**CS 490**

*OpenClick*

*Ben Waters, Ryan Wolfe*

*4/16/2015*

**ABSTRACT**

The question we asked ourselves was if we could create a system that rivaled other interactive classroom quizzing systems such as iClicker and Top Hat Monocle. Our implementation would need to be free, accessible, customizable, and benefit the student more so than the other systems. The benefits aim to include promoting positive interaction between the students and the classroom, increase the amount of learning done by keeping the students attention focused on the work, and by not costing them a penny. What we ultimately landed on was the idea of OpenClick. The aim of OpenClick is to provide teachers and students with an easily accessible and usable way of live classroom quizzing at an extremely low cost. Open Click is completely open source and customizable to the teacher, student, or institution. By being customizable, this would allow for a greater variety of question types including multiple choice, short answer, true and false, essay, and more. The benefits of having a larger variety of question types compared to other implementations would ultimately allow for more feedback to be given to the students from the teachers, resulting in more engagement and increased learning. The following pages will detail our thought process on how to go about creating OpenClick, the problems we faced, how we overcame these specific problems, and the results and conclusion of our efforts.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**BACKGROUND INFORMATION**

As a student in any level of education, you will have, or will one day find yourself face to face with an intimidating sheet of paper that reads, “QUIZ” at the top. In this day and age, many teachers, professors, and schools are heading down a path that leads to a digital classroom; a classroom void of paper. To implement technology into the classrooms and curriculums, many teachers and professors are having these quizzes be accessed through the Internet rather than taken on a sheet of paper. One such way of having these digital quizzes is using a form of live quizzing. Live quizzing takes place during class time and requires the student to answer specific questions supplied by the teacher or professor. The few implementations that there are that use this system of live quizzing require the student to either buy hardware or sign up to access a website that hosts the questions and usually both cost money. As students, not everyone has that kind of money to spend. Besides the problem of cost, many of these systems are very limited in their use.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1. INTRODUCTION**

Currently, there exist multiple implementations of live quiz systems such as iClicker and Top Hat Monocle. The one thing that both of these systems lack is expendability and a low cost to students and teachers. The question we posed to ourselves was can there be a free and simple, yet customizable and useful interactive questioning system for classrooms to replace current implementations such as iClicker and Top Hat Monocle. iClicker and Top Hat Monocle both require the student to pay for the usage of the system. iClicker requires that the students purchase individual hardware or purchase an app on their Smartphone to access the system and Top Hat Monocle requires that the students pay a fee to sign up and access the website that runs the software. Both iClicker and Top Hat Monocle have a steep starting price to use their systems. iClicker’s most basic clicker, the i>clicker+ costs $45 while the i>clicker 2 costs $55 [5]. Top Hat Monocle, on the other hand, offers deals for $24 for a semester, $36 for a year, and $72 for a lifetime, all while being free for the professor [6]. Our implementation, *Open Click*, will be free for the students. We set up an easy to configure environment built into the cloud with an option of open source hardware using a Raspberry Pi. *Open Click* is essentially a CMS (Content Management System) designed specifically for education and learning. The need for a system like this is very high due to the fact that these systems have shown an increase in student participation and engagement, as well as feedback for the professor on student learning [4]. Besides those reasons previously listed, our system could potentially be used for preliminary research data collection, psychological experimentation by polling students and collection real data while presenting false data, presentation feedback for a given speaker (student or otherwise), asking controversial questions while preserving anonymity, and many others.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2. PROBLEM STATEMENT**

***2.1*** After much experience with iClicker and Top Hat Monocle throughout our education, we came up with the question of whether or not a live questioning systems built for classrooms that is not limited in its ability and free for students could be implemented and be effective. Such a system would aim to be better than current implementation for both the students and the professors in terms of both cost and usability. This is a worthwhile question to answer because our implementation could essentially make quizzes more enjoyable (but who enjoys quizzes anyway?) than previously, and offer effective feedback since *OpenClick* is not a one-way communication system like other live quizzing systems. An added bonus to having a successful and live quizzing system like *OpenClick* is that these kinds of student response systems go a long way in improving education and student engagement. Having these systems in place provides good interaction, engagement, and motivation in the class on the part of the student. A survey showed that these systems improve the performance of students in comparison to conventional classroom teaching methods [2].

***2.2*** One of the many problems that we must tackle with this project is that *Open Click* must be easily accessible with low Internet accessibility. Despite hi-speed Internet being a very commonplace technology, there are many areas that do not have access to Wi-Fi, especially in universities. In the US, only 39 percent of public schools have wireless network access for the entire school [3]. The way that we are going to handle the issue of low connectivity is by utilizing a Raspberry Pi as a base station. If the classroom or location has poor Internet, the information will be sent to the Raspberry Pi and stored locally. Once an Internet connection is available, that information will be uploaded to the cloud. The information can then be put onto the website and handled accordingly. The teachers and professors will then be able to give feedback as needed.

***2.3*** *Open Click* must also have a low cost for its use. As mentioned above, many implementations of this concept require a fee from the student for the usage. *Open Click* strives to make the use of the system essentially cost free for students. If a university wants to utilize the *Open Click* software, a fee may be required from the university just for maintenance of the website. Also, if the teacher or university knows that they are going to be utilizing the system in an environment where there is no Internet, they must purchase a Raspberry Pi to use as the base station. The free use for the students must remain one of the primary goals.

***2.4*** Besides a low cost and easy accessibility, *Open Click* needs to be extendable and customizable, both in terms of interfaces and questions. This would give the main user or professor the flexibility to choose the look and layout of the system to fir their own needs. Given the question, the professor and students may want to remain anonymous. With the flexibility to choose, the professor can set to have the students answer anonymously, as opposed to iClicker or Top Hat Monocle where you are forced to either remain anonymous or not. In terms of question types, both iClicker and Top Hat Monocle only allow for the use of multiple choice type questions. For *Open Click*, our goal is to allow the professor or main user of the system to choose the question types from a more expansive list of options. The problem that we will run into is how to allow multiple types of questions and how we will create the structures for the question formats.

***2.5*** Besides the 3 primary focuses that we must tackle, we must also try to make sure that *Open Click* is simple and user-friendly in that it is easy for the students to use, is mobile friendly, and is easy to import and export data. The design of the website must make sure that the students are not bombarded with an excess amount of information. And is easy to look at. We also aim to implement an attendance-taking feature to *Open Click*, which could be as simple as singing in once class begins. Unfortunately, that is extremely easy for the student to bypass.

***2.6*** Another potentially problematic situation that may arise is the case where a student expected to participate in the live classroom questioning, however, the student does not have access to the website. Currently, the expected way of gaining access to the system is via an individual Internet connected device such as a computer, laptop or smartphone. An efficient solution is needed that allows the student to access the system in the case that they do not have access via an Internet connected device.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**3. SOLUTIONS**

***3.1*** In terms of information gathering, we did research into iClicker and Top Hat Monocle and the features and implementations of them. We compared and contrasted the features of both of those systems with the goals and ideas that we have for *Open Click.* We looked at how we could improve the features of these systems or determined which ones we deemed unnecessary. What features were needed that we would need to focus on to make *Open Click* stand out and be better than the others?

***3.2*** To implement the cloud, our goal is to set up Ubuntu 14.04 and run a Nginix and Django Webserver. A hardened security system will be used through 443/SSL that only allows keys and approved users.

***3.3*** For implementing the Raspberry Pi, we will use a Raspberry Pi b+ running Django Webserver and have it connect to an LCD display for visualization. The Raspberry Pi will have Bluetooth set up in order to receive incoming information. The teacher will create questions on the local Raspberry Pi and will sync to the cloud once an Internet connection is received.

***3.4*** In response to the problem posed above that discusses the issue regarding a student that is unable to access *OpenClick* due to the fact that they do not currently have an internet connected device with them, it is possible that the university that is actively using the *OpenClick* system can supply a few tablets or internet connected devices to each room. Obviously, that brings about an entirely new problem as to whether the university will be able to supply the devices due to financial reasons or other unspecified reasons. Ideally, with the direction that most universities are going in, in that they are slowly turning their classrooms into digital classrooms that distribute all materials and necessary resources and information digitally, everyone would have their own individual Internet connected device. Currently that is just not the case right. However, a recent study reveals that 79% of adults aged 18-24 own a smartphone of some kind and this number grows every year [1]. If all else fails, it is possible that the student may need to log in via their neighbors Internet connected device and participate in the quizzing that way.

***3.5*** Basic classroom and faculty support, as well as technical support will be needed. The users will need to learn how to use the system. For example, professors will need to learn how to create classes, questions, add students, and simply understand the organization of all of the materials.

***3.6*** It can be noticed that with implementations of a live questioning system such as Top Hat Monocle and iClicker, there is only a one-way interaction between the system and the user. Many of these systems were built with student anonymity in mind, thus resulting in no need for these systems to uniquely identify a student and subsequently store individual responses to the questions provided [1]. Fortunately for us, each user is registered into the system. In our case, each student signs into *OpenClick* using his or her Mason credentials. Due to the fact that each student logs in and their answers to given questions can be stored, the student can have a meaningful interaction with the system and feedback can be given. In the case that a question aims to have anonymous answers, an anonymity system could easily be implemented.

***3.7*** We would like to be able to have a live demo working that gives the audience and potential users a pretty good understanding of how the system works, despite not being entirely complete, by time we reach practice runs for our presentation. We will finally be able to answer of research question once we receive enough feedback from students and professors who have tested out *OpenClick*. If the results are highly positive and a large majority believes that our implementation of live classroom quizzing would be a fit replacement to iClicker or Top Hat Monocle, or at least another option, then we will be able to make a conclusion to our research question. If the feedback is highly positive, then yes, you can make a free and simple, yet customizable and useful live questioning system for classrooms.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4. CONCLUSION**

***4.1*** At the moment, as *OpenClick* is not fully complete for what we desire to accomplish this semester, we are unable to state exactly what conclusions that we have come to. In our opinion, but unsupported by much evidence at the time, except for any demo we show, yes, it is possible to make a free and simple, yet customizable and useful live questioning system. What we do end up finishing of *OpenClick* in the coming weeks could ultimately change what this section says, in which then we will state our final conclusions.

***4.2*** For future research, we would like to look into extending *OpenClick* a lot more. More questions types could be added. We would also like to look into opening up *OpenClick* to other services, such as Twitter and Facebook. If that was done, *OpenClick* could be used in an environment that was not a classroom, such as a conference. Instead of having to sign in through the university, which would not be available at a conference, it could be possible to sign in using your Facebook or Twitter handle and take part in live questioning that way.

**5. REFERENCES**

[1] Hatziapostolou, Thanos, Tomor Pupovci, Dimitris Dranidis, Iraklis Paraskakis, and Marina Ntika. *Boosting the Pedagogical Value of Classroom Clicker Systems via the Provision of Formative Feedback*. Thesis. 2014. N.p.: IEEE, 2014. Print.

[2] Kushalkar, Rajavel, and Rajesh Kushalkar. *Clicker: Device Independent Student Response System, Developed for Classroom and Remote Learning to Provide Instant Response and Feedback*. Thesis. Indian Institute of Technology, Bombay Mumbai, India, 2014. N.p.: IEEE, 2014. Print.

[3] Livingston, Peter Cohen & Jeff. "More Than Half of U.S. Public Schools Don't Have Adequate Wireless Access." *The Atlantic*. Atlantic Media Company, 13 Nov. 2013. Web. 15 Apr. 2015.

[4] Murphy, Trevor, Kathy Fletcher, and Amy Haston. *Supporting Clickers on Campus and the Faculty Who Use Them*. Thesis. N.d. N.p.: n.p., n.d. Print.

[5] <https://www1.iclicker.com/>

[6] https://tophat.com/

**6. APPENDICES**

To be concluded…