MOBILE ILLINOIS CLICKER (MI - CLICKER):

NEXT GENERATION EDUCATIONAL TOOL FOR MOBILE LEARNING COMMUNITIES

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Abstract: Education has always been the hallmark of man’s progress in the civilized world. In the past few decades we have seen the face of the classroom change by including more and more electronic devices like projectors, tablet PC’s and computers. Mi-Clicker is revolutionary interactive mobile application software for students. The Mi-Clicker encourages student participation in large classrooms. It also provides an instant feedback system for instructors. The goal of classroom education was instructors imparting knowledge to the students. In order to assist in this goal, Mi-Clicker provides activity features such as quizzes, a way for students to ask questions using an audio recording or a text message and an announcement system for students to remain up to date about any important class proceedings.

1. Introduction

The concept of a classroom has been present since the time that the concept of group learning was introduced. The initial blackboards have been replaced with whiteboards. Lecture slides on large projectors and tablet computers where professors are able to visually communicate their ideas are some of the new additions to the changing face of the classroom. Classrooms have gradually changed over the last few decades to ensure that the educational material is imparted in the best possible way. The average duration of a class is usually 50 minutes. The attention of students is not focused on the instructor’s lecture for this entire duration of time. The aim of the education system was to ensure that the number of students who comprehended the lecture material and the percentage of the lecture material grasped by students increased as these changes were made. Technology has been used to achieve these fundamental goals. In order to engage students more, class participation is encouraged with the professor asking questions and the students replying with electronic voting devices like the Illinois Clicker (I-clicker). The monotony of listening to lecture material is avoided by inserting YouTube videos or group discussion among students. In the past few years, a mobile device has become a pervasive technological tool. Mobile devices have taken the industry by storm with better and more advanced phones being released every month. Navigating a city, surfing the internet and watching videos are all possible with these handheld devices that boast of increased power and performance with each coming week.

The goal of Mobile Illinois Clicker (Mi-Clicker) developed at the University of Illinois, Urbana-Champaign is to use mobile devices to improve the quality of education for students today. Mi-Clicker has four main features in order to enable better interaction between the instructor and student– quizzes, announcements, audio messaging and text messaging. There have been many attempts to use handheld mobile devices in classrooms. One of the first attempts to involve students through the use of technology was Classtalk (Abrahamson et al. 1989). It was used by students in large classrooms to answer the instructor’s questions through the computer. The motivation behind it was to allow students to be actively involved in the lecture. TI-83 plus were also deployed in classrooms but they were only able to provide graphical interaction and basic multiple choice quizzes (Davis 2003). Moreover this was tested in a high school and hence scaling to the huge capacity of college classrooms might be an issue. The Wireless Interactive Lectures in Mannheim (WIL/MA) have also been deployed on a college campus (Sheele.2005). The
software developed using Java was used only on Netbooks and Pocket PC’s that supported Java rather than on mobile phones. It does have quiz, messaging and feedback features in its implementation which is similar to Mi-Clicker. In this paper we present the architecture of Mi-Clicker in section 2 and Login services in section 3. This is followed by the description of the quiz, messaging and announcement features of the Mi-Clicker software in Section 4, Section 5 and Section 6. In section 7 we present the student’s feedback and we conclude in section 8.

2. Mi-Clicker Architecture

![Figure 1: Mi-Clicker Architecture](image)

Mi-Clicker is software written by the students of University of Illinois, Urbana –Champaign for the students. It consists of both a web interface for instructors and client/server architecture for students. The web interface and server side management is composed of PHP files and a SQL database. The front end of the website is designed using CSS HTML templates in conjunction with PHP. The SQL database is used to store the announcement, messages and quiz files. It also stores the answers entered by the student. The PHP files are used to interact with the database. The client side is an Android application which can be run on any mobile device supporting the Android platform 1.6 and greater. We will describe the Mi-Clicker on a more functional level in the following sections.

3. Login

The login functionality of the web interface and the android application provides the required authentication for both instructors and students to use the Mi-Clicker software.

Instructor’s View

On viewing the home page of Mobile Learning Community, instructors can navigate to the top panel of the web page and login for the class that they are using the Mi-Clicker software for. The instructors can use the university ID for logging in. Initially the instructors have to request a password to access the site. There is also a link where instructors can change their password if they are aware of their existing password. On logging in, they view four links to their left which they can use for navigating the website. The four links are Quiz, Messaging, Announcement and Update Enrollment. The Update Enrollment link is used by the instructor to enter the student ID’s who are enrolled in the course and are using the Mi-Clicker application. The students ID’s are university affiliated and are identical to the university email address. We will continue our discussion in more detail about the other three features below.

Student’s View

The students have to download the Mi-Clicker application from the Android Market. In order to login to the application, students have to request the password on the home page of Mobile Learning Community. They can change their password by visiting another link on the homepage. Students on running the Mi-Clicker application
are immediately taken to a Login screen (Figure 1.a) where they enter their username and password. Logging in authenticates the student and the server provides it with an authentication token which the student uses for further interactions with the server. There is a “Remember Me” check box which can be used to cache the username and password. This is to ensure that the client authentication takes place seamlessly in the background if the authentication token is lost. The student on logging in is led to the activity screen (Figure 1.b).

4. Quiz

The quiz application provides a way for instructors to ask multiple choice questions about the lecture material and obtain a real time feedback about the progress of the students.

Instructor Side

The instructor can create and release quizzes with as many questions and answer choices as required. On logging into the web interface, the instructor navigates to the quiz list screen using the” Quiz” link on the left hand corner of the screen. There is an empty text box for the new name of the quiz along with the “Create Quiz” button. In the following page the instructor can enter the question and as many answer choices as required. The correct answer has to be indicated by clicking the radio button next to the answer. The instructor has to save the quiz and move back a page by clicking on the “Quiz Overview” button. The “add question” button can now be used to create more questions for the quiz. Once all the questions have been entered, clicking the “Quiz List” button will take the instructor back to the original Quiz page where all current quizzes are present. Once here the instructor can now view the various options that are present with every new quiz. Each quiz that the instructor creates can be released, unreleased and deleted. There is also a provision to release answers once the quiz has been completed by students and export answers to Comma Separated Value (CSV) format. The instructor can now release the quiz in the class in order to obtain instant feedback about the lecture material.
Students are able to better engage in the classroom proceedings by breaking the routine of listening for 50 minutes. They are also able to tell the instructor about how much they have learnt and if it would be beneficial to the majority of students to repeat any part of the lecture material.

**Student’s View**

The student logs into the application and is immediately taken to the Activity screen with all four features displayed. Clicking the Quiz icon, the student now moves to a screen with all the currently released quizzes. The quiz name is selected and the student is now able to view the quiz with all the answer choices displayed. The menu button displays four options for the student when taking the quiz. The student can either submit answers as they are being selected with “Auto Submit” or choose to save answers and submit them all at once with “Submit All”. Only the last answer is selected and stored in the database. This allows for multiple quiz submissions. There is also the “Help” option where the student can view which website to visit for more information about how to use the Mi-Clicker application and whom to contact in case of queries. If the instructor has released answers, the student on selecting the “Answers” option moves to a screen where all the quiz questions along with the options selected by the student are displayed. This is along with the correct answers to the quiz questions. If the student’s answer matches the correct answer, there is a single answer choice displayed in green. Else there are two answer choices, the correct one highlighted in green and the student’s choice highlighted in red. The statistics of the class is mentioned in terms of the number of students who were able to answer a question correctly. This provides feedback about the student’s performance with respect to the whole class. In this way the student can check to see if the concepts grasped are clear or more work is required.

**5. Messaging**

The text and audio messaging provide a way for students in large classrooms to ask questions without hesitancy and for instructors to address the queries in the best possible way.

![Figure 4.a: Text Message Dialog](image)

![Figure 4.b: Audio Message Dialog](image)

**Student’s View**

In order for students to query the instructor regarding lecture material, there are two messaging formats that are used. Students can either send a text message or an audio message. The text messaging icon brings forth the text messaging dialog (Figure 4.a). This is a text box with two options, to send the message or discard it. Sending the message will now enable the instructor to view it on his account through the web interface. Similarly clicking the audio messaging icon brings up the audio messaging dialog (Figure 4.b). Clicking on the start button begins the recording. Once that is completed, the student has three options. He can choose to discard the recording, send it to the instructor or play it back. Once the send button has been pressed, the recording is uploaded to the database for the instructor to listen to.
Instructor’s View

Clicking on the Messages link takes the instructor to a screen where he can view all messages sent by the students. The message is accompanied by the time and date, along with the student’s university id. Using this, the instructor can choose to address the problem in class or email the student about it. The Messages link is accompanied by the current number of unread messages. The text messages are visible along with options to delete them and mark them as having been read. The audio message can be downloaded or deleted as required. Audio messages can be played by the instructor with Windows Media Player or any other music player supporting the .3gp encoding. The messaging application aims to aid shy students or students hesitant to raise their voice in class. It is often noticed that most students who participate are in the first two rows of the classroom. In large classrooms, it is most beneficial to have a way for students in the back benches to communicate with instructors as effectively as people in front benches do. Mi-Clicker aims to increase student involvement irrespective of their location in a large classroom or personal hesitancy.

6. Announcements

The announcement feature of the Mi-Clicker software provides a convenient way for student to be up to date with the class proceedings. The instructors can choose to populate the announcement list that gives the student the most vital information about the class proceedings.

Figure 5: Announcement screen with menu button options

Instructor’s View

The Announcements link on the left hand side of the web interface leads the instructor to the screen for creating announcements. The instructor can enter new announcements in the text box provided and click “Post Announcement”. The announcements that have been created so far are present in a list below in chronological order. There are two options present with every announcement. The instructor can choose to release the announcement or delete them.

Student’s View

The student can click on the announcement icon and be led to the screen with a list of announcements (Figure 5). A number of options are presented to the students by the menu button. Students can send text and audio messages related to queries about announcements. They can refresh the current announcement list, view the latest announcements released or all the announcements that have been released till date.

7. Mobile Learning Community Feedback

The Mi-Clicker application was deployed using 40 G1 and G2 phones in the CS 241 – System Programming class in spring 2010 at the University of Illinois Urbana-Champaign. The feedback collected from students at the end of the semester provided valuable insight in order to proceed further with the Mobile Learning Community initiative. 19 students responded to the questionnaire which contained three main queries: (a) what were students’ experiences
with the mi-clicker software, (b) what kind of problems did students experienced with the phone, (c) what kind of future usage of phones/software do the students envision in an educational environment.

The most common answers to the first question was that students found it useful to use the quiz applications and text messaging, however the integration of this new educational tool into the current teaching system has to be planned. The Mi-Clicker was not used as frequently as the students would have liked. Students found the Quiz, Messaging and Announcements features most useful when used in class regularly. Improved web interfaces for instructors and suggestions for integrating the Mi-Clicker into their daily teaching paradigm might be useful to encourage the use of Mi-Clicker in future classrooms. Question 2 generated answers that focused on delayed responses from the server, device power and Wi-Fi availability issues. The ability of the current Wi-Fi infrastructure to support the large deployment of phones in a classroom is discussed in more detail in the technical report by Nahrstedt (Nahrstedt 2010). For the third question students responded by suggesting more applications to be included in Mi-Clicker like group management for assignments, SVN updates, newsgroups etc. Students suggested that a stable and simple version of Mi-Clicker without Wi-Fi availability issues be provided for future classes. They also requested Android programming tutorials to be conducted.

8. Conclusion

The Mi-Clicker software created by the students of the University of Illinois, Urbana –Champaign was one of the first educational applications developed on the Android platform as part of the Mobile Learning Community initiative. It provides the Quiz, Announcements and Messaging features in order to improve the interaction between students and instructors. It also helps in increasing student participation in large classrooms and providing instant feedback for instructors. By including Mi-Clicker into the teach paradigm of instructors, the educational experience of students in classrooms and outside will be improved.

There have been many challenges that have come up in the development and deployment of the Mi-Clicker software. Providing the necessary infrastructure to support the usage of the software by a 100 or more student has been difficult. The delay in client connections to the server was abated to some extent by the switch from non-persistent to persistent connections. More effort needs to be made to make the Mi-clicker a part and parcel of the instructor’s routine. The use of Mi-Clicker has also led to interest in Android programming. This has been encouraged by providing tutorial sessions for students to help them learn and develop Mobile Learning Communities. Incorporating the suggestion of students and making improvements to the Mi-Clicker application is carried out to create a more stable version of the Mi-Clicker software. The future stable deployment of Mi-Clicker in classrooms in the coming semesters is the next step in the Mobile Learning Community initiative.

References

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