Developing homework submission platform

[Project Proposal]

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ABSTRACT

Academic technologies, especially online or web-enhanced courses play a significant role in the creation of high quality learning environment. Apart from managing the courses, the courseware should provide ease of usability. In this paper, we evaluate usability drawbacks associated with the WolfWare and Moodle system being used at NC State University from perspectives of both students and teaching staff. We specifically identify the problems associated with homework submission and grading portal of Moodle. The conventional system requires students to use different portals for homework submission, for discussions and for managing the course resources. Also, the existing system requires teaching staff to download each submissions, grade them and then upload again. We propose a way which eases the cumbersome task of managing homework submissions for students and grading process for teaching staff. We also plan to enhance the experience by providing useful analytics to the users.

Categories and Subject Descriptors

H.4 [**Information Systems Applications**]: Miscellaneous; D.2.8 [**Software Engineering**]: Metrics—*observations, convenience measures*

General Terms

Analysis, Case Study, Assignments, Evaluation, Peer review

Keywords

Moodle, Google Calendar, Learning Management System, Homework Submission, Homework Analytics Dashboard

1. INTRODUCTION

IIn modern education, the information technology particularly the internet plays a very important role in imparting learnings to students. The best practices in education require usage of courseware tools in order to support the teaching and learning processes, as well as in efficient assessment of students. In this paper, we evaluate few courseware tools such as Wolfware and Moodle used at North Carolina State University for learning management platform and the problems and challenges faced by students, teachers, teaching assistants and graders in using them.

WolfWare is NC State's enterprise suite of academic technologies and tools that provide instructors, students, prospective students and staff with a cohesive online platform that facilitate teaching and learning in fully-online, face-to-face and blended environments [1]. Moodle is a web-based tool (often referred to as a learning management system or LMS) used for web-enhanced and online courses. NC State uses Moodle as its primary learning management software. Moodle enables instructors to communicate with students and provide a variety of activities and resources. Some of the features that Moodle provide are maintaining a website for the course, posting or linking to a variety of content such as syllabi, assignments, readings, reference materials or recorded media, e-mailing and posting messages to notify your students about important events, using forums and wikis to allow students to collaborate, posting grades securely, receiving and returning assignments from students and creating online assignments and quizzes [2].

In this paper, we discuss our study to identify the drawbacks in the existing system being used at NC State University. We conducted two surveys with target audience as students and teaching staff to understand and identify the most frustrating problems faced by them in using Moodle, WolfWare and other courseware. We also did a literature review to learn about the drawbacks in the usually used learning management systems. Our interviews with teaching staff helped us to understand their perspective of a good course management system, to learn more about how they currently use the system to manage the course and to brainstorm the problems with the current system that needs immediate attention and needs to be solved immediately to make their life easy in rightly delivering and managing the course. Our sur-

veys with considerate amount of observations and analysis helped us identify the problems they face while interacting with the course management systems and which additional features they think that will benefit them to manage their courses, submit homework and assignments, enable collaborative learning through forums, chats, file storage areas and email notifications, and increase the ease of using course management portals. Also, we referred to the existing studies [3], [4] and [5] that investigates student's and teacher's experiences with the Moodle and analyzes their opinions.

From our study, we concluded that the most common problem faced by both students and teaching staff is related to the submissions and grading of assignments and homework through Moodle. Also, adding features such as integrated forums with assignment submission sections and auto-syncing of submission deadlines with Google calendars will help both students and teaching staff to manage the courses properly.

The rest of the paper is organized as follows. Section 2 presents our process of conducting the study and the significance of each of our surveys. In section 3, results of a questionnaire and interviews regarding the problems with the existing system and expected improvements by the stakeholders is presented. Conception of our idea is presented and Conclusions are drawn in Section 4 and Section 5 respectively which gives us possibility for implementing our solutions and solving the problems faced by students and teaching staff and thus, improving the education process.

2. RELATED WORK

There have been various web and desktop applications that implement the homework management systems in different ways with different features. One such tool which is widely used is Moodle. This application has a lot of features like a discussion forum, a portal for assignments submission and a deadline tracker. But the problem with Moodle alone is that it isn't sufficient to cover all the required elements. Its discussion forum isn't the most user friendly tool and the deadline tracker doesn't have an option for reminders. Many professors use multiple platforms like Moodle, piazza, Top Hat and many more for a single course. This highlights the problem with the existing system. Our aim is to provide a solution to these problems and come up with a single platform that will make the both the instructors and students job easier.

3. STUDY

The subjects were involved in informal conversations. The primary source of our data collection were Students and Teaching Assistants of various courses offered at NC State University.

3.1 Research Questions

In this section, we describe all the questions we put forward in our interactions with the subjects and also the ideas behind asking each question.

3.1.1 Questionnaire for students

Following are the questions and description targeted for students:

1. **How many learning management softwares do you currently use?**

   In this question, we try to figure how many different tools a student uses. One of the significant problems that we try to fix in this project is to reduce the total number of learning management system a student uses. Ironically, even though every tool tries to do the same, many fail in the task. So, we wanted to get an idea of how many different learning management tools the student currently uses.

2. **Have you encountered difficulties in performing these tasks with your current learning management systems?**

   The main problem statement of our project is to identify various pain points in the existing learning management tools. To do this, we had to first get an idea of what kind of tasks the student generally faces problems in performing using a learning management tool. So, the options included generic tasks like homework submission, discussing about it, etc.

3. **On a scale of 1-10, rate the ease of submitting assignments in your current homework submission system (1 being the worst, 10 being the best)**

   Submitting homeworks is the most common task everyone would use a learning management tool for. So, we wanted to know in a scale of ten, how hard the task is now. This will give us a better picture on how tedious this process is and if it makes sense to have a tool that fixes all the so faces problems and make the process easier.

4. **What format is your homework regularly in?**

   There are different formats in which students have their assignments. Some assignments might require only a pdf or a doc file, while other assignments might require more elements like images, spreadsheets, etc. In programming assignments, the submitted files might widely vary. So, we wanted to find out what is the most common method of file submission so that we can come up with solutions that will make the process much more simpler for specific file types that are most commonly used.

5. **On a scale of 1-10, how would you prefer an online text editor for writing your solutions?**

   From the previous question, though we know that there can be so many different file types in which a student can submit their assignment in, most of the above file types can be opened in a text editor(program files, etc.) or contain formatted text content(pdf, docx,etc.). So, if the students are comfortable with using an online text editor, we can simplify this process and build an online text editor that will be designed specifically for homework assignments. This would lead to a whole lot of features like adding equations, formatting, using data specific to the assignment, giving specific content for selected questions, etc. that will make the student's life easier.

6. **Have you done a peer evaluation for any assignment? If yes, rate the ease of use of the system.**

Peer evaluations are one of the problems that most learning tools do not have a workflow for. So, most of the times, students and graders end up tweaking existing systems for performing peer reviews. Thus, if the student has done peer reviews earlier, we wanted to know how hard the process was and to figure out if it is really worth making this process easier and intuitive.

7. **On a scale of 1-10, rate the ease of referring the assignments with its discussion threads**

   One of the most general problems that students face is to discuss about the problem in discussion thread about a particular part of the assignment. Most of the discussions are tied to an assignment but still, both of these entities are separated and there is no proper way to refer an assignment in the discussion. So, we wanted to figure out how useful it will be to implement this feature in an advanced learning management system.

8. **How do you discuss your questions about the homework after the grades are released by the TA/grader?**

   This is one of the pain points that a learning management tool cannot generally handle. Though this is handled a little bit by discussion threads, it is not completely handled and students still face problems in communicating with their graders after they get the solution and the assignment evaluated. So, we wanted to know what tools students use to communicate with their graders. This will give us an idea of what the most commonly used tools are and will help us think more on how to improve the functionality of these most used tools.

9. **How often have you forgotten the deadline for your homework?**

   This is another instance having the same problem solved in different tools. Though calendars are widely used by everyone, each tool uses its own version of a calendar and so, all the useful calendars of a student are never synced properly. Most learning management tools have their own calendar. But they are still disconnected with the student's calendar and so students miss deadlines. So we wanted to know how often a student has forgotten their deadline. This will let us know if the calendar's notes were effective or if we should come up with some other novel method to remind the student of possible important deadlines.

3.1.2 Questionnaire for Teaching Assistants

Following are the questions and description targeted for graders/teaching assitants:

1. **What tools do you use to grade the assignments and projects?**

   This question was asked to identify the user groups and divide them into categories based on their frequency of using the tool. This question also helped us identify the main problem with the existing system. It helped us analyze that there is no single platform that can wholly help the instructors to take a course. Almost all the instructors responded with multiple tool names for a single course.

2. **What problems do you face while using the tools?**

   This question was asked to get a general idea about the various problems that the graders face while using these tools. We expected a variety of replies for this question from the users and planned to sort the problems and try to solve the most prevalent ones first.

3. **What kind of feature do you think would be a useful addition?**

   The main idea behind this question was that it could bring up new ideas for our project that we initially couldn't think of. We could also receive ideas which we already planned on implementing which would mean that our ideas were definitely going to help people.

4. **Would you prefer it if there was a feature which enabled correction of assignments on the website itself?**

   This question proposed our main idea to the subjects and helped us get feedback from them and helped us proceed in the right direction towards a solution.

5. **Do you think downloading and manually correcting each student's assignment leaves a lot of unnecessary files on your system?**

   This question was put forward to observe if the users were facing problem with wastage of storage space on their system. The response to this question was inline with our thought process.

4. DESCRIPTION OF THE GRAPHS

The data collected through the interviews and observing the users gave an overall view of the problems faced by the users using the various learning management systems. Observing the users showed us about the problems faced during the assignment submission process like the format of the submission, the files to be submitted, switching between the various softwares for viewing the discussion about the assignment, etc.

The interviews and the discussions with the teaching assistants and the graders revealed another set of problems with the learning management systems they use. The results of the interviews are summarized and the set of features they prefer are shown in Figure 1.

5. CONCEPTION OF IDEA

Though we had many ideas to improve the system before the surveys, the collected data from the surveys had a major impact on our course of implementing the system. We started by analysing the response from the students. It was evident that a significant population used more than three tools. Majority of the problems were faced difficulties in homework submission, deadlines and discussion. So, these are main points of interest. In homework submission, only eleven percent of the students felt they had a good system to do the task. So, it was obvious that improvements in that front could help many students. Most students had their homework as text files or files that contain text content. Though we thought having a powerful online text editor designed only for this might be helpful, the analysis turned out to be different. From the survey, students did not seem to

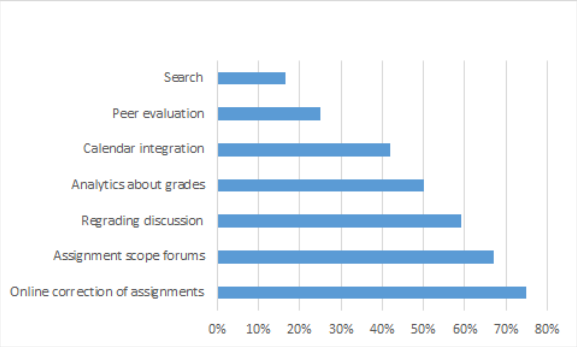

Figure 1: Preference of features by graders

From the pie chart, it can be inferred that the TAs and graders prefer a system where they can add comments and score the answers in the online system itself. They also preferred a system where the discussions about the assignments is present along with the assignments instead of being present in a separate place.

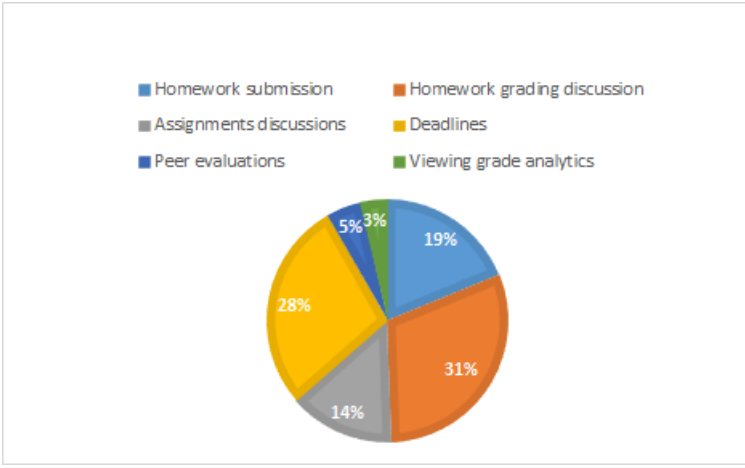

Figure 3: Distribution of difficulty in tasks

This figure reveals that most of the students face problems with the homework submission system present and also with viewing and tracking the deadlines.

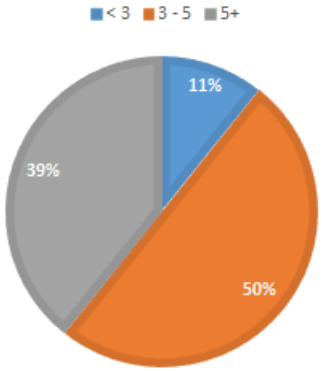

Figure 2: Learning softwares currently used

This feature reveals that majority of the students use around 3-5 tools for their courses currently. It can be inferred that multiple tools are being used for a single course.

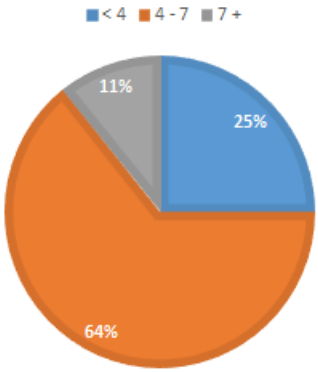

Figure 4: Level of difficulty in submission

It can be inferred that most of the students face problems with the homework submission system. The interviews revealed that the problems were related to viewing and relating the discussions, the file formats and the files to be submitted.

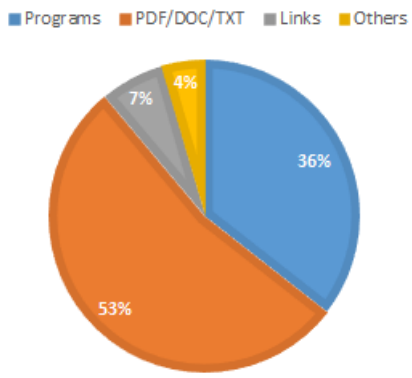

Figure 5: File format distribution for homeworks

The answers reveal that the most of the submissions contain text data. Hence an online editor in the submission page can also be helpful for the students.

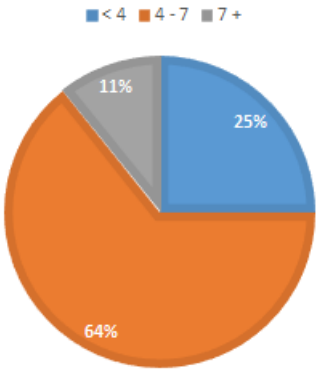

Figure 6: Online text editor preference

The graph reveals that only around 11% of the students prefer an online editor and 36% of the students prefer uploading a document for submitting the homeworks.

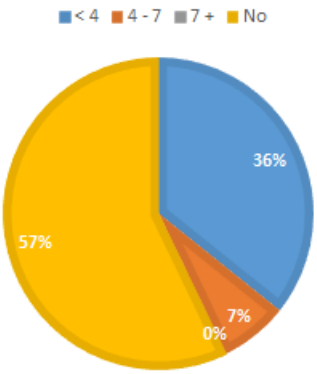

Figure 7: Level of difficulty in peer evaluation

Though 57% students have not done peer evaluation or never used a peer evaluation tool, the remaining population who have used these do not seem to be happy about it.

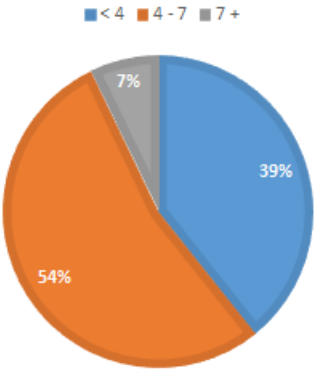

Figure 8: Level of difficulty in referring assignments in discussion threads

Almost 93% of the students seem to face issues in pinpointing their assignments in their discussion threads which shows a significant problem.

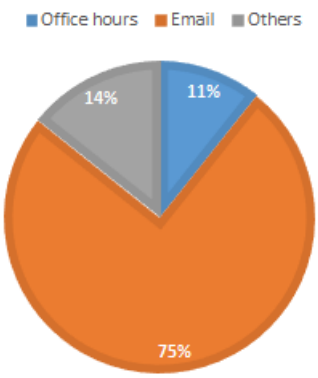

Figure 9: Distribution of student-grader communication method after grading

Students seem to go talk with their graders only 11% of the times about their graded assignments. 75% of the students prefer email to perform the same task.

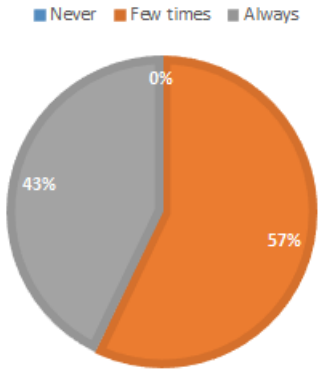

Figure 10: Extent of deadline forgetfulness

This shows that no student has never forgotten their deadlines. While 57% of the students forget it a few times, 43% of the students we reviewed seemed to find it very hard to keep track of their deadlines and always forget them

want an online editor. The percentage of the student population who would prefer an online editor was very less. So, we had to drop this idea. Having a better solution for the peer review system also turned out to be a good idea because most of the students had given a negative result on the ease of use of the existing peer review systems. The only problem was that many students had not used a peer review system for their courses. There was also good room of improvement on the ease of discussing over a particular assignment because students had problems in using the current system for this purpose and this was one the most common tasks they do. Discussing the assignment with the grader seems to always happen through email. Though current learning management tools have ways to solve this problem, students still seem to use email and so, a better tool that email might be useful for the students. Finally, forgetting deadlines always seemed to be a problem. Almost all the students had forgotten their deadline at least once in their work. So, a feature that would help the student to remember their deadlines should be a very useful part for every student.

With these results, we merged the results we got from the surveys taken with the graders. We found some very interesting points here. After looking at the surveys from the graders, some of the points made by the students seemed to make much more sense. The discussions platform was always a problem for the graders as well. The graders too faces the same problem and even though they did not want to use email, they were not left with better options to refer an assignment and have a conversation around it. This made it clear that we had to build a discussion platform right at the assignment and its solution so that the student and the grader can discuss about the graded assignment right in the context of the solution file submitted by the student. Another common problem for graders was to download and evaluate each of the submitted solution. So, doing it online by having document viewers and option to comment right there was a good way to help them out in easing the process. The problem with peer review seemed to be that most professors do not use it and even if they do, they have their own mechanisms to do it and so, even if there were tools for it, it wouldn't be of any use to the students or the graders. So, we had to drop this part. Also, there was no analytics on the score present on any of the tools. The graders felt that this might help them in understanding more on the assignments they had graded or they are grading so that they can just send this report to the professor. On thinking more on it, we felt that this kind of an analytics dashboard giving detailed insights on each single assignment, going deep to the level each single problem, common mistakes made, areas to concentrate on, etc. would help not only the professor or the graders but also the students in understanding the bigger picture. So, we planned to include that as well. Combining all these, we had a very good set of features and enhancements to be added to the existing learning management systems that will help the students as well as graders in doing their work better.

6. CONCLUSION

In our report, we stated the existing problems and described our study in detail. From our research, we concluded that many users face similar problems with the existing system. Most of the graders agreed that correction of assignments is a hectic task with existing systems like Moodle.

Many students who took part in our survey also accepted that they had trouble keeping up with multiple portals for each and every course. Students also agreed that contacting the instructors about grading issues is a cumbersome problem.

With our project, we provide an optimized solution which clears the problems of both the students as well as the graders. Our ideas were received well by almost all of the users who took part in our survey. Most of the graders suggested that they would like a feature which enabled correction of assignments online instead of downloading each file for every student. Students agreed that having a single platform which has all the functionalities required for a course is a great idea. Such a tool would help the students concentrate more on learning the course and not worry about keeping track of all the portals. We also plan on implementing an interactive forum for each assignment where the student and the instructors can communicate about grading issues. With our approach, we believe that the ease of usability will increase and thus, contribute in creating a better learning environment.

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APPENDIX

A. SURVEY QUESTIONNAIRE

Moodle is a learning management software where students can submit their homework, projects and take quizzes for various courses. It is also a platform for making course announcements and have a discussion about various topics through various features of Moodle. In this project, we aim to create a homework submission system that solves the problems in moodle and other homework submission systems.

A.1 Questions for Students

1. How many learning management softwares do you currently use?
   I. < 3
   II. 3-5
   III. >5
2. Have you encountered difficulties in performing these tasks with your current learning management systems?
   I. Homework submission
   II. Homework grading discussion
   III. Assignments discussions
   IV. Deadlines
   V. Peer evaluations
   VI. Viewing grade analytics
3. On a scale of 1-10, rate the ease of submitting assignments in your current homework submission system (1 being the worst, 10 being the best)
4. What format is your homework regularly in?
   I. Programs
   II. PDF/DOC/TXT
   III. Links
   IV. Others
5. On a scale of 1-10, how would you prefer an online text editor for writing your solutions?
6. Have you done a peer evaluation for any assignment? If yes, rate the ease of use of the system.
7. On a scale of 1-10, rate the ease of referring the assignments with its discussion threads
8. How do you discuss your questions about the homework after the grades are released by the TA/grader?
   I. Office hours
   II. Email
   III. Others
9. How often have you forgotten the deadline for your homework?
   I. Never
   II. Few times
   III. Always

A.2 Questions for Teaching Assistants/Graders

1. What tools do you use to grade?
2. What problems do you face while using the tools?
3. What kind of feature do you think would be a useful addition?
4. Would you prefer it if there was a feature which enabled correction of assignments on the website itself?
5. Do you think downloading and manually correcting each student's assignment leaves a lot of unnecessary files on your system?