

Increasing Student Engagement Inside and Outside the Classroom with Classroom Response System

Matt Evans¹, Cindy Albert² and Angie Stombaugh²

¹Department of Physics and Astronomy

²Center of Excellence in Teaching and Learning
University of Wisconsin – Eau Claire

Executive Summary

Decreasing resources and increasing class sizes have led to the need for manageable and effective teaching tools to help engage students and facilitate better learning outcomes. Classroom response systems, or clickers, have been around for many years and provide an efficient method to accomplish these goals. This pilot program introduced a polling system that allowed physical clickers and a mobile device app to be used in the same classroom to answer questions posed by the instructor. The introduction of a lower cost polling option, the app, was monitored for ease of use and desirability by the students, along with the perceptions of instructors towards having technology in the hands of students during lectures. In addition to looking at the perceptions of the instructors and students towards the technology and mobile application, the pilot was also designed to help instructors learn about the varied techniques of effective clicker usage and to gauge student usage of the software to support their learning beyond the classroom through a review of the in-class questions at a later time.

Purpose and Objectives

The University of Wisconsin – Eau Claire has been using i>clickers for over 10 years as the campus standard and has supported, through our Center of Excellence in Teaching and Learning (CETL), both instructors and students in their implementation and use within the classroom. This includes workshops on effective usage and drop-in sessions for instructors to be assisted in setting up their classes within the software. Additionally CETL has supported students by troubleshooting any problems that would arise with the student clicker. Over the years the cost of the physical clicker has nearly doubled and this has led to some instructors rethinking their use of the technology. We found that faculty are sensitive to the costs that are passed on to the students and, in spite of the positive outcomes afforded by this pedagogy, this led some instructors to discontinue using the device.

The company that created the physical i>clicker and accompanying software have recently developed a new instructor application that allows both physical clickers and an app on a mobile device to be used to answer questions in class. The ability to have both types of devices lowers the barriers of introducing of the lower cost app based response system as it leaves in place the existing purchased hardware. The main barrier to switching to a completely mobile technology based system over the years has been that not all students have suitable mobile devices, and thus the ability to have both a physical clicker and a mobile device will ease the transition period. A secondary barrier has been the reticence of the faculty to allow mobile devices in their classes, as they see them as a distraction that takes away from the classroom atmosphere.

Other considerations in this study were to look at the new software and the added benefit of having data stored in the cloud rather than locally, and thus the data is much easier to access from multiple locations and is more difficult to lose or corrupt. Additionally the software allows students to log into an account at a later time and review the questions posed in class, along with their response and the correct answer. The perception of this feature and whether it was important to the student was also listed as a point of study.

Organization and Approach

Our pilot program was designed to run throughout the fall semester, with instructor recruitment occurring before classes started. Originally we sought previous users of the original software, as they would need less training in pedagogy and on the similar software. After filling our allotment of users we expanded the selection to go beyond veteran users to include instructors new to in class polling. This was done to add data to the project from the perspective of a novice user. We ended up with 14 participants in the study from the following disciplines: Business Administration, Chemistry, Geology, History, Mathematics, Nursing, Physics, Communication and Journalism and Religious Studies.

Each instructor was provided instructions for setting up their class within the software and through D2L. The D2L integration allowed the instructors to seamlessly manage the course roster within the polling software. Each student was given a code to allow them to use the mobile app in class, or to use the app to review the questions posed in class at a later time.

Our data was collected through surveys to the students 7 weeks and 14 weeks into the semester and from the instructors 12 weeks into the semester. Additionally during the initial roll-out of the software we had 4 listening sessions with the instructors in order to understand any complications that occurred during the initial roll-out.

Early this spring we distributed a campus wide survey in order to expand upon the initial outcomes of the pilot program and collect a wider array of instructor responses.

Analysis and Findings

Our initial roll-out of the software to the instructor and students was hampered by the delay in funding for the project and the inability to get a key feature of the software to work with UWEC's D2L site. These setbacks were influential on the outcomes of the project due to the fact that the delay in purchasing the licenses to use the software caused some instructors to delay rolling out the software in the first 4 weeks of class. The difficulty of trying to introduce a new method that far into the semester was apparent on both the students and instructors, as much of the effort of the research team went into dealing with a less than uniform roll-out in each class. The difficulty in getting the software to work with D2L took much of our energy at the beginning of the project and thus took away from the effective rollout of the software to the instructors and students.

The difficulties in getting the software to work and getting the syncing of grades seamlessly to D2L are well documented. In spite of this our metrics from the instructors on the effectiveness and usage of the REEF software were quite good. Seventy eight percent of the piloting faculty (14 total) reported being satisfied with their first semester using REEF, with all of them indicating that they would use it again when they taught an appropriate course. The instructors indicated they used the system frequently in class, with 70% reporting that they asked 5 or more questions a day. 100% of the instructors had a positive opinion of REEF, with almost all have being more skeptical at the beginning of the project and an overall satisfaction rating of 5.7/7.0 This in spite of a difficult roll-out.

The concerns of faculty stem from the inability for students to easily register to use the system in class, the limited ability to upload scores to D2L and instructors limited understanding of the review features built into the software. Our pilot took this into account during fall semester and started to address these concerns during

the pilot period. For the review feature we conveyed the feature to the students so they understood they could log onto their online REEF account in order to review screenshots of the questions, see their answer and the correct answer. REEF also has the ability to upload a percentage score to D2L automatically and have it associated with a properly registered student. Our work in troubleshooting the link between the REEF system and D2L was figured out by our D2L specialist and conveyed to the REEF support team. This information is now shared on the proper REEF software support pages. Additionally we have developed a registration process that will allow a simple 3 step process to output individual sessions from REEF and then immediately import the scores into an individual grade item, a feature used by instructors using the clickers to administer quizzes. The thrust of our work was to develop clear instructions for both instructors and students to ease the onboarding process and to develop a procedure that, when followed, allowed a trouble-free registration experience. This included developing in house materials and spending time in video conferences with the REEF developers conveying our trials and tribulations. Although the pilot period ended at the end of last semester we have continued to monitor these concerns with the start of the new semester. The new onboarding materials drastically reduced student concerns, we have documentation in place educating the professors on proper uploading to D2L and we feel that the faculty better understand the review features and can convey them to students.

In general, as shown in the table below, students responded favorably towards the REEF application and its use in class. Almost 70% enjoyed using the software with less than 10% disagreeing with this statement. In the first survey students did have concerns about not having a clear idea of how the review feature of the software could be used, but by the second survey these concerns had lessened. Students reported that they used the REEF review feature before exams (43%), and an additional 10% using it more often. 35% never went back and 12% indicated that it was not available, in spite of the fact that the pilot gave every student access to this feature.

When asked about purchasing either the physical clicker or the \$10 app on a mobile device 45% were opposed to purchasing the \$54 i>clicker and 38% were opposed to purchasing the \$10 app. This indicates that purchasing is less a function of cost, but more about not wanting to buy classroom aids.

Question	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I really enjoy using REEF polling in class.	4.14%	4.58%	22.44%	48.58%	21.13%
Using REEF polling in class has helped me learn.	3.30%	5.49%	20.66%	47.91%	23.52%
Polling is used too much in class.	11.09%	50.43%	29.78%	4.57%	3.04%
I am fine with purchasing a clicker (\$54 new) for polling for an unlimited number of semesters because I believe it helps me learn.	18.66%	26.25%	24.30%	24.51%	6.07%
I am fine with paying \$10 per semester to be able to use my phone or other mobile device for polling in class because I believe it helps me learn.	13.67%	24.73%	32.10%	21.26%	8.24%

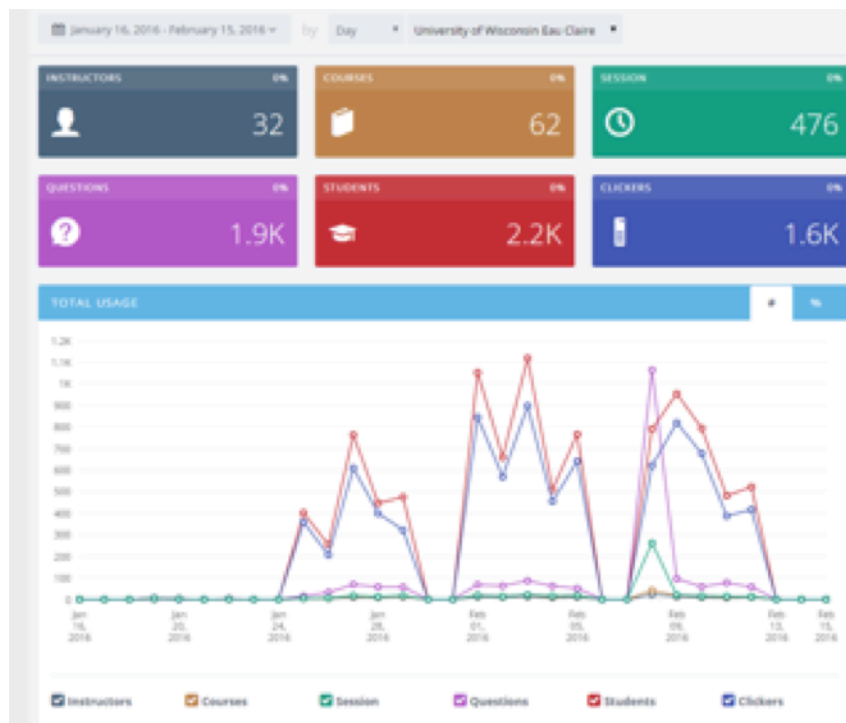
Table of Student Responses

Our pilot program has led us to poll the entire teaching faculty and staff at UWEC this spring. We looked for support for allowing mobile devices in any classroom using polling, and for pursuing a site license for all students using a mobile device. The survey yielded 56 responses. 75% of the respondents stated that they previously used clickers or would like to use them. 25% stated that they were not interested in using clickers, with a majority of those citing that the use of clickers was not appropriate for their pedagogy. Instructors were asked if they would allow devices in their classrooms if having a device allowed students to only pay \$10 per semester to use an app, instead of purchasing a clicker (\$54). 72% said yes, with 10% saying they wouldn't use clickers, and 18% worried about it being a distraction. When looking only at the instructors who would utilize the technology the number who would allow devices in the classroom jumps to 84%. The main reason cited for support was the lowered cost with some seeing this as a natural progression towards a more modern technology. These results led the UWEC faculty and staff senate technology committee to submit a proposal allowing students to use either a physical clicker or the mobile app in any class that uses polling at UWEC. This proposal is currently slated to be presented to the entire senate for consideration.

Another aspect of the poll of faculty was to ask if they supported an initiative to have a UWEC site license for classroom polling and quizzing. (A site license lowers overall cost and is not paid directly by the individual students). Overall 78% of the

respondents agreed, with the number climbing to 87% for those supporting clickers in their classrooms. The support comes from taking the financial burden away from an instructor's decision of whether to use the polling software.

The REEF software comes with an administrative dashboard, as shown below. This dashboard allowed the campus REEF administrator to monitor the usage of the software and the number of students using clickers versus mobile apps on a specific day. This data was useful in the pilot phase as it allowed us to see the rate of success in getting students signed in properly their classes, and allowed data to be collected on overall usage at the university. This turned out to be very important in the next phase of the project, namely looking at the feasibility of a site license or the ability to negotiate a lower cost due to the higher usage at our university.



REEF Administrator Panel

Conclusions and Recommendations

The pilot program determining whether our campus should implement a mobile technology to be used alongside the current physical i>clickers yielded a clear desire amongst our piloting faculty that mobile devices should be allowed in the classroom. Additionally a poll of all faculty and instructional staff revealed that a strong majority also supported this initiative as a way to lower costs to the student. This was backed up by a proposal by the UWEC technology committee to allow mobile device to be used in any classroom using clickers, and by the School of Nursing voting to recommend that the school convert exclusively to mobile devices to ease the burden of distance learning classrooms. The support for obtaining a site license is strong amongst the faculty and the student technology committee has shown support by their preliminary work exploring costs.

UWEC is poised to help other institutions within the system that decide to adopt REEF. As can be seen from the table below, showing current usage of the REEF software, our campus leads in number of instructors and number of students. This is unsurprising given the push of the pilot program, but the surge of usage in the spring semester, after the pilot was over, doubled the number of instructors and more than doubled the number of students using the technology at UWEC. Already CETL has shown they have improved the roll-out to new users and these pathways to a smooth rollout can be shared with other system schools. This dissemination will begin with a presentation at the OPID Spring conference, and may extend to La Crosse, Superior, Madison, Milwaukee, Parkside and Extension, all institutions that used the older i>clicker technology in the past year.

UW Institution	Instructors	Courses	Students	Reg. Clickers
Eau Claire	42	83	4090	2787
La Crosse	2	2	40	39
Madison	25	33	1187	462
Rock County	1	1	23	1
Superior	1	2	143	0

UW Campuses currently using REEF software

Appendices

Proposed Budget:

	Item Description (<i>person or item</i>)	"Hours and Rate" (if labor) or "Purchase Cost"(if non-labor)	Line Total
1	Faculty Stipend – Project Leader	About 8 hrs/wk at \$25/hr for 17 weeks	\$ 3,500
2	REEF Polling Access Fee	Purchase Cost	\$10,000
3	Faculty Stipend - Training	8 hrs at\$25/hr X 10 faculty	\$ 2,000
4		Total Request:	\$15, 500

Current Budget:

	Item Description (<i>person or item</i>)	"Hours and Rate" (if labor) or "Purchase Cost"(if non-labor)	Line Total
1	Faculty Stipend – Project Leader	About 8 hrs/wk at \$25/hr for 17 weeks	\$ 3,500
2	REEF Polling Access Fee	Purchase Cost – Negotiate Volume discount	\$7,500
3	Faculty Stipend - Training	8 hrs at\$25/hr X 14 faculty	\$ 2,800
4	Travel/Present OPID Spring Conference	Travel & Meals	\$ 550
5		Total Budget to date:	\$14,350

Team Members

Matt Evans, Professor
Physics and Astronomy
UW-Eau Claire
evansmm@uwec.edu; 715-836-5519

Cindy Albert, Associate Director
Center for Excellence in Teaching and Learning
UW- Eau Claire
albertca@uwec.edu; 715-836-2789

Dr. Angie Stombaugh, Director
Center for Excellence in Teaching and Learning
UW- Eau Claire
stombaam@uwec.edu; 715-836-4500

The following were the instructors piloting the software in their classes. They took the faculty survey and their students were part of the student surveys.

Nancy Hanson-Rasmussen	Business Administration
Warren Gallagher	Chemistry
Evan Perrault	Communication and Journalism
Lori Snyder	Geology
Kate Lang	History
Patricia Turner	History
Andrew Swanson	Mathematics
Arin VanWormer	Nursing
Jodi Arriola	Nursing
Rose Jadack	Nursing
Shelly Pehler	Nursing
Suzanne Voros	Nursing
Doug Dunham	Physics
Matt Evans*	Physics
Manu Lopez-Zafra	Religious Studies

*The principle investigator had a class taking part in the pilot study.

Tiffany Lewis and Roxie Muldoon, our D2L administrators, helped with initial set-up and roll-out documentation.