

COLLABORATIVE LEARNING WITH REAL-TIME LEARNING INTERVENTIONS

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Abstract: This paper describes the process of collaborative learning and project design work using various collaborative tools. Teachers use “doKumaran”, within the LAMS * Learning Activity Management System, to manage collaboration within different groups of students in the learning process. Outside the learning process, collaborative tools available in the market (“JIRA” and “Slack”) can also be used that also offer the ability to be used to create project tasks in a group. The paper demonstrates the use of “doKumaran” LAMS collaborative activities within the learning process and the application of “JIRA” and “Slack” collaborative tools used in the software development industry. Outside the learning process, collaborative tools available in the market (“JIRA” and “Slack”) can also be used, and they also offer the ability to be used to create project tasks in a group. The paper demonstrates the use of “doKumaran” LAMS collaborative activities within the learning process and the application of “JIRA” and “Slack” collaborative tools used in the software development industry.

Keywords: *Colaborative learning, Colaborative tools, E-Learning, Distance learning, LAMS, JIRA, Slack*

1. INTRODUCTION

Collaborative learning enables communication, exchange of knowledge, ideas, and the students' joint work to accomplish a particular task. It is often the case that the group is made up of students with different levels of knowledge, learning style, different grades and the degree of motivation. The difference between students in a group may also be geographical distance or type of study (the traditional way of studying or studying online).

The initial goal of the group must be set by the author of the teaching material (the teacher), who forms the learning process and the tasks that need to be solved. The next step is for a group of students to set their goals and how they will solve the task while solving the problem.

The goal of collaborative learning is to enable unobstructed and real-time work in the chosen environment, regardless of the possible differences between the students of the group members [3]. Teacher involvement is desirable in order to provide guidance and instruction for solving a particular task. This paper will introduce some of the possible environments for supporting collaborative learning and the development of different types of assignments (project assignments, writing documents, programming a specific part of the application) of students in a group at Belgrade Metropolitan University (BMU). Some of the collaborative tools that will be described are popular in

the software development industry and are used for different types of projects.

2. CURRENT BMU LMS

Belgrade Metropolitan University uses LAMS (Learning Activity Management System) [5] to display teaching materials. The teaching materials are created in the form of learning objects using the mDita editor tool [4] developed at Belgrade Metropolitan University. LAMS enables the creation of an interactive learning process and the addition of additional activities to the process itself.

Studying at Belgrade Metropolitan University is possible in the traditional way (fifteen weeks of classroom lectures during the semester) and online (using the LAMS learning management system). In addition to classroom teaching, traditional students have access to the LAMS system as well as internet students. Teachers create learning processes (Fig.1) that are visible on LAMS for both types of students. Accordingly, students are given access to teaching materials [1] anywhere, anytime, while before using collaboration tools students can also use:

- Audio and video materials within the learning process: making it easier to understand the teaching topic being covered
- Self-test tests: which help the student to test his / her knowledge in several different places in the learning process. The student may run the test several times (within which he/she will receive a

different set of questions each time) and test his / her knowledge until he/she is satisfied with the results obtained on the test. The test shows several questions that were randomly selected from the test bank of that test.

- Additional resources: additional materials provided by teachers in the form of case studies, scientific papers, documents that allow students to gain a real-life example of what is being processed in the learning process
- Mind maps: by means of which they can freely move through the learning process and read the contents of learning objects [2]
- Forums: where students can exchange views with other students on a teaching topic

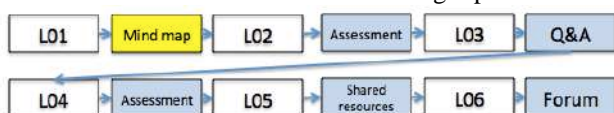


Figure 1: An example of a learning process with LAMS activities and a mind map

3. LAMS TOOL FOR COLABORATIVE LEARNING

LAMS since version 3.2 allows the implementation of collaborative activities between students. The “doKumaran” activity is an integrated tool with the LAMS system that allows teachers to easily create a collaborative learning process within which they can track student activities in real-time [6].

The tool allows students to collaborate on writing one or more different documents in real time according to the learning outcome set by the teacher for that part of the learning process.

The benefits of the “doKumaran” tool are:

- Possibility of real-time collaboration between students with the supervision of teacher involvement in work
- Archiving students' discussions and decisions during collaborative work
- Increasing the level of engagement of each student regardless of the level of knowledge
- Improving students' critical thinking according to the learning process

Following these activities, which are part of one learning process, students can do the tasks using a collaboration tool. It is up to the author of the instructional material to assign a task (whether students will do an example exercise, homework or project assignment) through a collaboration tool. Also, the author of the teaching materials creates groups of students who will work together on a defined assignment. Groups of students can communicate with each other, exchange task solutions, and work together to solve problems when needed.

Fig.2 shows the lesson of the subject “Software Design and Architecture”. After going through the learning process, students are tasked (in colaborative tool) with

defining functional and non-functional requirements for the system within a common project assignment. Students are divided into groups of three students (it is possible to place more students in a group).

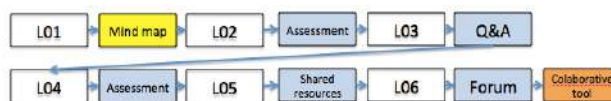


Figure 2: Adding collaborative activities to a previously created learning process

Fig.3 shows the lesson of the subject “Software Design and Architecture”. After going through the learning process, students are tasked (“doKumaran” activity) with defining functional and non-functional requirements for the system within a common project assignment. Students are divided into groups of three students (it is possible to place more students in a group).

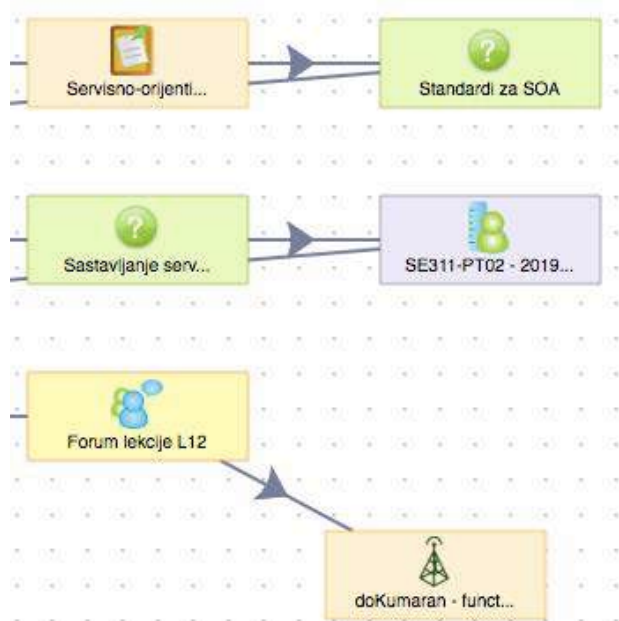


Figure 3: Part of learning process for "Software Design and Architecture" subject with doKumaran activity

Students must go through the complete learning process in Fig.3 and all activities in order to arrive at collaborative activity. At the beginning of the learning process, there is a mind map that students can access or any learning object in the learning process while they are on a project assignment if they need it. The student approaches a collaborative tool as part of the learning process and enters the first sentence: “List of functional requirements:” (Fig.4). The rest of the students in the group enter the text of the first student shown in green (Fig.5).

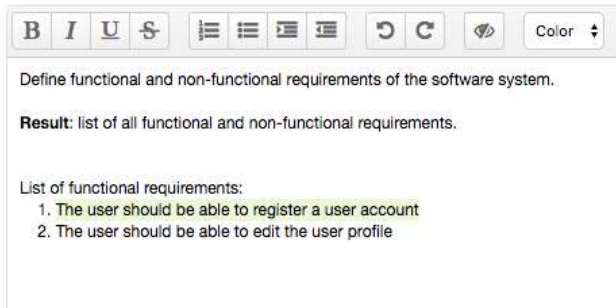


Figure 4: User interface for student 1

The second student who has accessed the collaborative tool enters a section of text under serial number 1 which is now displayed to the first student in green (Fig.4).

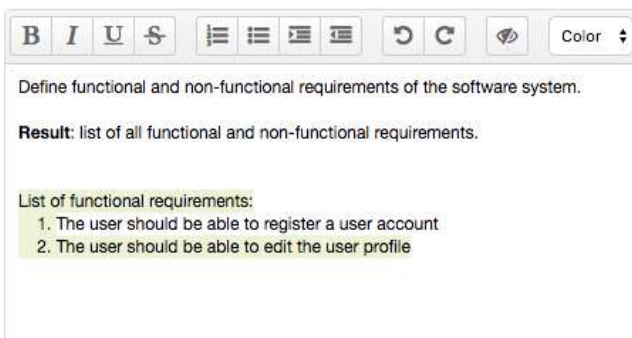


Figure 5: User interface for student 2

Text input by a third student within the group is indicated by a purple color. Students can change the previously entered part of the text, which after the change will be marked by their color for other students. (Fig.6).

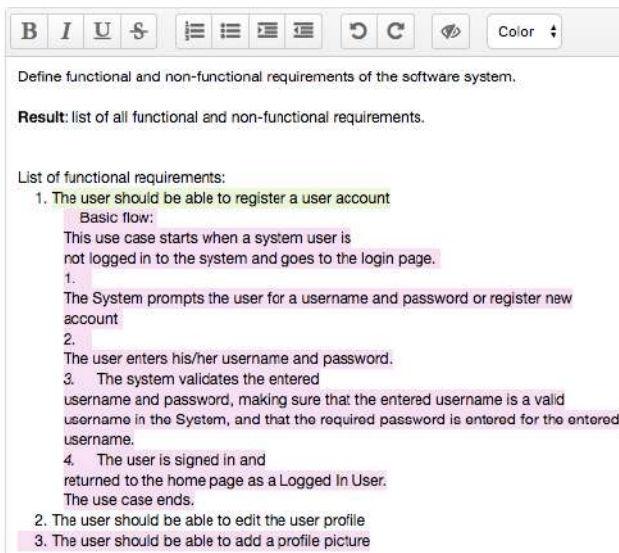


Figure 6: Example of text entry by a third student in a group

The author of the teaching material can at any time monitor students' activities in real-time in a collaborative tool, engage in a chat option in discussions between students, or directly correct part of the text that students have previously written. The written text can be saved as HTML or text file which can later be opened and modified in another word processor.

4. JIRA AND SLACK COLLABORATION TOOLS

JIRA [7] is a collaboration tool that incorporates various toolset according to project needs. It is widespread and is used in combination with other available tools. It is possible to create different fields, types of problems, data flows, notifications and generate different reports and diagrams to view the activities of project participants. Also, the tool is used as an issue tracking system and for workflow modeling.

For the purpose of working together students on a specific assignment, it is possible to define a task list for each student. The advantage of this tool is that the teacher can define assignments for each student and also the students themselves can select assignments from the to-do list and thus choose what suits them best. Students in the group can follow the progress of the project and the activities of other group members and, if necessary, get directly involved in its design.

An example is the creation of a part of a project assignment from the subject "Software Design and Architecture" within which a group of students has certain tasks that they need to distribute among themselves and complete within a certain time interval. The teacher created a to-do list, distributed them to students, and defined the estimated time each task was required to complete (Fig.7). Students, if they see a need for it, can create new tasks, split existing ones, and assign them within a group to other members to successfully complete the task.



Figure 7: List of student activities on the project

Fig.8 shows the list of assignments, the students to whom the assignments were assigned, and the current status of the assignments. Students, when they complete a particular task (which is in progress), can move the task into the "done" section, after which they must enter the time they need to complete the task.

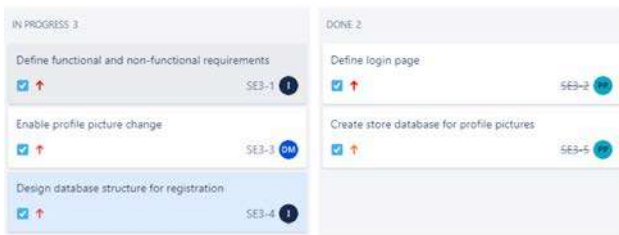


Figure 8: List of active and completed tasks

Jira is used in this case to create and assign tasks to a specific student. Slack [8] is used to communicate and inform students in a group while working on assignments. Slack works on the principle of different channels for communication and the main channel is connected to the Jira application in which the tasks are predefined. Any changes to the Jira Task are automatically displayed on the Slack General Channel. It is possible to use Bitbucket [10] or GitHub [11] to store code in combination with these tools.

When students update the program code, a notification is automatically created on Slack and all group members can comment on that notification or the program code entered by the student. Students within a group can be members of several different channels and the main channel contains all members of the group. It is also possible to create channels for each of the defined tasks and it is also possible to use a direct message for private communication.

Communication with the teacher through channels or direct messages is also possible at any time. Fig.9 shows Slack communication between students and teachers about predefined assignments through the JIRA tool. Students can comment on assignments, refer to them during the discussion, or assign a question to a particular group member. Also, the teacher can control communication and, if necessary, answer students' questions.

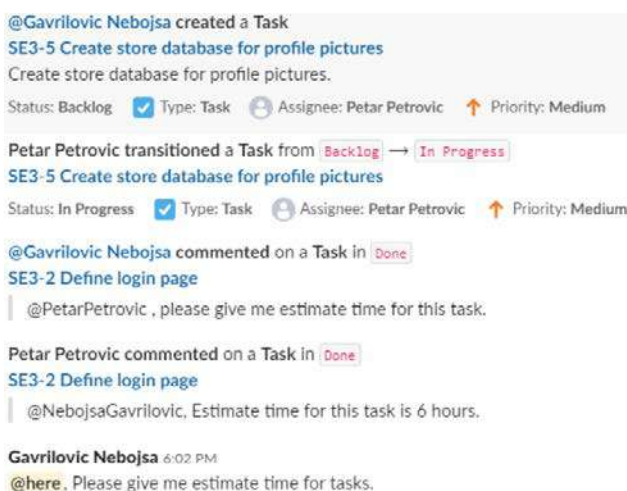


Figure 9: Slack Student Communication on Defined Assignments

The teacher as project manager can control the complete project work and generate different types of reports in which he can see all the activities of the students, the time

it took them to complete a specific task and assign the following tasks accordingly. Fig.10 shows the status of project assignments and the time it takes students to complete a particular task.

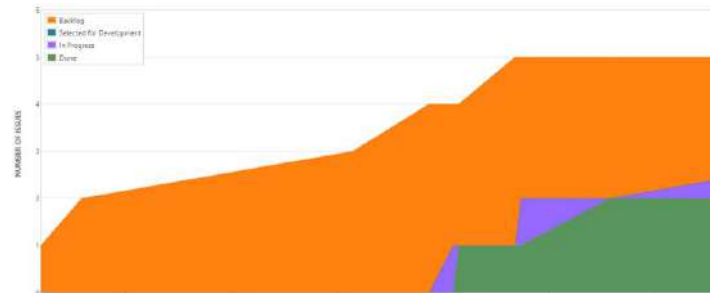


Figure 10: Diagram of the status of tasks within the JIRA project

5. RESULTS OF COMPARISON OF APPLIED COLLABORATION TOOLS

The collaboration tools described providing students with the ability to solve project assignments in a defined group in different ways. The LAMS tool (doKumaran) allows you to write project documentation and documents that are important during software design with the direct supervision and participation of group members and teachers.

JIRA as a tool allows you to define tasks and assign tasks to a specific group member. Also, JIRA has the ability to include a Confluence tool [9] that allows group members to participate together in writing a specific document. The advantage of the doKumaran tool is that it is directly integrated into the learning process and the student has the ability to read instructional materials and see case studies without using another tool or a new user account. Slack allows you to directly associate a specific JIRA tool task with a chat discussion.

The LAMS Collaboration Tool does not have this capability in chat, it is already necessary to emphasize what task is being discussed.

Based on the analysis of the collaboration tool, it is recommended that the "doKumaran" tool be used as part of the learning process and that students communicate with each other via teacher chat about the assignments given by the teacher. The JIRA and Slack tools in combination with a "Bitbucket" or "GitHub" account must be used for tasks involving programming.

6. CONCLUSION

This paper analyzes collaboration tools that can be used by a teacher to track student activity on a collaborative project. The teacher can:

- Controls student work in real-time
- Corrects program code or document in real-time
- Advise students through chat through student assignments

- Has insight into the time it takes students to complete a particular assignment
- Evaluates the performance of a particular student
- Monitor communication and collaboration within the group

The integration of collaboration tools within the learning process enables the student to have insight at any time into the teaching materials he / she has previously read and, if necessary, to go through the same and recall certain parts. Collaboration tools used in the software industry often require multiple different user accounts that need to be linked and verified before getting started.

The result of the analysis of this paper concludes that future research in the field of collaborative learning can be based on the integration of LMS systems and collaborative tools so that both students and teachers within one system have all the opportunities that available collaborative tools on the market offer (program code storage, updated program code, discussion of updated program code, etc.).

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