Successful Clicker Standardization

Standardizing on a single clicker system enhances pedagogical support while reducing logistical support issues and student costs

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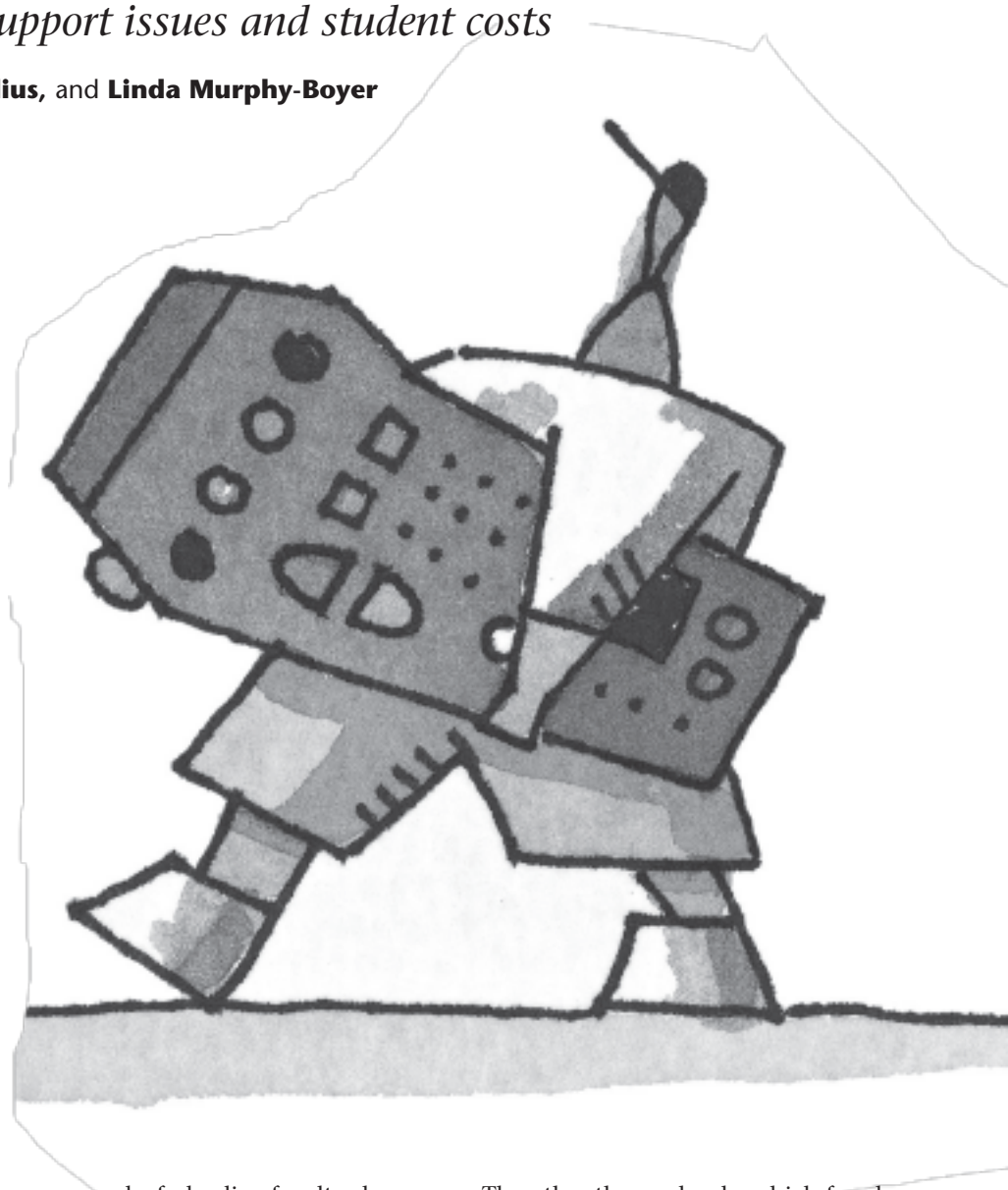

Student response systems, commonly referred to as "clickers," have become an important learning tool in higher education.[1] With a growing number of faculty using the technology to promote active learning,[2] student engagement, and assessment,[3] most campuses have seen increasing clicker use. And with faculty bombarded by multiple, incentive-laden clicker systems pushed by manufacturers and textbook publishers, it is not surprising to find multiple clicker systems on any campus.

The presence of multiple clicker systems inadvertently creates problems for different stakeholders. Campus IT staff have instructors asking for support on multiple systems; faculty discover they cannot share technical experiences or support one another; and students find themselves required to purchase and manage multiple clickers.

In an effort to address these issues, some institutions have standardized on a single clicker system. This article shares the collective experience of clicker standardization leaders at four institutions: Iowa State University (ISU), the University of Mississippi (UM), the University of Toronto (UT), and San Diego State University (SDSU). For various reasons, each institution selected a different system. Despite encountering a few bumps in the road, all have had success—as well as increased clicker use in classes.

Three of our schools followed a somewhat formal standardization process, but UM took a less formal route due in part to the engaging and visible on-campus work of a leading faculty champion. She made great progress using clickers to engage students. The results were compelling to her UM colleagues, some of whom had also enlisted the same clicker system for their classes with good results.

The other three schools, which faced more complicated situations, established ad hoc committees to focus campus input. For all four schools, the process of standardization and the establishment of appropriate support structures required a thorough analysis of clicker systems.

Common Clicker Attributes

- Radio frequency (RF) versus infrared (IR) based systems: While IR hardware costs less, many schools select RF systems due to significantly higher capacity and auditorium coverage, increased portability, ease of installation, confirming signals for students, and the ability to take attendance or administer tests.
- Integration with the campus LMS: Several clicker systems claim compatibility with commercial LMSs. Integration may require minor customization, however, along with local support.
- Cross-platform compatibility: Some clicker systems work equally well on Mac and Windows. Others may provide fewer features on the Mac platform, or may not work on a Mac at all.
- PowerPoint integration: Running clicker software within PowerPoint is considered an advantage by some and a detriment by others. Several clicker software packages work only within Microsoft Office's PowerPoint application. Other clicker systems work completely outside of PowerPoint. A few can run either inside or outside of PowerPoint.
- Support of question types beyond multiple choice: Some products offer numerical or even limited text response.
- Migration path beyond hardware clickers: Several manufacturers have hybrid products that work on laptops or PDAs. In some cases, they work alongside clickers in the same classroom. They also bring clicker accessibility to some disabled students.
- Conditional branching: The system software has the capability of jumping to different presentation slides based on the students' collective answers.
- Cost to the student.
- Cost to the institution (both hardware and support costs).
- Ease of use of the software and class roster maintenance for faculty.
- Ease of use of the hardware for students.
- Quality and availability of tech support from the manufacturer.
- Battery life and ease of battery maintenance.
- Clicker durability.

Involving Stakeholders

The more formal processes started with identification of interested campus stakeholders, most obvious being the faculty—not only the current clicker users but also other faculty leaders who promote active learning and student engagement. IT staff who support the teaching and learning mission were also critical participants as advocates of standardization to better use limited support resources.

Other, less obvious stakeholders became important allies. A university's bookstore, for example, is often the clicker point of sale to students. It can be under pressure from publishers to stock coursepacks of textbooks bundled with clickers and supporting materials. Students might want these bundled packs, but they also want to purchase course items individually, particularly if they already own a clicker from a previous course. Managing the inventory thus becomes quite cumbersome and even economically risky. At ISU, for example, bookstore representatives welcomed standardization as a way to simplify management of clicker systems.

Perhaps the most important stakeholders were the students themselves. Ironically, none of us included students in our initial standardization processes, although SDSU found them to be vital in selecting the final clicker system.

Student involvement is important but should be considered carefully. The clicker burdens for students include the additional cost, the need to carry the clicker to every class, often registration within the campus learning management system (LMS), understanding clicker operations and "indicator lights" that aren't as straightforward as they seem, and even battery management. Students, who are often inexperienced in the educational practices that benefit them, may make recommendations based only on these factors. If students are directly involved in the selection process, they need to be fully cognizant of the pedagogical benefits of clickers so that cost or nuisance factors don't become the only issues. Their input may be most valuable after the field of potential clicker systems has been narrowed to the final candidates.

Identify Attributes

The assembled stakeholders identified the clicker system attributes they considered most important (see the sidebar on common clicker attributes). Because some attributes are mutually exclusive, no single clicker system includes them all. As the stakeholders on each campus discussed their needs, some attributes became more important than others. These needs varied between institutions.

A key attribute desired by all four campuses was radio frequency (RF) operation. RF systems have overtaken their infrared (IR) counterparts in many ways. Important attributes of an RF system are

- significantly higher signal throughput;
- receiver portability and the elimination of fixed IR receiver networks in classrooms;
- confirming indicators for students; and
- the possibility of registering individual clickers, allowing faculty to take attendance or even administer tests.

Other important factors included ease of use, integration with local learning management systems, cross-platform software availability, and student costs.

Selecting a Manufacturer

ISU and SDSU found more than one system met their needs, which provided a welcome advantage when negotiating pricing prior to standardization. Manufacturers were invited to campus to demonstrate their systems.

ISU identified clicker systems for a "live test" or pilot phase, including use in classroom settings and a test of integration with the local LMS. ISU found willing faculty testers among the already assembled stakeholders. IT and faculty development support staff assisted in these tests, at higher than normal support levels. Such in-depth observations of faculty use were crucial in identifying both benefits and problems associated with the tested systems.

Ideally, any pilot phase would last long enough for faculty to get over a learning curve with the software and for stakeholders to gather consistent usage data. ISU's two-semester pilot was excessive. Institutions can gather enough data over several weeks to make an informed selection. Still other schools can make informed decisions about their clicker systems without a pilot phase.

At UT, only one manufacturer met the requirements established by its clicker committee, making the final decision straightforward. ISU and SDSU, however, identified two manufacturers' systems that met their needs, but neither was a clear-cut winner. SDSU went to its students for final input. Students preferred the functionality of one system, although they were unhappy about paying a fee on a semester-to-semester basis. SDSU worked with the manufacturer to modify its business model, satisfying the student concerns and helping SDSU reach its final decision. ISU, looking for a "tipping factor" in its neck-and-neck clicker decision, received from the vendor the promise of a rebate for students who had already invested in other clicker products.

In negotiations, clicker manufacturers are more able to modify their business models than their product features. Schools should ensure that the features they need are available and then work for better pricing or other incentives. Identifying a second system that would also meet the school's needs can increase leverage.

As we reached final decisions, each of our institutions' clicker standardization stakeholder groups created a final report and recommendation, which were submitted to appropriate local governance. This stage was important in obtaining the necessary support from senior administration.

Managing Deployment

Once a standardization decision was made, it was time for campus deployment. A clicker system has three components to be deployed:

- The clickers themselves
- A receiver, most often a plug-in device for the faculty computer
- The software, resident on the faculty computer

There are different ways to distribute each.

Clicker Deployment

Some institutions can absorb the costs of the clickers for their students, but most can't. By far the most common sales model involves campus book and supply stores. As with textbooks, clicker prices get marked up from 15 to 40 percent. A high mark-up on some of the more expensive clickers can bring the student's cost to over $60. Some faculty declined to use clickers solely because of their reluctance to impose such a high cost on students. Some campus bookstores buy back clickers at the end of the semester, and then resell them at a lower price. And some clicker manufacturers are setting up e-commerce sites, bypassing the bookstore sales model altogether.

Receiver Deployment

In some cases, the faculty member buys a receiver directly from the manufacturer. More often, a distribution and support agent on campus—usually the central IT department—supplies receivers to faculty. All four schools receive free receivers for some or all of their clicker faculty. SDSU's chosen manufacturer does this as a matter of course when an institution standardizes. UT was able to negotiate for free receivers for all faculty clicker users. UM and ISU negotiated for free receivers based on either class size or total number of clicker units sold. Because manufacturers make most of their profits on clickers, handing out free receivers aids diffusion of clickers on campus, saves the institution money, and promotes clicker sales.

Software Deployment

All the manufacturers we investigated offer free software download sites for faculty. Institutions can provide better service, however, by setting up internal mechanisms for distribution. If a central agent on campus assists with software and receiver distribution, that agent can also track which faculty have these elements and contact them when new software revisions or receiver firmware upgrades occur. For institutions that manage classroom computers, decisions are needed regarding incorporation of the clicker software into the standard classroom. This may not be a concern at first but will likely become an issue as clicker use spreads across campus.

Ensuring Support

Some think of clickers as a simple technology, but the software can be complex, necessitating support for faculty. Most clicker manufacturers provide phone, e-mail, and in some cases live chat technical support for users, and some institutions rely on that external support. Other institutions establish on-campus technical help, often at existing faculty help desks.

Pedagogical and learning support issues seem best handled on campus. Central support staff who specialize in learning technology can be good advocates for clicker use. An additional—and effective—support system comes from faculty peer networks. All four campuses have established groups where instructors can share clicker experiences, tips, and tricks, often by e-mail, and all host occasional clicker-faculty meetings to discuss clicker use and share ideas.

Key Recommendations

- Consider including students as stakeholders in the evaluation process. Work to make sure they understand how clickers benefit them.
- Include your bookstore staff as stakeholders, and help them understand their active involvement in spreading this technology on campus.
- Educate senior administrators about response systems and why standardization is important.
- Increase support for faculty during any pilot phase to more easily observe clicker use and issues.
- If possible, try to identify multiple systems that meet your needs prior to signing a standardization agreement. This will provide leverage for negotiating with your preferred manufacturer.
- Work closely with your bookstore in an attempt to keep their mark-up as low as possible. Encourage the bookstore to establish a buy-back program for clickers, just as they do for textbooks.
- Explore the possibility of having your selected manufacturer provide free receivers for faculty users. Some manufacturers do this automatically when signing a standardization agreement.
- Acquire a stand-alone system that can be used for demonstration and training purposes. Some manufacturers provide a "kit" at no charge, recognizing that enabling such demonstrations aids adoption and, ultimately, clicker sales.
- Establish records or tracking mechanisms as you deploy receivers and software to faculty. This will make updating software and firmware easier.
- Start your deployment small, so that start-up support issues don't overwhelm staff.
- After a semester or two, let clickers diffuse to more courses. Support needs do not increase at the same rate as course adoption. Include college and departmental support staff as clicker use grows.
- Use your successful clicker faculty to aid diffusion and establish faculty-led support groups.
- Don't push faculty into using clickers. Those unsure about using clickers are better served investigating clicker use in their curriculum and observing successful peer faculty before making a clicker commitment.

While not restricting use, our schools started with small deployments involving 10 to 15 faculty and representing 1,000 to 3,000 clickers deployed. These smaller deployments made initial integration more manageable as minor issues arose. For instance, ISU encountered logistical problems with inventory and stocking levels at its bookstore. ISU, SDSU, and UT experienced minor problems with LMS integration or clicker registration through the LMS. Now, one year later in the fall 2007 semester, deployment at our institutions—all large schools—ranged between 12 and 44 clicker courses (often with multiple, large-lecture course sections). These courses represent the use of anywhere from 3,000 to 8,000 clickers on each of our four campuses.

In spite of the thousands of clickers deployed, faculty support demands have been far from overwhelming. And as confidence in supporting a broader deployment has grown among our IT support staff, we have more broadly communicated clicker availability to faculty. Support demands are greatest at the beginning of the semester. As faculty use the system, their comfort with it grows. Still, our support staff tell faculty to start small, expect a learning curve, and not to attempt too many of the advanced features at once.

Another issue for faculty is time management. Clicker use in class takes additional time. If a faculty member already feels he or she is not covering all the class content, introducing clickers will not help. Including four or five clicker questions in a large classroom will probably take an additional 10 minutes of class time, at a minimum. Faculty who use clickers successfully tell us they cannot cover quite as much content as they once did, but the loss in breadth is made up by depth.

For all these reasons, clicker use on any campus will not grow unfettered. It is kept somewhat in check by the commitment required of faculty. That commitment means clickers are not for everyone. Nonetheless, all four institutions have at least one faculty "clicker champion" on campus—someone who demonstrates effective clicker use in teaching and is respected by other faculty. If possible, use the champion on your campus in instructional and promotional materials about clickers. Have them lead faculty peer groups and demonstrate effective, engaging clicker practice.

Conversely, all four institutions have seen a bad faculty experience with clickers. In one case, a faculty member pushed into using clickers never committed to the technology. When early struggles with the software arose, she quit using the clickers altogether. The students in the class, already stuck with clickers, developed a poor opinion of the technology, and the faculty member was left frustrated.

In another case, a faculty member's sole desire for using clickers was to administer exams. The upload feature to the LMS was used, resulting in a time-savings benefit to the faculty member. Here, too, the students were

not pleased, as they sensed they were required to purchase the clickers solely for the benefit of the instructor.

In clicker classes where students perceive a benefit, most notably when it aids their learning, they enjoy clicker use despite the expense. Evidence on our campuses suggests that student satisfaction is notably higher when clickers are used for immediate feedback, knowledge-checking, in-class surveys, group work, and other engaging activities. In these successful classes, some faculty still introduce a certain level of accountability by providing limited points for participation. This seems to be acceptable to the students, as long as they continue to perceive an overall benefit to using clickers. This is in keeping with the concept that the greatest benefits are realized when clickers are used for active learning. Any accountability or assessment use of clickers should be a secondary consideration.

Conclusion

Our four institutions did not find a clear-cut winner in the clicker manufacturer derby. In fact, each campus has had success with different products (ISU with TurningPoint, UM with InterWrite PRS, UT with i>Clicker, and SDSU with eInstruction). Common threads are a participative process, shared decision making, and supportive change management during adoption and diffusion.

Clicker technology is evolving rapidly. Eventually, mobile learning platforms will include this feature as part of a mobile or laptop classroom paradigm. In small, isolated instances, that day is today. But for most, the day of affordable, ubiquitous, large-scale learning platforms has yet to come. For the near future, classroom clickers exist as a moderately inexpensive way to engage learners in the educational process and to enrich their experience. *e*

Endnotes

1. EDUCASE Connect resource site on Student Response Systems, <http://connect.educause.edu/term_view/Student%2BResponse%2BSystems>.
2. M. Martyn, "Clickers in the Classroom: An Active Learning Approach," *EDUCAUSE Quarterly*, Vol. 30, No. 2, 2007, pp. 71–74, <http://connect.educause.edu/library/abstract/ClickersintheClassro/40032>.
3. D. Duncan, *Clickers in the Classroom* (San Fransciso: Pearson Education/Addison-Wesley and Benjamin Cummings, 2005).

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