Learning Analytics for Student's Motivation

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Abstract

Methods of Learning Analytics are gaining ever broader usage and significance in the interpretation of big volumes of data related to the process of studying. Such data, recovered from backlogs of digital learning media, can assist monitoring the behavior of students in online platforms. Continuous analysis of this information allows the teaching stuff to evaluate the efficiency of existing teaching techniques and to formulate the requirements to new didactic methods that should improve the learning process and advance the learning success of students. Therefore the patterns of studies in learning analytics are usually specially tailored to serve the teaching stuff. However, for the students it can be nonetheless interesting to learn how, on the base of monitoring and interpretation of their own behavior and activities in online platforms, they can gain more information about the pace of their own learning compared to their classmates, and what they can and should do in order to raise their motivation and in that way to enhance their own learning success. In this paper we have studied the interest of the students towards the introduction of the methods of learning analytics into the teaching process. We present results of the survey conducted among the students of the HWR Berlin as well as extensions of the software for the Learning Management System Moodle that were elaborated and implemented by the group of students, basing on the results of the survey. We also discuss the aspects of privacy protection in the context of the personal information employed.

1. Introduction

Formal and informal learning over the Internet acquires the more and more significant position in the modern knowledge-oriented society. Important role in this process belongs not only to the development and usage of the new informational and communicational technical tools but also to the improvement and enhancement of the internet offers provided by the Universities. Information about the learning behavior and about the processes running on the teaching platform is indispensable from this point of view; access to this information can be gained by means of the Learning Analytics tools. Learning Analytics (LA) is a relatively young field of research. Its objects are methods and instruments that enable one to process the ample information about the learners and, in this way, to elaborate the suggestions for optimization of the teaching process. Acquisition of data that pertain to the learning process and to the course of studying, as well as the subsequent evaluation of these data can be performed with the help of various tools, e.g. AAT [1] or LiMS [2]. A new tool LeMo [3], that has been developed in the frame of the research project and is currently applied at the Berlin School of Economics and Law (HWR Berlin), makes it possible to analyze and graphically represent the behavior of students inside the learning platform. Basing on the results of this analysis, lecturers and developers of the teaching content can evaluate their own teaching offers and thereby raise the quality of learning and the learning success of their students.

An interest to the analysis of the behavior of the learners is not restricted to the teachers. The students would also like to know how they can, through observation and evaluation of their behavior and activities, learn more about the degree of their personal success, as compared to the classmates, and what they should undertake in order to raise their learning motivation and thereby enhance their learning success. This is also a part of the research field "Learning Analytics" that partially overlaps with the research region "Quantified Self". In the context of learning, the latter field "Quantified Self" (self-knowledge through numbers) has the same aims as the "Learning analytics", including the amelioration of the teaching and of the learning success of the students. The focus of the research is here always put on self-knowledge through self-tracking, self-reflection and self-monitoring. An important question that can be answered with the help of the methods of Quantified Self is: what is relevant for a given participant of the process, and in which respects this participant differs from the fellow students, colleagues and the rest of the world. Also the behavior of the students in Online Learning platforms can be regarded as a possible application object both for Learning Analytics and

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for Quantified Self. The software prototypes LIM App and MoodMap App, developed within the EU Project "Reflective Learning at Work", can be mentioned as a possible framework that allows the application of the approach Quantified Self for the support of the reflective learning. Application examples, processed with the help of these prototypes, give positive answers to the question whether the methods and tools of Quantified Self can enhance the reflective learning, and whether the visualization of the results of self-tracking stimulates the motivation of the students.

2. Methodology

In order to evaluate the relevance of the topic "Learning Analytics & Quantified Self" for the students, we have together with them prepared and conducted a survey. As a basis for the survey we took e.g. the following questions:

… How good is my performance, compared (in terms of tests, tasks, exercise) with other fellow-students?

… When do my classmates start studying? (How many days after the start of the semester)?

… Which documents are most popular in my Moodle-course?

… When do my classmates learn (time of the day)?

… I would like to be informed via E-Mail about new documents in Moodle!

... In case of my long absence, I prefer to receive an E-Mail reminder to make a new login at Moodle!

... I do not care about data privacy protection as long as my activities at Moodle are assessed in an anonymized form!

…

The survey was sent to the mail addresses of all students of our University and published on the Facebook. Relatively strong feedback indicates the existing interest to this topic among the students. Assessment has shown that the majority of positive responses have been attained by items of purely informational character like "I would like to be informed…" Questions concerning own or comparable learning success have found less interest on the side of the students. Among all students, a test group singled out the participants with previous knowledge in the field of "Learning Analytics & Quantified Self". Their answers to the survey questions differed from those of other participants by the higher emphasis to the questions related to own achievements and especially to comparable success.
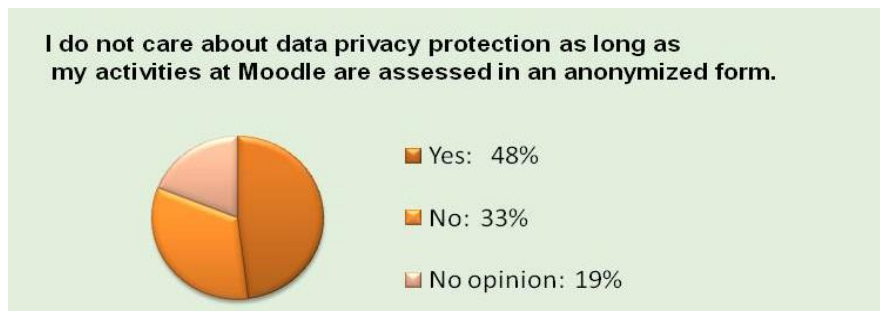

Fig. 1. Answers to the last survey question

Also the question about violation of data privacy protection in the context of anonymous evaluation of their learning activities invoked no negative associations in this group, although it was negatively answered by 33% of all survey participants (Fig. 1).

3. Implementation

During the implementation we performed a check: could the existing free LA-tools, through deepening the concept of role and authorization, be extended with the purpose of enabling the students to see their own activities and compare them to the activities of the classmates? There, we encountered a conflict with the regulations of the law on the defense of informational privacy that forbid storage of personal data of the students outside the Learning Management Systems (LMS) and, thereby, disable identification of participants in the frame of external programs.

Taking this into account, we decided to implement the new functions as Moodle Plugin components, since the LMS Moodle is an intrinsic part of the teaching process at our University. The newly

developed components should be, at first, activated and configured by the administrator of the Moodle; after that, the members of the teaching stuff decide whether these properties will be switched on/off in their courses. Technical realization of this idea was executed by a group of students in the bachelor program "Computer Science and Administration"; the objective was, to develop a plugin component for Moodle that, through evaluation of clicks and documentation about the login and logout times of the students, should offer assistance in improvement of the time management.

3.1 RememberMe

Implementation of the plugin component "RememberMe" ensures that after activation it is integrated into a background process automatically started by the system. It periodically checks whether a user has not logged in within a specified amount of time and, if necessary, sends to her/him a reminder (Fig.2). Both the time without log-in required to trigger the reminder and the content of the reminding message can be customized. The link [4] leads to the installation instructions and the technical details.
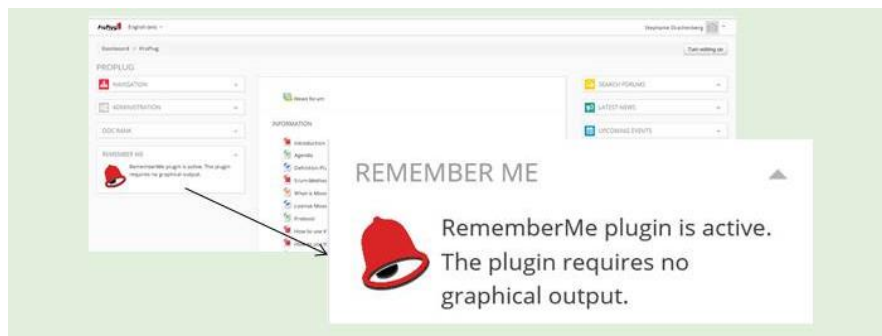

Fig. 2 Moodle-Plugin "RememberMe"

3.2 DocRank

The plugin "DocRank" is used to indicate how often a document has been clicked in a Moodle course. A click on the logo of the course opens a new window (Fig. 3). The information on the viewing rate of
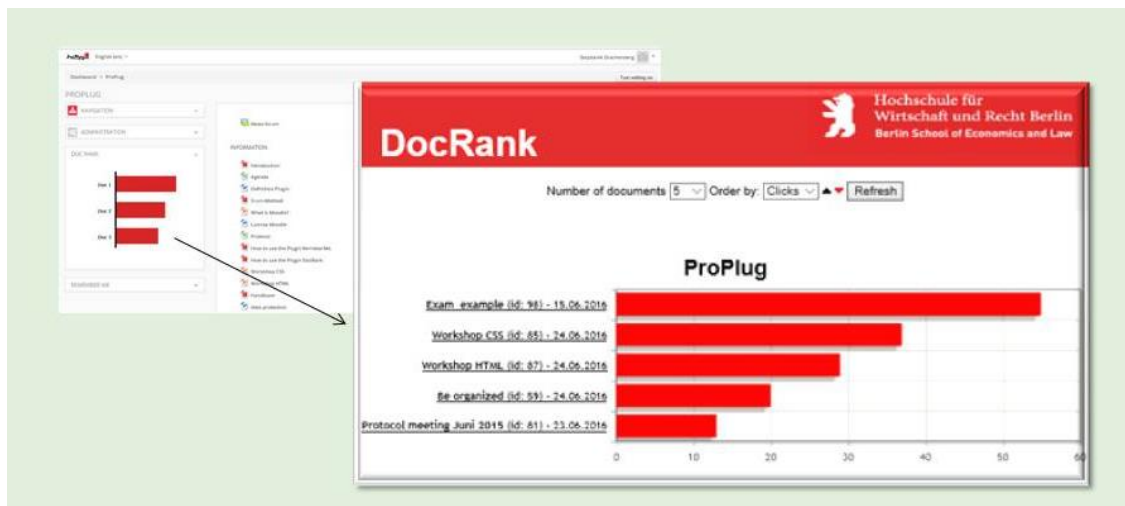

Fig. 3 Moodle-Plugin "DocRank"

documents within a course is then analyzed and the results are visualized as a chart. This enables ranking of documents in popularity and importance, urging users to read certain documents or pay closer attention to them. The chart features various filters and sorting possibilities. When the cursor is moved over a certain bar, the exact amount of clicks is indicated. The name of the document on the

left side of the chart is actually a direct link to the document itself. Clicking on it has no effect on the counter in the database. The link [5] leads to the installation instructions and the technical details.

3.3 CaT Work (Click and Time)

The purpose of this plugin is to visualize daytime distributions of activities. Once the plugin is correctly installed and activated, a new logo in the Moodle course appears (Fig. 4). A click on the logo opens a new tab in the browser which contains a heatmap-diagram with the numbers of clicks per time unit, sorted vertically with respect to the weekdays and horizontally with respect to the time slots. Every second column (Own) displays own activities of the user in the current course. The data are further partitioned into total amount, total own, average and average own. The color saturation serves identification of the weekdays and time slots that correspond to the bulk activities in the course. Installation instructions and technical details will soon be published under the docs.moodle.org, cf. [4], [5].
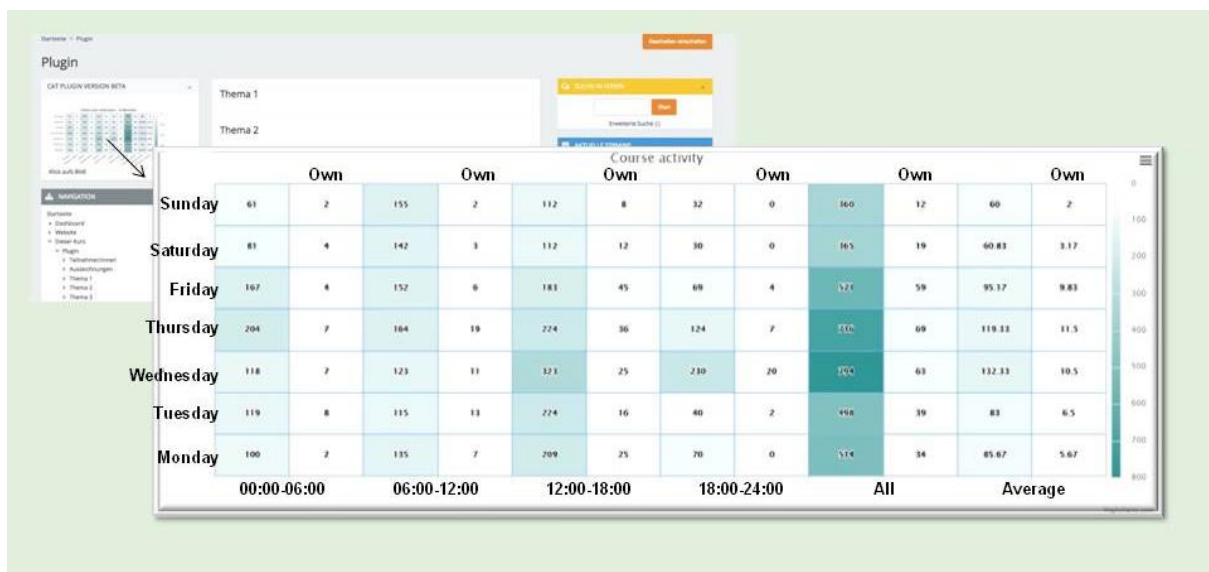

Fig. 4 Moodle Plugin "CaT Work"

5. Conclusions

The studies confirm that there are no technical obstacles to the acquisition, evaluation and visualization of student-related information that originates in usage of the digital learning media.

The problems of data privacy protection can be addressed via anonymization and the concept of the access authorization. The feedback from the students to the survey can be viewed as relatively strong, indicating their doubtless interest to this topic. However, the results of the survey have shown that the own motivation of the students concerning the evaluation of their own learning activities is not especially high. The reason can be the lack of knowledge about the benefits of self-tracking methods; this knowledge can be acquired e.g. via the exchange of experience or through the recommender-system, integrated into the learning management environment. The implemented extensions for the LMS Moodle will be improved with the aim of further application in evaluation of activities of the students.

References

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[4]   https://docs.moodle.org/31/en/DocRank

[5]   https://docs.moodle.org/31/en/RememberMe