visualization and question on how lecturers’ motivate students to participate more actively in the course. In the interviews participated 10 the most active lecturers that use Moodle in their everyday teaching practice.

4 RESULTS

To research do students and lecturers use Moodle option for learning process visualization Activity completion there were chosen 20 the most active courses in the one-week timeline. From 20 courses, 16 have an option for students manually check resources, activities they decided as finished. Together in seventeen courses, there were 360 students involved. There are 5 courses were none of the students used this possibility. So, from 16 courses only in 11 courses, students used an option to use Activity completion. In these 11 courses, 267 students participated. From these 267 students, only 65 used this possibility - that is 24 % of students. There have to be admitted that in none of the courses there is information for students that they can use such a possibility. This 24 % of students used this
option intuitively. These results show that Activity completion as a tool is visualized in well manner but there must be some improvements to enlarge student numbers who uses it intuitively.

In the course’ analyzes the range of students in percentage that uses an option differs from 71% of students in the course that uses an option to 5%.

All courses together (16 courses) had 878 resources and activities to check. In courses where students used Activity completion (11 courses), there are 583 choices to check. The range of choice is from 4 choices to 182 in one course. However, in none of the courses students used all possibilities to check. In average students checked around 7% of resources and activities. But in some courses, there are 0,38% of resources and activities checked as complete, in some 23%. See overview in Table 1. But there must be admitted that Activity completion works also for resources, activities that are set as not visible for student. Deeper research of this issue can in some way change data.

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<th>Course ID</th>
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<th>Students (all)</th>
<th>Students (checked)</th>
<th>Choices (all)</th>
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There is not enough data to find out, is there a correlation between course topics or study programmes of students and usage of Activity completion. This issue is for future research.

Semi-structured interviews were done with ten the most active lecturers - Moodle users in their everyday practice at Liepaja University. Interviews showed that most of the lecturers think that it is very important for students to follow their progress in their study courses. Lecturers admit that information on learning process, visualization and analysis of it makes a positive impact on students’ knowledge acquisition process. It can be an external learning motivation tool to promote students’ independent and responsible learning.

7 from 10 lecturers admit that they didn’t know about Moodle possibility for students and lecturers to follow students’ progress by using Activity completion. They asked to show this possibility and were optimistic to take into account this issue. Lecturers who knew about Activity completion point out that visualization of this tool are inexpressive. One of lecturer about current learning process visualization in Moodle said: “It is just ‘naked’ numbers”. Probably because of inexpressive visualization this tool is not in value for those lecturers who know about this possibility.

All of the lecturers agreed that for them it is important that students keep track on their progress (in scale from 0 to 5, 8 lecturers chose 4, 2 out of ten chose 3). All of the lecturers admit that they lack (or don’t know how) in Moodle possibility to get a visual overview, analysis of students’ progress in their courses. It would help lecturers to overview study results, problems, issues within the semester and act on them if needed, not only in the exam period. It would improve student - lecturer interaction and collaboration that can result in better knowledge and skill acquisition, changes in behaviour and also make better learning’ experience. On the question of how lecturers follow learners’ progress - all
answered that they use tests and homework for assessments. One of the lecturers admit that in existing visualization student can see what he/she have done but doesn't see any feedback or suggestion about next steps. It resonates with research made by M. Olsson, P. Mozelius and J. Collin (2015) where students also pointed out this issue.

Lecturers admit that they have their own way to follow students’ progress. Some of the lecturers offer the possibility for students to get the course assessment (fully or partly) without exam test if they submit their homework on time and work hard within the semester. One lecturer reduces assessment if the student has unaccomplished works. One lecturer makes his own notes on student progress but it is not available for students.

All of the lecturers admit that in a way to get an appropriate visualisation of student’ learning process, large effort must be put on the course development. To develop an appropriate course, it takes a lot of time resources and skills for lecturers. They miss methodological support on how to develop and organize the course to get meaningful visualization of the study process.

5 CONCLUSIONS
Learning process' visualization as a research topic is very popular nowadays as lecturers, teachers and students are interested in learning process - in terms of knowledge, experience and behavioural changes. The most often Moodle is used to fulfil knowledge acquisition need.

Moodle as one of the most popular learning management system offers some possibilities to use learning analytics to follow student’ learning progress. Research made at Liepaja University showed that students intuitively use Activity completion in very rare situations. That means that there has to be information for students and lecturers of possibilities to visualize learning process. It is possible to set Activity completion as default for every course and in case lecturer doesn’t see meaningful usage of this tool, he/she can deactivate it. But there must be information about usability of this tool.

Lecturers, on the other hand, admit that they need methodological support on how to design and organize a course in Moodle to get meaningful visualization of learning progress. The semi-structured interview shows that seven out of 10 lecturers don’t know about existing Moodle tools that can help them follow students’ progress. There must be developed support materials for lecturers about visualization possibilities in Moodle as well as possibility to use some external learning analytics tool.

Research showed that learning process’ and progress visualization can motivate learners take more active role in their learning. It also can bring them more positive experience of learning. Research suggests that there is need for learning process visualization. To find appropriate and the most meaningful tool for this purpose future research must be held on already existing tools as well as possibility to develop one.

ACKNOWLEDGEMENTS
The article is written with the financial support of European Regional Development Fund project Nr.1.1.1.5/18/I/018 Pētniecības, inovāciju un starptautiskās sadarbības zinātnē veicināšana Liepājas Universitātē.

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