



Teaching Support Services

TECHNOLOGY  
BRIEF

# Student Response Systems (Clickers)



## **What Are Clickers?**

Clicker systems are a combination of handheld remotes, receivers and software that allow responses (typically in multiple-choice format) from an audience (students) to be collected and tabulated in real-time. Responses are transmitted wirelessly to a receiver connected to a computer, and tabulated by the software.

## **How Can They Be Used?**

Generally, the main benefits ascribed to clickers are the potential to increase classroom interactivity, engage students, and assess student understanding. Research has demonstrated that increasing peer and student-teacher interaction in the classroom can increase learning and course effectiveness (Hake, Mazur, etc.). Some specific applications or strategies using clickers include:

- question and answer in lecture
- unit review
- collaboration (pairs, groups)
- debate
- voting and peer evaluation
- data collection (survey, statistical analyses)
- customized instruction (based on understanding)
- informal assessment

## **Should I Use Them?**

TSS continues to investigate clicker technology and its classroom application. Clicker technology and the relationship between publishers and technology providers is currently in transition. One must also consider that it is possible to achieve many of the benefits of clickers without the use of technology. Therefore, TSS recommends that you proceed with caution and/or consult with TSS before making an investment in clickers. Further evaluation of this technology also needs to be done in the Guelph context. A TSS representative can provide up-to-date information on these considerations and your specific situation.

Consider the following factors before pursuing the use of clickers:

- |                                |  |
|--------------------------------|--|
| <b>Cost</b>                    | Publishers are providing clickers bundled with textbooks; this has been one of the driving forces behind clicker adoption. The cost of the remote is passed on to the students, while cost of the base hardware and software for the instructor varies, depending on the company.  |
| <b>Technology</b>              | Currently, certain manufacturers are moving from infrared to RF (radio frequency) remotes. It is likely that infrared clickers will be obsolete shortly. One should consider this point especially if an up-front investment is required by either instructor or students.   |
| <b>Support</b>                 | Currently, there are a number of competing systems on campus, and the University has not standardized on a clicker system. Therefore, it is not possible to provide full central support for these systems. Publishers will provide some training and support, but this varies from company to company.  |
| <b>Teaching &amp; Learning</b> | This technology may be useful in increasing interactivity, especially in large classrooms, but it must be applied thoughtfully and in the right circumstances. Clickers should be used to address specific learning needs (Draper) and can help create “contingent teaching” experiences, where learning experiences can be adjusted ‘on the fly’ (Draper & Brown). Many techniques are available that will increase interactivity and engagement without the use of the technology so individuals must determine if the technology is really necessary to meet their needs, and departments must determine if this is a priority for investment. We discourage the use of clickers for formal assessment because of the limited functionality of the current generation of response systems (e.g., no confirmation of answer or receipt), the reliability issues, and student apprehension about the use of such systems for testing. |

## What strengths and challenges should I be aware of?

<p><b>strengths</b></p> <ul style="list-style-type: none"> <li>• enables increased/different types of interactivity</li> <li>• forces interactivity</li> <li>• makes interactivity more feasible in large lectures</li> <li>• encourages review of content</li> <li>• encourages review of course design</li> <li>• immediate feedback to prof allows for continuous improvement</li> </ul>	<p><b>challenges</b></p> <ul style="list-style-type: none"> <li>• investment in time, money</li> <li>• time and support for integration and design</li> <li>• must redesign class delivery</li> <li>• maintenance and administrative overhead</li> <li>• additional class technology/set-up time</li> <li>• student skepticism/trust issues</li> <li>• student costs</li> <li>• inaccessible for students with motor or visual impairment</li> </ul>
<p><b>recommended for:</b></p> <ul style="list-style-type: none"> <li>• well-integrated question &amp; answer exercises</li> <li>• informal evaluation of understanding</li> <li>• situations that require data collection</li> <li>• larger lectures</li> </ul>	<p><b>not recommended for:</b></p> <ul style="list-style-type: none"> <li>• formal in-class assessment</li> </ul>

## How can clickers help improve teaching and learning?

<p><b>Seven Principles For Good Practice In Undergraduate Education*</b> (Chickering And Gamson)</p>	<p><b>Ratings</b> ★ mediocre ★★ good ★★★ excellent</p>	<p><b>Comments</b></p>
<p>encourages contact between students and faculty</p>	<p>★★★</p>	<p>gives immediate feedback; encourages question and answer</p>
<p>develops reciprocity and cooperation among students</p>	<p>★★</p>	<p>students can work in pairs, groups; help each other</p>
<p>encourages active learning</p>	<p>★★</p>	<p>provides opportunities to have interaction with peers, faculty and content</p>
<p>gives prompt feedback</p>	<p>★★★</p>	<p>basic foundation of this technology!</p>
<p>emphasizes time on task</p>	<p>★★★</p>	<p>encourages opportunities for students to problem-solve and/or reflect on learning (unless there are technical problems)</p>
<p>communicates high expectations</p>	<p>★★</p>	<p>can be used to point out deficiencies or set levels of achievement</p>
<p>respects diverse talents and ways of learning</p>	<p>★★</p>	<p>provides opportunities to apply knowledge; can also encourage participation from all students, including those that are shy or who have language barriers.</p>

## **Where can I go for support?**

TSS provides the following support for clickers:

- for installation of technology & technical training (on cost-recovery basis)  
contact Steve Borho at sborho@uoguelph.ca or ext. 52956
- for advice on integrating clickers into classroom practice, developing question sets, etc.  
contact Peter Wolf at pwolf@uoguelph.ca or ext. 52468
- for support integrating clicker systems with WebCT and PowerPoint  
contact Aldo Caputo at acaputo@uoguelph.ca or ext. 52936

## **Authors**

Steve Borho, Classroom Designer

Aldo Caputo, Manager, Learning Technology & Courseware innovation

Peter Wolf, Manager, Instructional Design

## **References & Further Resources**

Bunz, U. & Rice, R. (2003). *Evaluating a Wireless Course Feedback System: The Role of Demographics, Expertise, Fluency, Competency, and Usage*. Available at: <http://www.scils.rutgers.edu/~bunz/NCA2003cps.PDF>

Chickering, A.W. and Gamson, Z.F. (1987). *Seven Principles for Good Practice in Undergraduate Education*. Available at: <http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/7princip.htm>

Crouch, C.H. and Mazur, E. (2001). Peer Instruction: Ten years of experience and results. *American Journal of Physics*, 69, (9), 970-977. Available at: [http://scitation.aip.org/journals/docs/ajpias-ft/vol\\_69/issue\\_9/970\\_1.html](http://scitation.aip.org/journals/docs/ajpias-ft/vol_69/issue_9/970_1.html)

Draper, S.W., and Brown, M.I. (2004) Increasing interactivity in lectures using an electronic voting system. *Journal of Computer Assisted Learning*, 20, 81-94.

Draper, S. (2002). *Electronically enhanced classroom interaction* Available at: <http://www.psy.gla.ac.uk/~steve/ilig/handsets.html>

EDUCAUSE Center for Applied Research (ECAR) (2004). *Transforming Student Learning with Classroom Communication Systems*. Available at: <http://www.educause.edu/LibraryDetailPage/666?ID=ERB0403> (available through TSS).

EDUCAUSE Learning Initiative (May 2005) *7 Things You Should Know About Clickers*. Available at: <http://www.educause.edu/ir/library/pdf/ELI7002.pdf>

Elliot, C. (2003), *Using a Personal Response System in Economics Teaching*. Available at: <http://www.economics.ltsn.ac.uk/iree/i1/elliott.htm>

Hake, R.R. (1998) Interactive-engagement vs. traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *Am. J. Phys.* 66, 64-74. Reprint.

Harrison, L. (2005). *Report on Potential Implementation of Student Response System ("Clicker") Technology*. Ryerson University.

Johnson, C. (2004). *Clickers in Your Classroom*. Available at: [http://clte.asu.edu/wakonse/Enewsletter/studentresponse\\_idea.htm](http://clte.asu.edu/wakonse/Enewsletter/studentresponse_idea.htm) Wakonse-Arizona E-Newsletter

Jackson, M.H. & Trees, A.R. (December 2003). *Clicker Implementation and Assessment* Department of Communication. Available at: <http://www.colorado.edu/ftpe/technology/FTEPMichele%20jack.pdf>