Learning is just a CLiCK away

A Comprehensive Guide to Effective Clicker Usage in Higher Education

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The Clicker Mission:

A Review of the Literature on the Effectiveness of Using Student Response Systems in Higher Education

Students' Disengagement—What a plight!

Keeping students engaged in the classroom is a major challenge for tertiary educators today. One of the major factors contributing to this challenge is the "digital divide" that continues to exist between students and their teachers. Most college students today are digital natives—so aptly labelled for their absorption and armory of all things digital. Trying to keep these students engaged is quite difficult for many lecturers, who have to deal with an influx of digital learners who are more technologically up-to-date and more wired than lecturers themselves (McHugh, 2005). As a lecturer, it can be quite frustrating to watch your students zone you out with their "cool" gadgets or other activities they find interesting; or worse, fall asleep midway in your lecture. When this happens, it does not necessarily mean that your students are "bad", irresponsible or disrespectful. The reality is that students' attention span will decrease significantly when they are sitting through long monotonous lecture sessions.
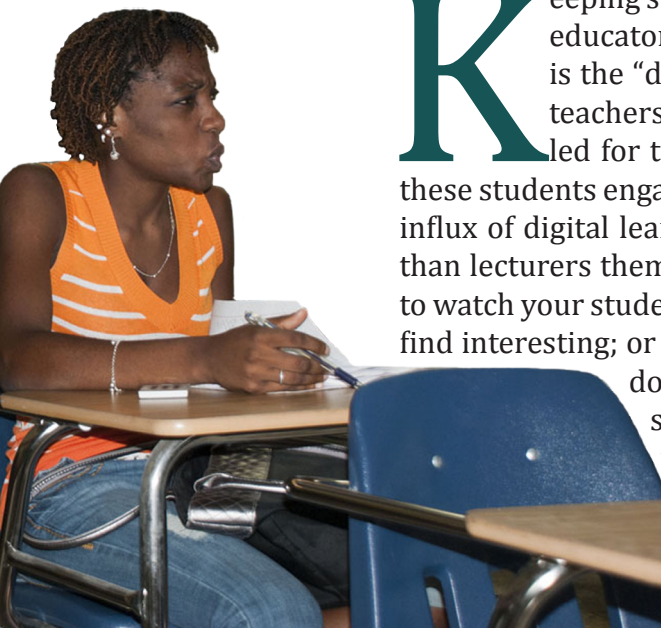
Students today have a great need for enjoyment and engagement when learning, and one of the most effective ways in which these can be provided is by making greater use of interactive technology. Studies indicate that actively engaged students will absorb and retain more content (Moredich & Moore, 2007). Undoubtedly, the more students are engaged, the more they will learn. Therefore, finding ways to keep students engaged during class time should be a priority for instructors.

The Clicker Mission—Combatting Students' Disengagement
Fortunately, more and more educators are realizing this, and have begun to implement different ways to foster meaningful engagement among students. One of the ways in which educators have sought to increase students' engagement in the classroom is through the use of Student Response Systems—also called Audience Response Systems/ARS or Classroom Response Systems/CRS (Appendix A). Student Response Systems allow instructors to pose questions to students within a class, after which students' answers can be immediately collected and viewed using small handheld devices (resembling a remote control) called clickers. Berry (2009) explains indepth how Student Response Systems work:

> Finding ways to keep students engaged during class time should be a priority for instructors.

"With clickers, the instructor uses a computer with an attached receiver and projects a presentation (often in PowerPoint) for students to view. Questions may be displayed with possible answers, as in multiple-choice questions. Students have wireless keypads and select the answers they believe are correct by pushing the corresponding letter. Answers are then sent to the receiver attached to the computer. The clicker system software collects the results and the aggregate data are graphically displayed within the presentation for all participants to see. The system also stores individual student choices on all questions, allowing the instructor to use the data for grading purposes if desired" (p. 295).

Clickers are especially useful in large lecture environments, where having meaningful interaction with students can be challenging. Although ideal for large lecture sessions, clickers are also useful in small classroom environments, as well as, for departments across a wide range of disciplines.

In recent years, clicker technology has become one of the most sought-after technologies for higher education. This is especially so in universities overseas, where a reported estimate of one million clickers are used in the United States alone (Duncan, 2008). The technology has been steadily gaining popularity for its ability to foster meaningful engagement among students in different types of learning environments. For example, most modern versions of Student Response Systems are compatible with portable smart devices (like cell phones, laptops and PDAs), which can be used as the "clicking device" in some instances. Additionally, web technology has been incorporated into many Student Response Systems. These added features have served to appeal to, and increase active and immediate participation from a wider range of student audiences.

Generally, the main goals for using Student Response Systems are to engage students, assess their performance and to increase their academic success (Wallace, 2009). In this light, Student Response Systems have been tested and proven to be effective in achieving these goals. Most research studies on the benefits of using clickers in the classroom have shown that students' enjoyment and engagement levels tend to increase when clickers are used in their lessons. Several researchers (Martyn, 2007; Meedzan & Fisher, 2009; Moredich & Moore, 2007; WKU Academy Technology, 2006) theorize that these benefits are so because clicker technology typically promotes active learning—a highly acclaimed instructional model in higher education, which places students at the center of the teaching/learning process. Deal (2007) posits a parallel theory, emphasizing the value of clickers in helping to promote an audience-paced learning environment.

> *"Once instructors can see plainly what students do and do not understand, the intuitive next step is to adjust the pace of presentation and explanation strategies accordingly"* (Deal, 2007, p 6).

Many instructors who are already using clickers in their classrooms describe the technology as being a refreshing change and a great aid in keeping students awake during lectures. Gilmore (2010) explains how including clicker questions in lecture presentations can help to break the flow of a lecture—making it less monotonous.

> *"Even if asking and answering the question takes only a minute or two, it allows the students a mini-break that resets their attention span yet doesn't distract them from the subject at hand"* (p. 1).

Similarly, many students often praise clickers for improving their motivation and attention. Researchers at the University of Colorado Science Education Initiative [CU-SEI] and University of British Columbia Science Education Initiative [CWSE] (2009) report that "students in classes where their lecturers utilized clickers often overwhelming recommend that clickers be used in all their lecture classes". In a similar study done by Johnson & Lillis (2010), students indicated that the use of clickers in their labs helped them to learn material more effectively, stay focused, and also to verify their understanding. Many students often express their appreciation in having a classroom tool that enables them to answer questions anonymously without the risk of embarrassment if answers turn out to be incorrect (EDUCAUSE Center for Applied Research [ECAR], 2007; Gilmore, 2010; O'Donoghue & O'Steen, 2007, Zhu, 2007).

As a result, there is increased classroom participation, as students are encouraged to answer questions even if they are not sure of their answers.

Although many studies have pointed out clickers as being an instrumental tool in enhancing learning, as well as, communication between instructors and students, an important point to note is that the effectiveness of clickers lies in the way in which they are used and not in the technology itself. Staff-researchers at the University of Colorado Science Education Initiative and the University of British Columbia Science Education Initiative explain this point well. They note that "clickers in themselves are not a solution to anything. Like a chalkboard, they can only serve to extend the capabilities of the instructor" (CU-SEI & CWSE, 2009). Kirkwood and Price (2005) emphasize similar sentiments as it relates to instructors use of technology in educational programs. They conclude that "the medium itself is not the most important factor in any educational programme—what really matters is how it is creatively exploited and constructively assigned" (as cited in O'Donoghue & O'Steen, 2007, p. 772).

Contrary to the findings of numerous research studies (as discussed earlier) on the pedagogical effectiveness of clickers, Morgan (2008) points out that using clickers may actually create disadvantages to students and lectures. Namely: clickers could distract from learning—where the focus rests on the technology rather than the material, and questions may not be very helpful. In her study on the pedagogical effectiveness of clickers, Morgan found no significant differences in the attrition of grades between the clicker and control classes. The findings from Morgan's study are similar to those from a study done by Carnaghan and Webb (2007), which also indicated that although students indicated they enjoyed using clickers, this satisfaction did not translate into increased satisfaction with their course, or improvements in their grades (as cited in Morgan, 2008, p 31). Based on previous literature however, Morgan (2008) critically notes that "it is how the instructor makes use of the clickers, rather than the simple adoption of clickers themselves, that determines their pedagogical effectiveness".

An extensive review of the literatures indicates that there are obviously "right ways" and "wrong ways" to use clickers. Instructors should then ensure that they distinguish which uses of clickers lead to success from which lead to failure when introducing or refining the use of clickers in their courses. Using clickers should reap benefits for both instructors and students. As Duncan (2008) posits, "successful clicker use can only exist when both students and faculty members report being satisfied with the results of using clickers".

> **The effectiveness of clickers lies in the way in which they are used and not in the technology itself.**

Throughout the rest of this guide, we will continue to explore the benefits of using clickers, as well as, other theoretical frameworks guiding the use of Student Response Systems. The information contained within will assist instructors in making optimal use of clickers within their classes.

Effective Use of Clickers in the Classroom

Exploring the Uses and Functionalities of Clickers

■ Assessments & Quizzes

Pre-Lesson Assessments to Guide Teaching: Lecturers may want to measure what students know before they start to teach them. They may also want to see how well students are carrying out reading assignments, as well as, how well they are understanding reading materials. Clickers can be used at the beginning of a lecture to do so. The lecturer could give reading assignments well in advance of class, then create questions on the reading materials given. This would allow you to gauge which areas or topics of the lesson you need to give more/less focus. Rewards could be given to students who prepared for the class.

Post-Lesson Assessments: Similar to above, the only difference is that the questions would be generated after and not before the lesson. This way, the lecturer could see whether or not pre-lesson misconceptions or misunderstandings were cleared up. You can also test to see how well students are retaining the main lecture points. This is also a great way to gauge whether or not a particular teaching style is effective and fine-tune it to work better for students.

Practice Quizzes: Multiple choice practice quizzes can be given to students to help prepare them for upcoming exams. While you may ask students to answer questions using the clickers, they could also be given the questions on paper to take home and go through at their own pace.

■ In-Class Voting

Administrative Polls: Clickers are quite useful when doing polls regarding administrative issues. For example, students can use the clickers to vote for a class representative, to select tutorial times, or to select an exam review date, et cetera. Voting can be anonymous or the clickers could be set to record student's names with their votes.

After students have voted, the results can be displayed immediately using the charts or graphs available. Tread carefully in using the clickers to take attendance. Students generally express resentment towards any thing that they feel is being used to track them. Furthermore, clickers were developed primarily to track students' progress, not their attendance.

Background polls: Some lecturers may want to get to know their students before they begin to teach them. In this light, clickers could be used to gather background information on the students within the class. Information regarding their ethnicity, religion and social life and could be gathered. The clickers could also be used to reveal students pre-existing thinking, attitudes and opinions.

Peer Review: Often times, lecturersmay require students to do in-class group or individual presentations or activities. The Clickers provide a simple and easy way to collect peer assessment from the class, rather than circulating paper for students to record their marks on.

■ Class Discussions

Group/Peer Discussions: Lecturers could divide the class into groups and assign clickers to each group. Students would then be asked questions about a particular topic, which they cannot answer (via clicker) until they have discussed the answer with their respective groups. After the voting has taken place, the lecturer could lead the entire class into a stimulating debate or discussion.

General Class Discussions: Clickers provide a great way for lecturers to start class discussions on critical topics relating to a lecture or to a course itself. Such discussions can take place mid-way in the lecture session, or at the end of the lecture. Depending on the course, questions may require students to do calculations then choose from a list of possible answers.

Ice Breakers and Fun/Interactive Games: The good thing about Student Response Systems is that they can be used in just about any environment and for just about any type of question. Lectures can create questions on controversial topics to encourage students to think and relax. Questions may also be structured in game format, and can draw on knowledge from everyday life and current affairs. A lecturer could also create a class game show and have the audience vote on the best performer/performers.

Constructing Effective Clicker Questions

Using clickers is undoubtedly a great way to promote interactivity when teaching. However, clickers can only be effective when questions are properly constructed, so as to challenge and engage students. How questions are constructed and used will impact significantly on learning outcomes. Below is a list of pointers that instructors can apply when constructing clicker questions:
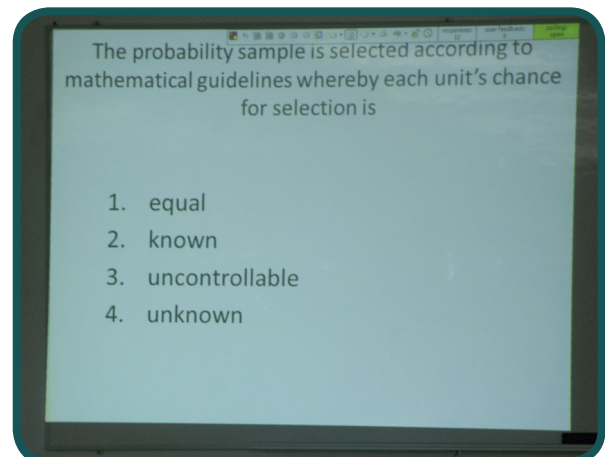
Snapshots from the UWI, Mona 2012 Clicker Pilot

Constructing Effective Clicker Questions (Cont'd)

1. Questions should be relevant and meaningful to the lesson—This relates especially to assessment questions. Questions should not be trivial, but should instead focus on the most meaningful parts of a lesson. This will allow for more in-depth thinking and learning. Well-designed clicker questions target higher order thinking (Sullivan, 2008).

2. Have multiple plausible answers (or even better, make all distractors plausible)—NEVER make things too easy for students. Challenge their minds and get them to think. Making multiple distractors plausible can lead to more stimulating class discussion. Everybody will want to defend their point-of-view and debate on others.

3. Do not use too many clicker questions in one session—The number of questions you use will largely depend on the length of lectures. If the lecture is not a long one, avoid having too many questions in that one lecture. Projecting too many questions may end up robbing the class of valuable discussion/debate time. Of course this applies only to regular lecture sessions. A lecturer may chose to use a session for revision, in which case having a vast number of questions would be appropriate.

4. Be mindful of the length of questions—Multiple Choice Questions/MCQ's are the most popular question type associated with clickers. Don't drag out the question unnecessarily. Be as concise, yet as clear as possible. The actual length of questions may vary according to subjects or courses. For math courses or courses requiring a lot of calculations, consider how long students will need to work out their answers. Keep the questions as short as possible, leaving more time for students do their calculations and subsequent discussions.

5. Use clicker questions to replace parts of the lecture—Now this is a very crucial point. Some lecturers feel that using clickers will take up valuable class time that could be used to cover the curriculum, and so, they are not too sold on the idea of incorporating clickers into their lecture time. A common bad practice is for lecturers to add clickers to their lectures instead of integrating clickers into lectures. The common misconception is that clicker questions should be some form of end-lesson assessment added to existing lectures. So a lecturer will end up franticly trying to fit 10 or more revision questions into the last five minutes of the class. Time will more than likely run out leaving little or no time for class discussion, which then defeats the whole purpose of using clickers. Lecturers should instead use clickers to replace different parts of lectures. For example, instead reading lecture slides, structure clicker questions to transition into new topics and catalyze discussions.

6. Include "I don't know" as a choice for students to choose from—Lecturers need not do this for every question, but this becomes very important when testing students' knowledge on important concepts, definitions and terms that may appear on an exam. Certain concepts may be a "must know" for students, and in that case, you do not want students to be doing blind guessing. Students may very well guess the correct answer even though they do not understand the subject matter they are answering about.

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General Tips for Using Clickers

1. Embrace change! It may be challenging at first to incorporate clickers into lectures. Preparing clicker questions, projecting them and analyzing the results may seem like a lot of work. You may be tempted to stick to your traditional style of teaching because you feel using clickers will clash with your personal teaching style. Bear in mind though, that education is not so much about our teaching, but more so about our students' learning.

2. Explain to students what the clickers are for before you start using them in your class. Outline your reasons for using clickers and the benefits to be derived from the use thereof. Also, be sure to explain that the clickers are for class learning and not for attendance tracking.

3. Have specific goals for each class session and structure questions around these goals.

4. Ask for post-clicker verbal participation—For example, ask students to stand and explain their choice before revealing the correct answer.

5. Have discussions on both correct and incorrect answers—Don't just say, "Hey class, A, B and C are wrong, D's right...let's move on!" Students need to understand why right answers are right and why wrong answers are wrong. The reasoning behind the answer is as important (maybe more so) as the answer itself.

6. Encourage students to collaborate—This will lessen tension and eliminate the fear of getting answers wrong.

7. A little humor never hurts—Use humor where possible. This of course will depend on the teacher and the learning environment.

8. Practice! Practice! Practice! —Ensure that YOU are comfortable using the clickers before distributing them to students.

9. Attend to technicalities—Ensure that the brand of Students' Response System that you are using is up-to-date and that receivers are working. Also, check lectures slides before class to make sure that clicker questions are showing, et cetera.

10. Be consistent—Use clickers frequently. Let them be a regular part of the semester, especially if students have bought or rented them for the course.

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Clicker Distribution Models

There are numerous ways in which educators can get clickers into students' hands. Below we explore some of the ways in which institutions could do so.

1. Free Clicker Model—With this method, students are given free clickers that are paid for by the university's fund. This method of distribution is obviously only appealing if the university has a significant amount of money to spend on clickers. In this case, clickers could be bought and distributed to students free of cost. The university will now have to decide which fund it will use for purchasing clickers. Here are few suggestions:

    *   Raise tuition fees to accommodate the purchase of clickers (Attach an extra charge on the fees of students belonging to the department where the clickers would be used.)
    *   Raise miscellaneous fees
    *   Have fundraisers
    *   Get sponsorship
    *   Include the cost of clickers in special packages (For example: Include clickers in chemistry or bio kit)

2. Clicker Rental Model—With this method, the university or a department would purchase clickers for students to use, but distribution would take place via a rental system. Having decided that clickers will be used for a particular semester, students would be required to go to a selected rental post (Say the Main Library, the Book Shop or the Admissions Office) and check out their clickers at the start of the semester. Students would then be required to return the clickers at the end of the semester. An incentive could be applied where full or half of the rental cost is reimbursed upon return.

3. Student Purchase Model—With this model, students are required to undertake the cost of purchasing their own clickers. In this case the clickers would have to be used consistently by the lecturers. It makes no sense we ask students to buy them if they won't be used. It would be best to use one brand of Students' Response System across campus so that students could use their clickers for all their classes. With this model, students' could also register their clicker using their name or ID numbers. Since students will buy their own clickers, they would be responsible for the safekeeping of the clickers. So less time and personnel (to manage clickers) would be required from the university. Students could re-sell their clickers to other students when they are leaving the university.

4. Departmental Loan Model—With this model, the university would buy clickers for departments instead of students. A large number of clickers could be bought upfront and then divided between departments. The departments would then be required to distribute and safe-keep clickers. The university may renew the clicker inventory of each department on a needs basis. A proper distribution and recollecting system would have to be in place to minimize loss and theft of clickers. For example: Students could be charged if they do not return clickers (They would have to pay for it or be barred from exams). Each department would have to implement a booking system for use of the clickers between courses.

Clicker Evaluation Methods

Conducting evaluations on the use of Students' Response Systems can be very challenging. In doing any evaluation of the sort, one of the major questions we want answered is "how has the technology enhanced students' learning?' and this is not always a very easy thing to assess. Another underlying concern in doing research on the use of clickers is to ascertain whether or not the purchase of clickers was warranted. This is more so a pressing concern for departments running on tight budgets. There are several approaches that departments can use to assess the pedagogical effectiveness of clickers. Below are some of our suggested approaches.

1 **Project-based Research (Pilot Tests)**
Develop a research project to assess the pedagogical benefits of using clickers before doing mass purchase or implementing them broadly across the campus. It would be good if participating lecturers taught more than one course at the same level (i.e. year-group and department). This way, you could have two control groups (a "clicker course" and a "non-clicker course"), which would help to acquire more comparative data. Doing project-based studies may provide the most empirical data, as lecturers/researchers can include classroom observations, surveys, as well as, quantitative research procedures in their evaluation.

2 **Quantitative Comparative Analysis of Academic Performance**
This method is used primarily for tracking students' academic performance over a year-to-year or semester-to-semester basis. It involves gathering numerical data on students' academic performance, and then using the data to make yearly or semester based comparisons. Comparisons could be made between the class pass-rates or students' grades, et cetera.

Unlike Project-based Research (#1 above), this method of evaluation is purely statistical, and students need not be heavily involved in the evaluation process. Lecturers (or the researchers) would simple establish a baseline from which to start their comparisons, then they would set mathematical procedures to do their evaluations at the end of the semester or academic year. The researcher could even opt to compare and contrast data on students' grades for the present year with data on students' grades in the past (before clickers were introduced to the course).

4. Faculty/Department Evaluation Rubric

Departments could develop their own set of criteria to assess the effectiveness of clicker usage. These criteria would be aligned with the current goals of a department (or course), as well as, the goals that you may want to achieve by making use of the clickers. These goals may range from you wanting to increase the level of student participation in lectures, or you may want to see improvements in students' grades.

Whatever your goals are, once you have identified them, begin to formulate specific targets and metrics by which you will measure the effectiveness of using clickers.

Departments could consider a number of technical, educational and distribution aspects to base the rubric on. Developing an evaluation rubric is not only useful for assessing the effectiveness of clickers on a whole, but also when assessing different brands of clicker systems to determine which brand best suits an institution. The following table outlines some possible criteria.

3. Student Polls (Surveys)

Conducting student surveys is another method that can be used to assess the effectiveness of the use of clickers in the classroom. With this method, you will get feedback straight from the horse's mouth. Who best to explain about how clickers have enhanced students' learning, than STUDENTS themselves? Surveys could be done at the end of each semester.
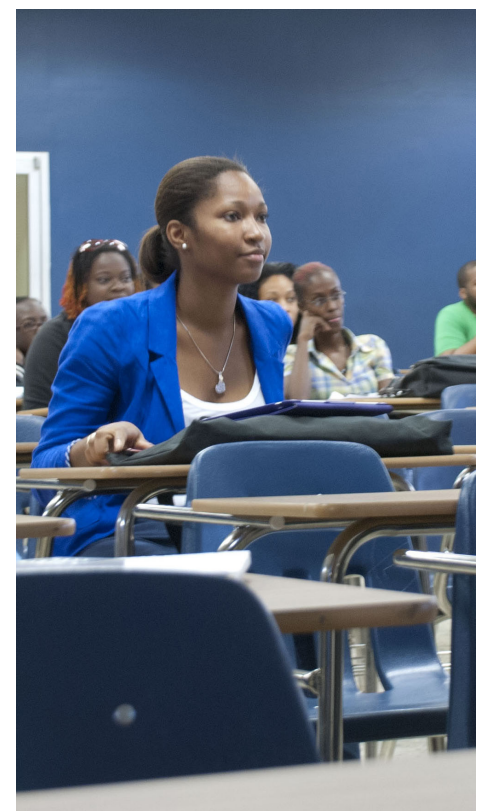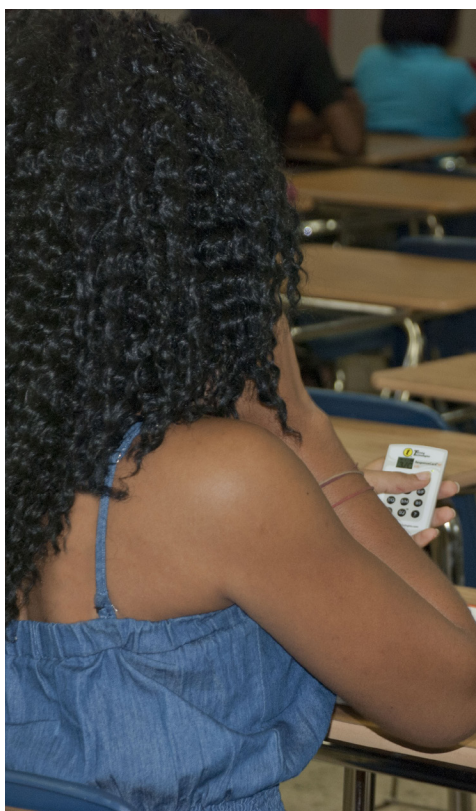
Clicker Evaluation Rubric

Technical Aspects	Educational Value	Distribution Process
Ease-of-use	Interactivity	Ease-of-purchase
uncomplicated Set-up	Aid in communication	Cost
Size of device	Assist in retention	Portability
Multiple OS compatibility	Increase pass rates	Flexibility
Operating Software	Assessment Component	Support
Functionality	Engagement	Monitoring
Features/design	Collabortion	Security

Table showing possible criteria by which to evaluate the effectivness of clickers in the classroom.

Appendix

Appendix A: Common terms used to describe clickers
(Adapted from Christopher Keller of the University of Colorado-Boulder, Department of Physics)

- zappers
- personal response system
- classroom communication system
- wireless classroom communication system
- wireless course feedback system
- classroom feedback system
- personal electronic response system
- peer response system
- classroom response system
- electronic response system
- audience response system
- group response system
- interactive response system
- interactive student response system
- electronic student response technology
- wireless response technology
- voting machine
- electronic voting machine
- electronic voting system
- electronic polling system
- classroom polling tool
- wireless keypad
- classroom performance system
- audience-paced feedback system
- CATAALYST-(Classroom Aggregation Technology for Activating and Assessing Learning and Your Students' Thinking)

References

Berry, J. (2009). Technology Support in Nursing Education: Clickers in the Classroom. Nursing Education Perspectives, 30(5), 295-298. Retrieved October 22, 2012

Deal, A. (2007). A Teaching with Technology White Paper. Classroom Response Systems. In Carnegie Mellon University. Retrieved August 18, 2012, from http://www.cmu.edu/teaching/resources/Publica tionsArchives/StudiesWhitepapers/ClassroomResponse_Nov07.pdf

Duncan, D. (2008). Tips for Successful "Clicker" Use. Retrieved October 19, 2012, from http://www.colora do.edu/physics/Web/TipsforSuccessfulClickerUse.pdf

Gilmore, A. (2010). Using Clickers in Mathematics Instruction. Retrieved October 29, 2012, from http:// www.google.com.jm/url?sa=t&rct=j&q=using%20clickers%20in%20mathematics%20instruc tion%20allison%20gilmore&source=web&cd=1&ved=0CBwQFjAA&url=https%3A%2F%2Fweb. math.princeton.edu%2F~gilmore%2Fclic

Johnson, K., & Lillis, C. (2010). Clickers in the Laboratory: Student Thoughts and Views. Interdisciplinary Journal of Information, Knowledge, and Management, 5(2012). Retrieved November 8, 2012, from http://www.ijikm.org/Volume5/IJIKMv5p139-151Johnson445.pdf

Kaleta, R., & Joosten, T. (2007) Student Response Systems: A University of Wisconsin System Study of Clickers.

EDUCAUSE Center for Applied Research [ECAR], 2007(10). Retrieved October 29, 2012, from http://www.educause.edu/library/resources/student-response-systems-university-wiscon sin-system-study-clickers

Martyn, M. (2007). Clickers in the Classroom: An Active Learning Approach. EdUCAUSE Quarterly, 30(2), 71-74. Retrieved September 11, 2012, from http://www.educause.edu/ero/article/clickers-class room-active-learning-approach

McHugh, J. (2005, September 25). Connecting to the 21st-Century Student. In Edutopia. Retrieved October 19, 2012, from http://www.edutopia.org/ikid-digital-learner

Meedzan, N., & Fisher, K. (2009, June). Clickers in Nursing Education: An Active Learning tool in the Class room. Online Journal of Nursing Informatics (OJNI), 13(2). Retrieved October 11, 2012, from http://ojni.org/13_2/Meedzan_Fisher.pdf

Moredich, C., & Moore, E., (2007). Engaging students through the use of classroom response systems. Nurse Educator, 32 (3), pp. 113-116.

Morgan, R. K. (2008). Exploring the Pedagogical Effectiveness of Clickers. InSight: A Journal of Scholarly Teaching, 3(2008), 31-36. Retrieved November 9, 2012, from http://www.insightjournal.net/Volume3/ExploringPedagogicalEffectivenessClickers.pdf

O'Donoghue, M., & O'Steen, B. (2007). Clicking on or off? Lecturers' rationale for using student response systems. In Ascilite.org. Retrieved October 30, 2012, from http://www.google.com.jm/url?sa=t&rct= j&q=clicking%20on%20or%20off%3F%20lecturers%E2%80%99%20rationale%20for%20 using%20student%20response%20systems&source=web&cd=1&cad=rja&ved=0CB wQFjAA&url=http%3A%2F

University of Colorado Science Education Initiative [CU-SEI] & University of British Columbia Science Ed ucation Initiative [CWSE] (2009). Clicker Resource Guide: An Instructors Guide to the Effective Use of Personal Response Systems (Clickers) in Teaching. Retrieved from http://www.cwsei.ubc.ca/re sources/files/Clicker_guide_CWSEI_CU-SEI.pdf

Wallace, V. (2009, December 15). Clickers Fall 2009 Pilot Final Report. In Northeastern University. Retrieved October 19, 2012, from http://www.northeastern.edu/edtech/sites/default/files/Clickers_Pilot_Final_Report_FINAL_with_Exec_Summary.pdf

Western Kentucky University/WKU Academic Technol. (2006). Recommendation and report on "clicker" pilot project. In www.wku.edu/it/atech/. Retrieved October 18, 2012, from http://www.wku.edu/it/clickers/documents/clicker_recommendation.pdf

Zhu, E. (2007). Teaching with Clickers. CRLT Occasional Papers, 22. Center for Research on Learning and Teaching, University of Michigan. Retrieved August 18, 2012, from http://www.crlt.umich.edu/sites/default/files/resource_files/CRLT_no22.pdfCFVGB

Credits

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