University of Arkansas – CSCE Department

Capstone I – Final Proposal – Fall 2019

Clicker App

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Abstract - Bri

Some professors, especially in entry-level classes require that students purchase clickers. These allow them to take attendance and also keep students engaged with questions. Students are required to purchase a physical clicker and subscription through Turning Point to activate the clicker. This is costly to students, and the functionality of the clicker is minimal. Simply allowing a student to check-in, and answer basic multiple-choice questions. We are going to create a mobile application that will have this same functionality, but is also free for students. It will also have a more detailed user interface allowing teachers to ask more engaging questions. It will be more accessible than the clicker because most students have a smartphone that they can download this application onto. We are going to create a cross-platform application using React Native. It will be written in JavaScript.

This clicker application will have great significance for many reasons. It will save college students, who are typically already on a very strict budget, money. It will also allow professors to interact in a more effective way with their students, especially in large classes. Students will not have to remember to bring their clicker to class, thus more students will be able to interact, and be counted present. This will foster a better learning environment and more successful students.

1.0 Problem - Bri

Professors encourage students to be present during lectures, mostly in entry-level classes, by factoring in-class attendance into each student's grade. This is achieved using clickers. Clickers

are “handheld devices that enable instructors to pose questions to students and immediately collect and view the responses of the entire class”. They are also used to give quizzes and take polls. The clicker can be used for multiple classes, because the student must set the channel number, based on which classroom they are in. Students must purchase the physical clicker from the bookstore. They also have to create a Turning Account and register their clicker.

The major issue with the current system that the university uses is that it is costly for students. On the University of Arkansas Bookstore website, a clicker currently costs $82.99. This includes a five-year subscription through Turning as well. This subscription is used in order for the student to activate the device, as mentioned above. On top of tuition, and books, this is another added cost that is unnecessary. Students should not have to purchase technology, to simply be counted present.

Another issue with the clickers is their limited functionality. The clicker has twelve buttons, which include single digits/the first ten letters of the alphabet, a channel button, and a help button. This only allows professors to create multiple-choice questions and fixed response polls. There have been issues with students checking in, or answering questions for other students. One student could bring multiple clickers to class, and allow their friends to also receive the credit for participation. This is not fair to the other students. It also hurts the students who are not there, because they are missing out on important material. Another issue arises if a student who is attending class, forgets their clicker. They are then penalized for missing class, even though they were there.

2.0 Objective - Lori

The objective of this project is to create an app that will allow students to check in to class for free and will also allow professors more flexibility in how they take attendance and give in-class questions.

3.0 Background - Lori

3.1 Key Concepts

The first key technology related to this problem, and the inspiration for the project, is TurningPoint clickers. The clickers are a physical device that students can purchase to use to check in to class. There are similar apps available but a subscription must still be purchased to use them. The technology is used for taking live polls in multiple settings, including businesses and classrooms. The software can be used for taking polls to multiple-choice questions but cannot be used for open-response.

Another similar technology is iClicker. This service has all of the same functionality as TurningPoint and more. Instead of clickers, the handheld device is called a remote and can be used as a distraction-free way to answer questions. There is also an app available and it uses

GPS tracking so that students must be in the classroom to answer a question. It also has open-response capabilities, allowing for tweet-length responses. It has learning management system integration so grades can be updated automatically. Teachers can also send out the questions to students as study guides whenever they choose, with or without answers. With all of its functionality, students still have to pay to use the software. This, on top of other school fees, is unnecessary. Students are already paying tuition to be in the class, they should not also have to pay to be counted present and answer in-class questions.

3.2 Related Work

Development of TurningTechnologies [2] began in 2002 in Ohio. iClicker[3] was created by the University of Illinois in 2000. Both TurningTechnologies and iClicker provide a good infrastructure for class attendance and questions in terms of usability. However, they both fail to provide something that students today need: a free service. With the cost of attendance at universities going up, this is just another needless burden on students.

With our implementation of the response system, we plan to make it free for all students to use. It will also provide functionality such as GPS tracking and short-response questions which TurningTechnologies currently does not offer. For teachers, this service will provide integration will a grading system that will allow grades to automatically be updated. This will overall make it a better option for students and teachers to use.

4.0 Design

4.1 Requirements and/or Use Cases and/or Design Goals - Walter

- For signup, there should be functionality to sign up as either a teacher or student.
- Teachers should be able to create classes and be given a unique code from the server based on that class.
- Students should be able to register for their class by typing in a code given by their instructor.
- Teachers should be able to create sets of questions before class or create questions on the go for the students to answer during class.
- Students should be able to sign in and/or answer questions.
- Teachers must be able to see student's statistics for attendance and question grades. This includes statistics for individual classes and all classes.
- Students must be able to view their past attendance and grades.
- The user interface should be minimal and easy to use, while being flexible at the same time.

4.2 Detailed Architecture - Phil, Taylor

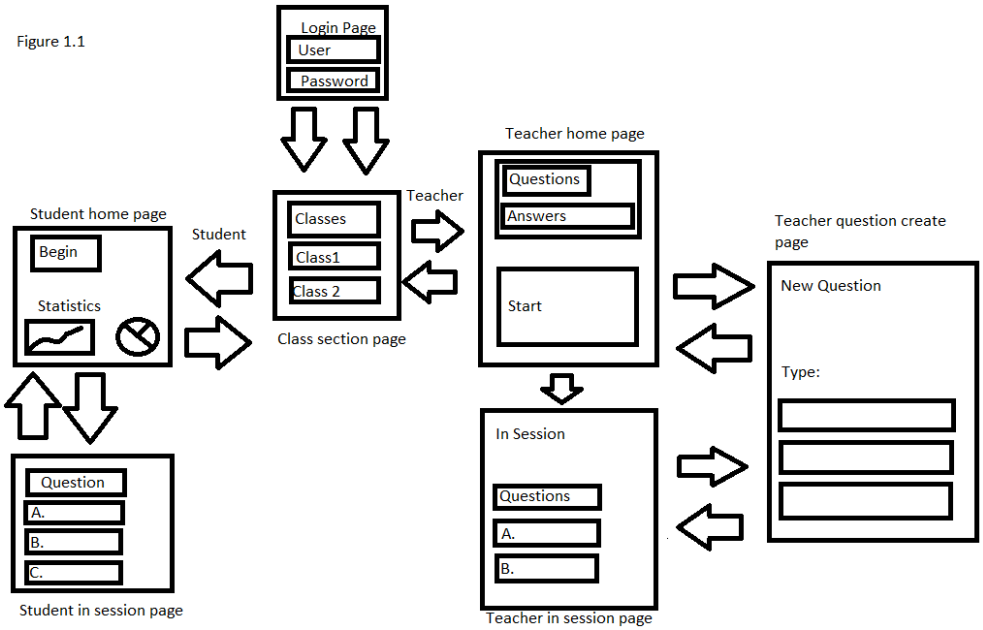
For this project, the main components that will comprise it are the phone, the application itself (i.e. the user/client side interactions) as well as a Firebase database to store user information. A proposed design for the flow of the user interface is attached.

Initially, the app will launch with a login screen displayed. The user will enter their credentials, and then be redirected to a “hub” page whose functionality depends on the status of the user. For the most part, it would be a list of classes that are attached to the user, with a button that adds the ability for a user to add a class. The action initialized by pressing this button will depend on the type of user - if the user is a student, they will be prompted to enter the unique ID of the class that they are trying to sign in to. If the user is a teacher, they will be redirected to a page that allows them to create classes and edit their properties.

On the “hub” page that would have tiles corresponding to the classes attached to the user, the user would be able to click on them and be taken to a page for that specific class. For students, it could comprise of a large button at the top of the page that would sign the student into the class. Under this button, there could be a collection of statistics that the system has recorded for that user in the specific class. The page teachers are redirected to would be similar but with added functionality to create/edit sets of questions for their classes. There would be a button to start or activate the class, which would allow students to sign in and answer questions in real-time.

In terms of the back-end, the main components will be the databases and the logic to efficiently link users to classes, and classes to professors, et cetera. We will have a table for all of the users, a table for all the classes, and tables for each class that contain each student.

Figure 1.1



4.3 Risks - Walter

Risk	Risk Reduction

Project Incompletion	We have thoroughly planned by creating the design, high-level architecture, schedule, and task assignment. We have also chosen a popular technology stack with an abundance of documentation, tutorials, and resources.
Wifi Loss	If wifi goes down, local app storage will be used to save data if there is no cellular service in the classroom. When connection to the internet is restored, any data that was not passed to the database will be updated.

Tasks - Taylor

1. Make the roles of the project clear and assign roles.

2. Create a login interface that is able to connect to the database.

3. Create a class list page that lists every class that the user has access to.

4. Create a student homepage that is able to create statistics based on the student's performance and begin a session to answer questions. The statistics are based on how many questions the students answer correctly.

5. Create a student in-session page that allows the student to answer questions and uses a timer to answer questions within a time limit.

6. Create a teacher homepage where the professor can create questions and begin an answer question session.

7. Create a create question page which allows the teachers to create questions and assign a timer.

8. Create an in session page for the teachers which allows the teachers to activate the questions that they created in the question creation page.

9. Test and debug the final product.

10. Compile all of the documentation together.

11. Finalize the Product.

12. Publish on the Playstore.

4.5 Schedule - Taylor and Phil

Tasks	Dates
1. Assign Roles and divide the tasks	1/13
2. Create a login interface that is able to connect to the database.	1/13-1/17
3. Create a class list page that lists every class.	1/17-1/22
4. Create a student homepage that is able to create statistics based on the student's performance and begin a session to answer questions.	1/22-2/5
5. Create a student in session page that allows the student to answer questions.	2/5-2/12
6. Create a teacher homepage where the professor can create questions and begin an answer question session.	2/12-2/19

7. Create a create question page.	2/19-2/26
8. Create an in session page for the teachers.	2/26-3/4
9. Test and debug the final product	3/4-3/18
10. Compile all of the documentation together	3/18-4/1
11. Finalize the product	4/1-5/1
12. Publish on the playstore	5/1

Deliverables

- Design Document: contains a listing of each major hardware and software components
- Database scheme and initial data: the database schema is for a firebase version
- Source code for the application
- Access to the firebase database
- A final report that is similar to the preliminary report but will have more detail

5.0 Key Personnel- Brittney

Brianna Ciora- Ciora is a senior in Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas and has a minor in Mathematics. She has completed Software Engineering and has relevant experience in mobile development. Ciora will be responsible for the database connection and maintenance of this project.

Walter Dane- Dane is a senior in Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas. He has completed Software Engineering and has relevant experience in mobile development. Dane also has had an IOS mobile development internship at Karsh Consulting. He will be responsible for the database connection and maintenance of this project.

Lori de Boer- Boer is a senior in Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas and has a minor in Mathematics. She has completed Software Engineering. Boer will be responsible for the front end and user interface design for this project.

Brittney Pham- Pham is a senior in Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas and has a minor in Mathematics. She has completed Software Engineering and has relevant experience in mobile development. Pham will be responsible for the front end and user interface design for this project.

Taylor Kinsey- Kinsey is a senior in Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas and has a minor in Teaching. He has completed Software Engineering. Kinsey will be responsible for the back end of this project.

Phillip Boudreau- Boudreau is a senior in Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas. He has completed Software Engineering. Boudreau will be responsible for the back end of this project.

6.0 Facilities and Equipment- Brittney

The main advantage of our application is to create a free application that lets students sign into their classes without paying for expensive response cards. The only technology that the student needs is a smartphone that can be able to download applications and connect to the internet. Our group does not need any facilities to complete this project as all attendance/answer inputs will be stored inside of our application for instructors to handle at their discretion.

7.0 References

[1] Create a Student Turning Technologies Clicker Account, https://bbhelp.uark.edu/getting-started-with-student-clickers/

[2] Turning Technologies, Clicker and Student Response Devices, 2019, https://www.turningtechnologies.com/clickers/

[3] iClicker, 2019, https://www.iclicker.com/