Clickers Fall 2009 Pilot Final Report

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Clickers Pilot Final Report
December 15, 2009
Executive Summary

Pilot Background
When a working group discussed clickers a few years ago, IS concluded that the technology was too much in flux to choose one system to standardize on. The technology has improved and stabilized, and there is extensive research from various universities about implementing the systems effectively across campus as well as research about their effectiveness.

A number of faculty on campus use clickers but vendor choices had been made by random selection. No formal research was conducted. Since faculty were using different vendors this meant, in certain cases, students were required to purchase multiple clicker remotes. (See Appendix A: Northeastern Faculty Using Clicker technology)

Pilot Purpose
Northeastern University faculty members from a variety of disciplines are currently using various clicker systems in their classes. Until recently, standardization of clicker systems has been difficult because the technology was immature, and no single system could meet the faculty members’ range of needs. But the lack of standardization presented many difficulties including a lack of technical and pedagogical support and the danger that some students could be required to purchase multiple clicker remote controls for different courses. In the last year, clicker technology has improved significantly. As a result a Clicker Task Force was convened in March 2009 to select a single system that could provide the functionality that Northeastern faculty members need.

Clicker Pilot Recommendations
After piloting two products during Summer-Fall 2009 and reviewing faculty and student feedback, the task force recommends Turning Technologies as the university-wide system. Turning Technologies was selected as the university-wide vendor for faculty for five primary reasons:
   1. Flexibility: Turning Technologies has four main products that work with the same student clicker remotes
   2. Features: TurningPoint – Interactive PowerPoint best met faculty reporting needs
   3. Ease-of-use: TurningPoint AnyWhere (“a light version” of TurningPoint-interactive PowerPoint) was easy to use
   4. Portability: Turning Technologies products require only a small USB receiver
   5. Support: Turning Technologies provides support at all levels in various delivery mechanisms

Turning Technologies was selected as the university-wide vendor for students for two primary reasons:
   1. Better Reliability: 95% of the students reported no problems with the Turning Technologies clicker remote.
   2. Ideal Clicker Size: 94% of students selected the Turning Technologies clicker remote as being the ideal size

Pedagogical and technical support will be provided to faculty and students through Turning Technologies customer support, with additional assistance supplied by Information Services and the EdTech Center. Faculty members will be able to begin using Turning Technology Clickers during winter semester, 2010.

A report detailing the pilot, products, survey results and recommendations follows.
What are Clickers?

Clickers, also known as classroom response systems, student response systems and audience response systems, have been around since the 1960s, initially as hard-wired systems, which were very expensive and rather inflexible. The systems have evolved to the current versions of wireless radio frequency systems (combination of hardware and software) and virtual clicker systems that are web-based and can be run from laptops or delivered to cell phones and PDAs without additional hardware. Many institutions have adopted clicker technology as a quick and easy way of engaging students, assessing understanding and increasing student success, particularly in lecture classes. Faculty can easily build a few question slides into their PowerPoint presentations (or other applications, depending on product), create questions on the fly, or even ask questions verbally and then give students a minute to click in their answers. When all students have responded, a graph is displayed that shows how the students answered. Based on this visual feedback, a faculty member can continue with the lesson or stop and go back over the most recent concept to foster better understanding. Clickers can also be used to take attendance, which can be especially valuable in large lecture classes.

The main goals for utilizing clicker technology with classes are to engage, assess and increase student success. Applications include:

- Actively engage students through practice or review questions, can be in the form of games played individually or in teams
- Conduct opinion surveys, provide visual representation of different perspectives
- Pretest/posttest pairs – Pretests measure students’ entry knowledge of course topics and uncovers deficiencies; posttest measures mastery of course content. Provides visual feedback to students of how they compare to peers. Poll and re-poll in same session to measure gain in understanding
- Promote collaboration – put students in groups, have them discuss a question, come to consensus, record their answer as a group, compare group responses, have students discuss discrepancies
- Generate instant feedback on question, issue or calculation
- Increase communication – hear from every student in class on every question
- Capture formative and summative assessment – measure student preparation, understanding or satisfaction
- Gather research data

For students, clickers provide a means to actively participate in class, particularly in large classes. For faculty, clickers provide an alternate method of engaging students and measuring student comprehension.

Clickers are already being used across campus (Appendix A: Northeastern Faculty Using Clicker Technology). Clicker use is underway in Pharmacy, Speech-Language Pathology & Audiology, and Biology. Their typical uses include:

- Informally quizzing reading assignments
- Assessing student knowledge and re-design day’s lecture based on scores (i.e., 90% correct - delete that content from day’s lecture)
- Grading
- Attendance
- Learning Games
- Comprehension via ratings scale (1-10, How well do you know this material?)

These can be categorized into three strategies:

- ‘Early Discovery’: clickers often are used to assess students’ fundamental knowledge from pre-requisite coursework.
- ‘Immediate Feedback’: Most times clickers are used to assess comprehension or application of content just taught.
- ‘Retention’: clickers can be used as a tool for assessing information retention at subsequent classes.

It is important to note that while clickers can be used to engage students and measure comprehension, to be effective, clicker questions and activities must be developed in conjunction with specific curriculum goals. Piloting a clicker program with a small group can help uncover weaknesses in the product and training requirements for application and implementation before it is more widely implemented.
Fall 2009 Pilot

Task Force Committee Charge
Assess clicker needs for the Northeastern community for both students and faculty. Review current University clicker initiatives and university priorities related to clickers. Identify pilot vendors for September ’09 implementation. Based on evaluations of pilots, both students and faculty, make recommendations for broader implementation for a university-wide standard vendor.

Benefits of a University-Wide Standard
Instituting and supporting university-wide standard clicker vendor provides a range of benefits for different users in the university community.

For students, a university-wide standard clicker vendor will provide:
- a one-time purchase, despite multiple faculty use
- greater purchase availability through the bookstore
- a bookstore buy back option

For faculty, a university-wide standard clicker vendor will provide:
- eventually, students who already have purchased a clicker
- university computers with pre-installed clicker software
- continuous on-site university support, technically and pedagogically

In the spring of 2009, in response to a request from senior leadership and faculty, Alicia Russell convened a working group, led by Victoria Wallace to study requirements for a standard university-wide clicker vendor for Northeastern, review products and make recommendations. (See Appendix B: Clicker Task Force Committee).

Process/Timeline
The following process was established to guide the group’s work:

1. Determine Goal
2. Form Committee/Task Force
3. Review background studies/examples from other institutions
4. Interview faculty who have/are using clicker technology
5. Collect requirements, use case scenarios - define use scenarios and feature requirements
6. Prepare background report on clickers (history at NEU, studies, examples of uses, etc.)
7. Identify tools based on requirements and recommendations - document
8. Host on-campus demo(s) of recommended product(s)
9. Review tools & select product(s) to pilot
10. Work with IS on integration requirements, work with Vice Provosts on funding model, integration model. Figure out how to market and
encourage use
11. Create & distribute RFP, inviting people to participate in pilot
12. Based on RFP's, determine pilot participants; Vendors provide free equipment for pilot use
13. Solicit pilot feedback through surveys and focus groups
14. Evaluate pilot and make recommendations
15. Devise wider implementation strategy

The group began its work by preparing a report on current clicker efforts at Northeastern. Surveys with faculty and follow-up interviews contributed to the requirements gathering process, which led to the development of "use scenarios," describing current and future uses of clickers (see Appendix C: Use Scenarios) and clicker feature requirements to fulfill faculty requirements.

Over the next several months the EdTech Center reviewed and researched several products, using the following process:

1. Gather list of products from variety of sources (Clicker websites, Wikipedia, colleagues, other universities)
2. Review products and map to requirements (4 products reviewed) (Appendix D – Product Matrix)
3. Task Force Committee determined two vendors met faculty requirements (iClicker and Turning Technologies)
4. Talk with other institutions using products and also those instituting university-wide solution
5. Invite both vendors to demonstrate products to faculty
6. Involve IS in technical review re: integration.

Based on research conducted by EdTech professionals and faculty feedback, iClicker and Turning Technologies was invited to demonstrate its product for Northeastern faculty.

Turning Technologies representative, Kevin Owens, came to Northeastern on June 10, 2009 and provided a one-hour demo and iClicker representative, Brenda Braevner, came to Northeastern on June 11, 2009 and also provided a one-hour demo. Both products met faculty functional requirements and several faculty indicated interest in using either clicker product during their fall classes for the pilot.

**Pilot Kickoff**

Since both vendors agreed to provide pilot equipment to faculty and students at no charge the task force committee decided to pilot both products simultaneously. Through an RFP process advertised to all faculty, the Provost’s Office approved eight faculty to pilot one or both clicker products (see Appendix E: Pilot Participants). The courses where clickers were used represented broad coverage of the university disciplines as well as Use Scenarios.

During Fall 2009, faculty pilot participants integrated clicker technology into their course lectures. Some also chose to test and use the Blackboard Gradebook integration feature.
Description of Turning Technologies Products

Turning Technologies clickers allow students to participate in lectures by submitting responses to interactive questions using a ResponseCard keypad, web-enabled phones, or computer devices.

Turning Technologies was selected as the university-wide vendor for faculty for five primary reasons:

1. Flexibility to meet a range of faculty needs: Turning Technologies has four main products that work with the same student clicker remotes:
   a. TurningPoint – interactive PowerPoint (PC or Mac) - is a software add-on to Microsoft PowerPoint that enables faculty to develop and administer real-time assessments of students within their PowerPoint presentations
   b. TurningPoint AnyWhere - Poll in ANY PC or Mac application including web browsers, PDFs, Word documents and more. Faculty can use existing presentation or materials for easy, instant polling.
   c. Interactive Polling for Distance Learning and Remote Meetings RemotePoll – In keeping with our university global/international efforts, faculty can poll students from remote locations and no longer have to be confined to a single classroom.
   d. ResponseCard Anywhere - is a portable device that displays polling results right in your hand. This LCD screen-equipped handheld receiver is approximately the size of a deck of cards and is the perfect solution for faculty who need to work in a lab, the field, or a classroom not equipped with a pc or projection system.

2. Features: TurningPoint – Interactive PowerPoint was assessed to the most robust product to best meet faculty reporting needs (50% of iClicker faculty reported iClicker did not include all the features/functions they required).

3. Ease-of-use: Although iClicker was assessed as being the easiest product to use, TurningPoint AnyWhere (“a light version” of TurningPoint-interactive PowerPoint) was assessed to be just as easy. If faculty require more robust polling and reporting features, Turning Technologies offers the alternate TurningPoint-interactive PowerPoint.

4. Portability: Turning Technologies products only require a small USB receiver. Although iClicker was a no-install product, it did require faculty bringing a large base to run the software. ‘No install’ is a feature that is less important in this scenario since university-wide supported initiatives/software can be added to the ‘image’ of all pc machines by IS.

5. Support: Turning Technologies provides support at all levels. Support resources are available in a variety of formats at no additional cost including onsite training, online tutorials, and recorded training sessions to individual consulting with faculty. They offer phone support through an 800 number to both students and faculty.

Turning Technologies was selected as the university-wide vendor for students for two primary reasons:

1. Better Reliability: 95% of the students reported no problems with the Turning Technologies clicker remote while 95% of the students using iClicker report one or more times having difficulties getting their clicker remote to work in class. Nearly 25% of iClicker students reported problems with the batteries.

2. Ideal Clicker Size: 94% of students reported the Turning Technologies clicker remote was the perfect size while 40% of the iClicker students felt the clickers were too large.
Student and Faculty Reactions to Pilots
Feedback was collected via surveys from students (268) and faculty (16) in November and December, following the pilot.

All six faculty piloting Turning Technologies were very satisfied with the software and features but many have requested additional training on the more robust product, TurningPoint-interactive PowerPoint. They felt able to use the software but in limited capacity, given the training and resources provided prior to the pilot. They were however confident that the product met their needs.

While 83% of the Turning Technologies faculty reported zero to one instance of a technical problems, 50% of the iClicker faculty reported technical problems two or more times. Additionally, 25% of iClicker faculty reported low satisfaction in getting their technical issues resolved quickly.

268 students responded to the survey (approximately a 34% rate of return). Some of the significant differences in vendor products included the following:

- 95% of the students reported no problems with the Turning Technologies clicker remote while 95% of the students using iClicker report one or more times having difficulties getting their clicker remote to work in class. Nearly 25% of iClicker students reported problems with the batteries.
- 94% of students reported the Turning Technologies clicker remote was the perfect size while 40% of the iClicker students felt the clickers were too large.
- 88% of Turning Technology and 86% of iClicker students would like to use clickers more often in class.

Survey Results
- Quantitative Data from faculty can be found in Appendix E: Faculty Survey Results.
- Qualitative comments from faculty can be found in Appendix F: Faculty Comments.
- Quantitative Data from students can be found in Appendix G: Student Survey Results.
- Qualitative comments from students can be found in Appendix H: Student Comments.
Considerations for Broader Implementation

Funding
The exact cost of need to be negotiated with Turning Technologies and will be affected by volume of clicker remote sales. However, standard agreements at other institutions include the following approximations:

- $30 for a student clicker remote
- 20 clicker receivers are ‘fronted’ to the university after exclusive agreement. In some cases, full kits (including remotes) are included as well
- For every 100 remotes sold, 1 clicker receiver is awarded

Distribution
There are a number of student distribution options:

- Similar to purchasing textbooks, students may purchase clicker remotes at the university bookstore as part of their ‘class pack’.
- Students may purchase remotes from Turning Technologies online store
- Students may purchases used remotes through various online bookstores

The procedure for faculty distribution of clicker receivers needs to be finalized. Meetings with EdTech, IS, and HelpDesk have been initiated.

Training and Support
As previously mentioned, one of the primary reasons Turning Technologies was selected as the vendor of choice is the level and quality of support that they provide at no additional cost. Faculty who used Turning Technologies support services during the pilots were very satisfied with the response. Still, a successful comprehensive training effort will be required, including some combination of the following:

- Faculty Workshops: Especially in the early semesters of using the product, usage will be encouraged and made more effective by offering faculty workshops both on the pedagogy of using clickers and an introduction to the Turning Technologies products. Workshops could be offered in several formats including in-person, web cast, and as online documentation.
- Faculty Consulting: Turning Technologies provided excellent consulting to individual faculty. An 800 number is available as well as individual consulting with the area representative.
- Students: Students should be encouraged to use Turning Technologies’ 800 number for end user support.
- Documentation: Turning Technologies provides online guides and tutorials and recorded trainings. In the pilots, these were most effective when they were locally customized.

Blackboard Integration
Turning Technologies integrates with Blackboard Gradebook. This feature was tested on a small scale during the pilot with great success. The implications for a larger rollout should be thoroughly considered in collaboration with IS however we do not foresee any issues based on the pilot results.
### Appendix A: Northeastern faculty already using Clicker technology

A number of departments are actively using clickers at Northeastern; all of these trials have been devised and spearheaded by faculty and staff enthusiasts. Departments/Groups that have used or are currently using clickers at Northeastern include:

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Current Vendor</th>
<th>Note Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veronica Godoy-Carter</td>
<td>Biology</td>
<td>None – was Turning Point See Notes.</td>
<td>Class of ~40 students. Used TP for two semesters last year. Stopped using in January 2009. Mac user and Office suite 2007 was installed. TP does not support this version of the software. Had setup issues at first but once running, very satisfied. TP support was very good. Concern: students forgetting clickers. Interested in participating in pilot.</td>
</tr>
<tr>
<td>Leslie Day</td>
<td>Physical Therapy</td>
<td>elInstruction</td>
<td>Started with elInstruction because attached to textbook (infra-red). Switched to Turning Point but was not happy with faculty costs and lacked advanced features. Back with elInstruction for the past year. Likes the extra features and different reports. Concern: cost to faculty</td>
</tr>
<tr>
<td>Michael Gonyeau</td>
<td>Pharmacy</td>
<td>elInstruction CPS 4 years Switched to Turning Technology Summer09</td>
<td>Logistics with laptop use have been a problem. CPS support was not good and was not happy with cost structure. Required registration did not allow faculty to use extra pads for class or dry runs of materials.</td>
</tr>
<tr>
<td>Jim Matthews</td>
<td>Pharmacy</td>
<td>elInstruction CPS 4-5 years Switched to Turning Technology Summer09</td>
<td>Using only for engagement at this point – no credit. Use in large classes. (100-160 students) Has seen increase in participation. Satisfied with elInstruction but there was room for improvement.</td>
</tr>
<tr>
<td>Margarita Divall</td>
<td>Pharmacy</td>
<td>elInstruction CPS 4-5 years Switched to Turning Technology Summer09</td>
<td>Overall, was unhappy with elInstruction. Clickers had to be registered by students with vendor. Also, upgrades were difficult to understand. Trying TP because clickers are less expenses. Some receivers allow smart phone technology.</td>
</tr>
<tr>
<td>Gerry</td>
<td>Pharmacy</td>
<td>elInstruction</td>
<td>2005-Summer 2008 used elInstruction. Stopped using due to technology</td>
</tr>
<tr>
<td>Name</td>
<td>Department</td>
<td>Current Vendor</td>
<td>Note Summary</td>
</tr>
<tr>
<td>-----------------------</td>
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<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Schumacher</td>
<td></td>
<td></td>
<td>issues/failures (20%), bookstore hassles, always had to bring laptop, setup complicated, etc. Probably will not use again.</td>
</tr>
<tr>
<td>Judith Barr</td>
<td>Pharmacy</td>
<td>eInstruction</td>
<td>Same experiences as Gerry, but would use Clickers again.</td>
</tr>
<tr>
<td>Sarah Young-Hong</td>
<td>Speech Language Pathology and Audiology</td>
<td>iClicker</td>
<td>First year using clickers. Use in small classes and large clinical case conferences. Also, requires all students to use clickers in the clinical case conferences. Concern: high markups at the bookstore and making sure bookstore has enough clickers in stock for students. On one occasion, all clickers were purchased and there were none left for her class.</td>
</tr>
</tbody>
</table>

**Additional Northeastern faculty interested in using Clicker technology**

- b.ritchie@neu.edu
- Christine Oka/Library/NEU
- Daniel F Quinn/CAS/NEU
- Donald King/CAS/NEU
- Iris Berent/CAS/NEU
- Janna D Kucharski-Howard/Health Sciences/NEU
- Jennifer L Kirwin/Health Sciences/NEU
- Ki Young Suzie Byun/Health Sciences/NEU
- Liana J Pennington/CAS/NEU
- Maureen A Harris/Health Sciences/NEU
- Michael Feeney/IS/NEU
- Paul A DiMilla/CAS/NEU
- w.smith@neu.edu
- Patricia Kiladis/Health Sciences/NEU@NEU
- MarySusan Potts-Santone
Appendix B: Clicker Task Force Committee Members

- Aduama, Audrey
- Beadle, Terry
- Berent, Iris
- Bergman, Kostia
- Carrillo, Christopher
- Day, Leslie
- DiMilla, Paul
- Feeney, Michael
- Godoy-Carter, Veronica
- Gonyea, Michael
- Harris, Micki
- Janna; Kirwin
- Jennifer; Byun
- Ki Young Suzie
- Kiladis, Patricia
- King, Donald
- Kucharski-Howard
- Mary-Susan
- Matthews, Samuel
- Oka, Christine
- Pennington, Liana Jean
- Potts-Santone
- Quinn, Daniel
- Ritchie, Bruce
- Russell, Alicia
- Smith, Wendy
- Staples, Mark
- Trowbridge, Stephanie
- Wallace, Victoria
Appendix C: Use Scenarios

Potential Use Scenarios (types of clicker uses)
The goals and priorities of a particular course will influence the design and implementation of clicker technology and the required capabilities of the system. The following descriptions represent potential scenarios for clicker uses in the classroom.

Early Discovery

Discussion Warm-Up/Class Icebreakers
Posing questions, giving students time to think about it, submitting their answers via clickers, and then displaying the results can be an effective way to warm-up a class for a class-wide discussion. Faculty can assess students’ fundamental knowledge from previous courses or class pre-work prior to beginning the day’s lecture. Compared with the approach of responding to the first hand that is raised after a question is asked, this approach gives all students time to think about and commit to an answer, setting the stage for greater discussion participation and an accurate assessment of class knowledge on a particular topic.

Immediate Feedback

Attendance
Clickers can be used to take attendance directly (e.g. asking students to respond to the question "Are you here today?") or indirectly by determining which students used their clickers during class. The later is most often used at Northeastern University today.

Contingent Teaching
Similarly, this can be applied in real-time. Since it can often be challenging for instructors to determine what students do and do not understand, instructors can use clickers to gauge student comprehension in real-time during class and modify their lesson plan accordingly. If the clicker data show that students understand a given topic, then the instructor can move on to the next one. If not, more time can be spent on the topic, perhaps involving more lecture, class discussion, or another clicker question.

Peer Instruction
The teacher poses a question to his or her students. The students ponder the question silently and transmit their individual answers using the clickers. The teacher checks the histogram of student responses. If significant numbers of students choose the wrong answer, the teacher instructs the students to discuss the question with their neighbor. After a few minutes of discussion, the students submit their answers again. This technique often (but not always!) results in more students choosing the correct answer as a result of the peer instruction phase of the activity. This is a fairly simple way to use clickers to engage a large number of students in discussions about course material. This approach can also set the stage for a class-wide discussion that more fully engages all students.

Data Collection
Data collection is something that has not been done regularly but is something that faculty have expressed interest in. Clickers can capture data on student responses and provide them with frequent indicators of both individual and class learning progress which include comparisons with peer groups, previous classes and demographic subgroups - to encourage positive effects of self-assessment and competition among students. Data can be divided into demographic categories to facilitate course revisions, to provide input to students on demographic positions, and to provide information for personnel research into critical topic areas.

**Student Presentations**
Clickers are not just for faculty facilitation. Some faculty have required students to use clickers for clinical case conferences, which include 80+ students. Students use clickers to maintain engagement and/or reinforce material during and after their presentation.

**Retention**

**Measuring Comprehension**
In general, instructors can create questions to measure comprehension and determine what students already know or don’t know. This includes:

- Review of topics presented in previous classes
- Review of material covered in the homework

In order to assess students' understanding of topics previously covered or material covered in the homework, begin the class lecture with a number of questions or scenarios for group work to gauge their level of understanding. If 90% get the answer correct, move on. If the numbers are lower, be prepared to review the topic before moving on.

**Assessment (Formative)**
Clickers can be used to pose questions to students and collect their answers for the purpose of providing real-time information about student learning to both the instructor and the students. Students can use this feedback to monitor their own learning, and instructors can use it to change how they manage class "on the fly" in response to student learning needs.

In order to give students the chance to monitor their grade, increase participation, and encourage student use, a points system can be implemented. For example, one faculty member provides points strictly for participation. To make it more valuable for the students, she gives full credit (1) if the student gets 67% or higher, half credit (.5) for below 67% and no credit (0) if the student is absent. These scores are 5 or 10% of their total grade. This type of grading system rewards students for any response but provides more points if students answer correctly. Therefore, students have an incentive to take the questions seriously. A secondary result: more students attend class.

**Assessment (Summative)**
Due to concerns of accuracy and cheating, most faculty at Northeastern University do not use clickers for graded quizzes or tests. However, clickers can be used for graded activities, such as multiple-choice quizzes or even tests.

**Final Exam Reviews**
Take it one step further: the top-25 students in points receive extra credit. During the last class of the semester, faculty can review for a final exam by having the top-25 students compete with each other to answer potential final exam questions using clickers. Reviewing in this manner engages the entire class and allows every student to learn.

**Other techniques used at other Universities:**

**Repeated Questions**
In the peer instruction approach described above, students respond to a given question twice—once after thinking about their answer individually and again after discussing it with their neighbor. Some instructors ask the same question several times, with different activities in between rounds of voting designed to help students better answer the question. For instance, an instructor might have the students answer the question individually, then discuss it with their neighbor and respond, then participate in a class-wide discussion and respond, and then listen to a mini-lecture on the topic and respond. For particularly challenging questions, this can be an effective technique for helping students discover and explore course material.

"Choose Your Own Adventure" Classes
In this technique, an instructor poses a problem along with several possible approaches to solving it—perhaps approaches suggested by students during class. The instructor has the students vote on which approach to pursue first, then explores that approach with the students. Afterwards, the students vote on which approach to pursue next.

**Case Study in Biology/Genetics**
In this “clicker case,” students read about a murder committed in Wales, then learn about DNA structure and replication and how scientists have adapted these concepts to develop processes for use in forensic analysis. The students use this knowledge to identify possible suspects in the crime. The case study is presented in class via PowerPoint, with multiple-choice questions sprinkled throughout the “lecture.” Students are expected to answer the questions as they arise using their clickers. Many instructors allow students to consult with their neighbor before clicking in their answer. The entire approach encourages student participation even in the largest of classes. The use of clickers in combination with case studies is described in greater detail in the article “Clicker” Cases: Introducing Case Study Teaching Into Large Classrooms. PowerPoint Slides: [http://www.sciencecases.org/druid_dracula_clicker/prelude.asp](http://www.sciencecases.org/druid_dracula_clicker/prelude.asp)

**Question-Driven Instruction**
This approach combines contingent teaching and peer instruction. Lesson plans consist entirely of clicker questions. Which questions are asked depends entirely on how students answer the questions. An instructor might come into class with a stack of clicker questions, with multiple questions on each topic. As students perform well on clicker questions, the instructor moves on to questions on new topics. As students perform poorly, the instructor asks further questions on the same topic. The instructor does not have a lesson plan in the traditional sense when using this approach. Instead, the course of the class is determined reactively to demonstrated student learning needs.
### Appendix D: Product Matrix

<table>
<thead>
<tr>
<th></th>
<th>Turning Point Technology</th>
<th>eInstruction CPS</th>
<th>Interwrite PRS (now owned by eInstruction)</th>
<th>iClicker</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Platforms</strong></td>
<td>PC and Mac</td>
<td>PC and Mac</td>
<td>Windows, Mac and Linux</td>
<td>PC and Mac</td>
</tr>
<tr>
<td><strong>Setup</strong></td>
<td>Plug and play hardware setup.</td>
<td>Software learning curve to PC</td>
<td>Software downloaded to PC</td>
<td>Software on Flash Drive or download from internet</td>
</tr>
<tr>
<td></td>
<td>Customized save locations- Save data directly to your hard drive or removable thumb drive for maximum flexibility.</td>
<td>Software downloaded to PC</td>
<td>Class Pack includes:</td>
<td>Separate receiver</td>
</tr>
<tr>
<td></td>
<td>RemotePoll™ software extends TurningPoint functionality to remote locations</td>
<td>Receiver connects directly to your computer's USB port</td>
<td>(32) Radio Frequency Clickers</td>
<td>No installation required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Interwrite PRS RF Software and Free Upgrade</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soft-sided Carrying Case for all components</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Or customize</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turning Point Technology</td>
<td>eInstruction CPS (now owned by eInstruction)</td>
<td>Interwrite PRS</td>
<td>iClicker</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------</td>
<td>----------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td><strong>Vendor Technical Support</strong></td>
<td>Faculty and students</td>
<td>M-F for students and faculty</td>
<td>9am - 11pm M-F</td>
<td></td>
</tr>
<tr>
<td>- 866-746-3015</td>
<td>- Available early mornings and weekend hours (per Leslie D)</td>
<td>- 800-856-0732</td>
<td>Toll free number</td>
<td></td>
</tr>
<tr>
<td>- M-F 7am-9pm EST</td>
<td>- M-F</td>
<td>- Faculty and students</td>
<td>Online support/information</td>
<td></td>
</tr>
<tr>
<td><strong>Vendor Training</strong></td>
<td>- Online guides</td>
<td>- Online training sessions</td>
<td>- Daily training webinars</td>
<td></td>
</tr>
<tr>
<td>- Online Training options</td>
<td>- Videos</td>
<td>- Videos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Online training options</td>
<td>- Documentation</td>
<td>- Documentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reporting</strong></td>
<td>- Expanded reporting options.</td>
<td>- Various reports (faculty member said more advanced than Turning Point)</td>
<td>- Graph responses</td>
<td></td>
</tr>
<tr>
<td>- Different modes</td>
<td>- Different modes</td>
<td>- A variety of reports can be produced, including: attendance, results for a single session, individual student or an entire semester-to-date performance report.</td>
<td>- Export report info to Excel/CM:</td>
<td></td>
</tr>
<tr>
<td>- Gradebook feature</td>
<td>- Gradebook feature</td>
<td>- Integrated gradebook</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Software Compatibility</strong></td>
<td>- Some ver. only PPT</td>
<td>- Compatible with/without PowerPoint</td>
<td>- Compatible with ANY software (PowerPoint or other)</td>
<td></td>
</tr>
<tr>
<td>- TP Anywhere allows polling from any PC application inc. browsers, pdfs, Word.</td>
<td>- PowerPoint integration</td>
<td>- Not sure without?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Clickers Pilot Final Report  
December 15, 2009  18
<table>
<thead>
<tr>
<th></th>
<th>Turning Point Technology</th>
<th>eInstruction CPS</th>
<th>Interwrite PRS (now owned by eInstruction)</th>
<th>iClicker</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost Overview</strong></td>
<td>- Most cost on faculty (per one faculty member)</td>
<td>- Student: $15/semester via registration</td>
<td>- One-time cost for Clickers - no recurring fees</td>
<td>- Approx. $34 for clicker</td>
</tr>
<tr>
<td></td>
<td>- Approx. $40 for clicker</td>
<td>- Approx. $40-45/life of the student (max. cost)</td>
<td>- $48-50 for clicker</td>
<td></td>
</tr>
<tr>
<td><strong>Registration Required?</strong></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No but optional</td>
</tr>
<tr>
<td><strong>Publisher Affiliations</strong></td>
<td>- Thomson Learning</td>
<td>- John Wiley &amp; Sons, Inc.</td>
<td>- Pearson Education</td>
<td>- Bedford, Freeman and Worth Publishers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Pearson Education</td>
<td>- Thomson Learning</td>
<td>- Elsevier</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Lippincott, Williams &amp; Wilkins Publishers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Pearson Education (all imprints)?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Wiley Publishers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- W.W. Norton</td>
</tr>
<tr>
<td><strong>Blackboard Integration?</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Export to - Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Clicker Features

<table>
<thead>
<tr>
<th><strong>Turning Point Technology</strong></th>
<th><strong>eInstruction CPS</strong></th>
<th><strong>Interwrite PRS</strong> (now owned by eInstruction)</th>
<th><strong>iClicker</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- LCD Screen or without – depends on version</td>
<td>- LCD Screen or without – depends on version</td>
<td>- Two-line LCD screen to see answer before you send it and view status messages</td>
<td>- One click polling</td>
</tr>
<tr>
<td>- Some receivers allow smart phone technology</td>
<td>- Separate database</td>
<td>- Variety of question formats - multiple choice, true/false, numeric, short answer, multiple correct, rank order, decimal point, fractions and positive/negative numbers.</td>
<td>- On the fly questions</td>
</tr>
<tr>
<td>- On the fly polling</td>
<td>- Similar features, functions to Turning Point</td>
<td>- Self-Paced and Homework Modes</td>
<td>- Anonymous polling</td>
</tr>
<tr>
<td>- Customized save locations – hard drive, jump drive, etc.</td>
<td>-</td>
<td>- Self-forming rosters</td>
<td>- Integrated grade book</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Instant grading and reporting features</td>
<td>- Pre-determined point values</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Participation/Attendance points</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Web-based version for laptops, PDAs, cells</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- BC beta testing app for smartphone</td>
</tr>
<tr>
<td>Known issues/ Faculty Concerns</td>
<td>Turning Point Technology</td>
<td>eInstruction CPS (now owned by eInstruction)</td>
<td>Interwrite PRS</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------</td>
<td>---------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>− Not compatible with Mac Office 2007</td>
<td>− Some faculty found reliability issues when used for grade/attendance</td>
<td>− One study: students found handheld device difficult for students to handle</td>
<td>− Only one faculty member using on campus – first year using.</td>
</tr>
<tr>
<td>− One faculty stated most costs fall on faculty</td>
<td>− Some faculty did not like cost structure (new fees for student registration)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>− Lacks advanced features (reporting)</td>
<td>− Support not good/support good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>− Faculty has to create rosters</td>
<td>− Cost concerns</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>− Cannot perform dry-runs due to registration requirement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>− Some faculty found software difficult to use and upgrades difficult to understand</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>− Some faculty estimated technology issues/failures at 20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turning Point Technology</td>
<td>eInstruction CPS</td>
<td>Interwrite PRS (now owned by eInstruction)</td>
<td>iClicker</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------</td>
<td>------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Contact Info/ Vendor Offers</strong></td>
<td>eInstruction is currently offering a &quot;Pilot Program&quot; for university professors. Each participating professor receives a FREE CPS Higher Ed (rf) Starter Kit. This includes a CPS RF Response Pad, RF Receiver and CPS award winning software. The hardware and software would normally cost well over $500.00. Online Training in a variety of formats is also available to meet each professor’s busy schedule.</td>
<td></td>
<td>Brenda L. Bravener-Greville Marketing Consultant i&gt;clicker (c) 508 878-9322</td>
</tr>
</tbody>
</table>
## Appendix E: Pilot Participants

<table>
<thead>
<tr>
<th>Pilot Product</th>
<th>Name</th>
<th>Department</th>
<th>Number of Students/Participants</th>
<th>Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>iClicker</td>
<td>Michael Gonyeau</td>
<td>Pharmacy</td>
<td>105</td>
<td>PC</td>
</tr>
<tr>
<td></td>
<td>Margarita Divall</td>
<td></td>
<td></td>
<td>PC</td>
</tr>
<tr>
<td></td>
<td>Andrew Skirvin</td>
<td></td>
<td></td>
<td>PC</td>
</tr>
<tr>
<td>iClicker</td>
<td>Leslie Day</td>
<td>Physical Therapy</td>
<td>120</td>
<td>PC</td>
</tr>
<tr>
<td>iClicker</td>
<td>Christine Oka, et. al.</td>
<td>Libraries</td>
<td>19 students (per one-shot) Total students: 130</td>
<td>PC</td>
</tr>
<tr>
<td>iClicker</td>
<td>Ed Wertheim</td>
<td>CBA</td>
<td>90</td>
<td>PC</td>
</tr>
<tr>
<td>Turning Technologies TurningPoint PowerPoint</td>
<td>Sarah Young-Hong</td>
<td>Speech Language Pathology and Audiology</td>
<td>25</td>
<td>PC</td>
</tr>
<tr>
<td>Turning Technologies TurningPoint PowerPoint</td>
<td>Leslie Day</td>
<td>Physical Therapy</td>
<td>120</td>
<td>PC</td>
</tr>
<tr>
<td>Turning Technologies TurningPoint Anywhere</td>
<td>Suzie Byun</td>
<td>Chemistry</td>
<td>245</td>
<td>Mac</td>
</tr>
<tr>
<td>Turning Technologies TurningPoint PowerPoint</td>
<td>Jackie Isaacs</td>
<td>ADVANCE/ STRIDE</td>
<td>50 +/- (per presentation) 6 presentations</td>
<td>PC</td>
</tr>
</tbody>
</table>
Appendix F: Faculty Survey Results
(10 iClicker Responses and 6 Turning Technology Responses)

The vendor product training was useful and met my needs.
- Strongly Disagree (1)
- 2
- 3
- 4
- Strongly Agree (5)

EdTech Observation:
TP requires additional training

How often, if ever, did you experience technical problems?
- Never
- One
- 2-3 times
- Often
- NO RESPONSE

EdTech Observation:
Technical problems occurred more often per user with iClicker
Vendor technical support was available when I needed it.

<table>
<thead>
<tr>
<th>Strongly Disagree (1)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Strongly Agree (5)</th>
<th>NO RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree (5)</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>60%</td>
<td>10%</td>
</tr>
</tbody>
</table>

ICLICKER

TP

My technical issues were resolved quickly and to my satisfaction.

<table>
<thead>
<tr>
<th>Strongly Disagree (1)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Strongly Agree (5)</th>
<th>NO RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree (5)</td>
<td>0%</td>
<td>17%</td>
<td>17%</td>
<td>67%</td>
<td>0%</td>
</tr>
</tbody>
</table>

ICLICKER

TP

EdTech Observation:
TP resolutions were faster

Clicker software and clickers were easy to install/setup/connect to computer.

<table>
<thead>
<tr>
<th>Strongly Disagree (1)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Strongly Agree (5)</th>
<th>NO RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree (5)</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>67%</td>
<td>33%</td>
</tr>
</tbody>
</table>

ICLICKER

TP

EdTech Observation:
iClicker was slightly easier to setup/install/connect.
Clickers Pilot Final Report
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Clicker software was easy to navigate.

<table>
<thead>
<tr>
<th>Strongly Disagree (1)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Strongly Agree (5)</th>
<th>NO RESPONSE</th>
</tr>
</thead>
</table>

EdTech Observation:
iClicker software was a little easier to navigate

Creating questions in the software for class was easy.

<table>
<thead>
<tr>
<th>Strongly Disagree (1)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Strongly Agree (5)</th>
<th>NO RESPONSE</th>
</tr>
</thead>
</table>

EdTech Observation:
Creating questions somewhat easier in iClicker

Clicker software and clickers were easy to use during class lectures/presentations.

<table>
<thead>
<tr>
<th>Strongly Disagree (1)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Strongly Agree (5)</th>
<th>NO RESPONSE</th>
</tr>
</thead>
</table>
Clicker software included all features/functions I required.

Strongly Disagree (1)  
2  
3  
4  
Strongly Agree (5)  
NO RESPONSE

EdTech Observation:  
TP had better features/functions

Sharing poll results with the class was easy.

Strongly Disagree (1)  
2  
3  
4  
Strongly Agree (5)  
NO RESPONSE

EdTech Observation:  
TP polling results were easier

Creating reports in the software was easy.

Strongly Disagree (1)  
2  
3  
4  
Strongly Agree (5)  
NO RESPONSE

EdTech Observation:  
Creating reports seemed average to difficult for both products. (more training required?)
Clicker software reporting features met my needs.

| Strongly Disagree (1) | 2 |
| Strongly Agree (5) | 0% |

**EdTech Observation:**
*iClicker software reporting did not meet needs - TP does better job.*

Rate this clicker compared to other clickers you have used in the past:

**IClicker**
- Worst product I have used so far: 10%
- Not great but I have used worse: 20%
- They were about the same: 30%
- Not bad but I have used better: 30%
- Best products I have used so far: 10%

**TP**
- Worst product I have used so far: 0%
- Not great but I have used worse: 33%
- They were about the same: 67%
Appendix G: Faculty Survey Comments

Software compatibility: Were you able to use this product with the software you normally lecture with? (i.e., PowerPoint, Keynote, Explorer, etc.) If there were problems, please explain.

iClicker
- Yes, no problems, very functional!
- Yes, it seemed compatible with PowerPoint.
- Yes, but having to toggle back and forth constantly between PowerPoint and iclicker was annoying.
- For the most part yes. However, there was issues with the iclicker software, after displaying graphs, staying in the background so that the lecture could advance the slide with either the given remote or a mouse.
- Product worked well with PowerPoint. However, it was inconvenient to have to click back on the PowerPoint slide after polling the class so that I could continue advancing the slides with the remote control.
- Yes, I was able to use PowerPoint with the i-clicker, but did have some trouble with the switching back and forth with the programs.
- Yes
- Yes, it was pretty streamlined and worked with PowerPoint, Firefox, etc. One problem we had: I was using the Alt-Tab key combo to switch between my PowerPoint and a live website view in Firefox. Sometimes when I would Alt-Tab back from the website to my PowerPoint to ask further clicker questions, pressing the instructor clicker's Forward button would not advance to the next slide, and I would have to go cycle through the Alt-Tab active programs again in order to get the instructor clicker's Forward and Back buttons to work with the PowerPoint. Other times this did not seem to be an issue, but it did happen more than once.
- Yes -- there were no problems. I had to learn to be a little more savvy with alt-tabbing between windows, but that was no shortcoming on the vendor's side.

Turning Technologies
- Yes, had no problems with software integration.
- Yes, this system functioned with my PowerPoint slides after inputting the appropriate materials/slides into the system.
- "Yes - with power point"
- "yes"
- Yes.
- Yes. I had problems creating some of the question slides. After taking with the vendor, I found out that you cannot copy other questions slides and modify them, you need to insert new slides. I had copied some question slides from other old TT presentations
What additional training needs to be offered, if any?

iClicker
- There was no 'official' training as was previously done with the Turning Technology clickers.
- "The person supplying the training was not very informative or knowledgeable when questions were asked.
- Do not feel that I receive adequate training on reporting. Would be nice if the training session actually ran through a typical use (i.e. create questions, poll, reporting) while I was able to actually see and/or do it myself."
- Gradebook management
- It was pretty easy. You were able to make your own questions in PowerPoint format and then have the students answer. No issues
- once a clicker product is decided upon, every faculty member who wants to use the product in their classroom should attend a session of vendor training, I think. The grading functions in iClicker (iGrader) were not totally intuitive and it was useful to have seen a demo from the vendor regarding that portion of the product.
- I would have liked a change to explore the grading software a little more before going into the semester. I wish I'd taken a little more of my own time, but it's always hard to find time, so one additional session forcing me to sit and really look at the grading piece would have helped in the long run.

Turning Technologies
- Prior to use, I was unfamiliar with all of the features that Turning Point had e.g. team designed polling, real-time posting of questions. If we were to utilize this going forward a second detailed information session may be in order to help us fully utilize these features.
- I would recommend an initial training/overview (like we had), and then once instructors have an opportunity to "play" with the software independently, a follow-up training to answer questions and review a bit. I know each faculty could contact the vendor rep for questions, but being able to meet again live would have been helpful, specifically to brainstorm with other faculty.
- There are many features of the product, perhaps a basic training and an advanced training would be useful. Do not feel that I received enough training on the reporting.
If clicker software was missing any desired reporting features, please list.

**iClicker**
- This software is great for classroom instructor who teaches the class and can just have their questions embedded in power point and no extra preparation is required. However, I like reporting features of the turning technology better and they have more options in terms of creating groups and having groups compete with each other.
- My utilization of the iclicker was limited and I did not have a chance to explore all of the functionality. If this technology incorporates the ability to pair students into groups and utilize a team-based answering approach I would say that this is the best product I have used, as I found it easier to setup/utilize than the Turningpoint technology.
- "When creating reports I could only display the students name. I was not able to display both name and clicker number on a report. Thus for exporting to excel I had match the names and numbers myself if I wanted to be able to record daily classes or calculate averages over the entire semester and then export or post something in gradebook. True, iclicker can upload to gradebook, but if I only wanted to upload 1 column (average of all days using clickers) I could not do this.
- It only exports as number correct, rather than percentage (i.e. 12 [out of 20] instead of 60%)."
- ability to compare data across multiple courses (not just sections of the same course) -- though the library is kind of a unique case and we may have made a tactical error at the beginning by treating each library session as a separate COURSE (rather than as sections of the same course).
- I used clickers for the library pilot, which made our grading/reporting needs a little unique. We had multiple sessions we wished to compare on a question-by-question format, and I don't believe the iClicker grading/reporting software was sophisticated enough to do that, even if we’d made all the sessions different "sections" of the same "class". However, since this is the first time I’ve used iClicker it’s possible there were grading options I missed. My sense was also that faculty were typically using Blackboard grading software instead of the iClicker software, but I would be curious to see if any faculty also thought the iClicker grading software was a little too basic.

**Turning Technologies**
- "No desired features missed on the interactive ppt version, but the anywhere version lacked a countdown timer.
- Almost too many features."
- None"
- select random student
- Given the amount of features with the software, I don't think I used it to its full capacity.
Did you experience any problems with this vendor or their product? (If so, describe)

iClicker
- I had a strange problem with blackboard integration which was very specific to my blackboard account. While it took a while to resolve it did eventually get resolved.
- I have had a recurring problem with the clicker repeatedly turning itself off during lecture - to the tune of several dozen times during a 2 hour block. Changing the battery did not seem to resolve the issue. It still worked for all the functions, I just had to keep turning it back on over and over and over and over...
- The master clicker used to advance slides kept turning itself off all the time. It was not a battery issue, just seemed defective. Toggling between PowerPoint and the clicker tool bar was annoying and seems unnecessary. Also, the limited options with iclicker were a big turn off for me. I liked the added functionality of turningpoint MUCH more.
- "Several remotes would just randomly shut off in class without warning that there was a low battery.
- Some student remotes would be on, but no signal was being sent? I have no record of their use although I watched them use the clicker.

Turning Technologies
- "The interactive PowerPoint sometimes did not work (graphs would not appear after polling, animations like countdown timer would not run) if you had backgrounds in the slide, if you copied the slide or if you had other animations in the slide.
- Sometimes the software would not recognize the receiver, but this was fixed by stopping and restarting the software.
- If you are using the software on a NU computer and saving the info to usb (or using your own computer) and something causes the computer to shut down, then data is lost. UGH! it is also possible to shut down the program without saving data."
- None
- No
- A few glitches along the way with try to decide which product was right for my course--TurningPoint Anywhere or TurningPoint 2008. This was a bit confusing, that there were two.
Please list any additional comments you have about using this clicker and clicker software

iClicker
- "I liked the loaner system.
- I liked the plug and play on any computer, no need to bring my own computer
- I liked the ease of use and ability to use any program to ask questions.
- Students appreciated the batteries being AAA, rather than watch battery that is expensive and hard to find
- I did not like that the graphs of the answer distribution would not display immediately after polling was closed.
- The reporting is a bit too simple. I was not able to combined sessions or create averages. (more as stated above)
- It was a bit frustrating (time consuming) to have to either remember to check off the correct answer during class or go back through all the questions after class to input the correct answer for grading.
- Did not like having to bring and plug in the large box (ran out of USB ports).
- Sometimes wish I had more than 5 answer choice options
- Wish I could have options for how much time is added to the clock when polling (set for 20 seconds)"
- I think this software suits the departments needs
- "one other problem we had been the delay between when we pressed the button to open up voting/polling on a question, and when it started tabulating votes. If students rang in too quickly after we opened polling, their vote would not be recorded. Quite frequently we had to ask everyone to retry their vote because we were one or two short, because people had jumped in too quickly after polling was opened.
- In general, though, despite these small glitches, the product was easy to use from the instructor standpoint, especially the plug-and-play setup in the classroom. I personally found the iGrader side of the software a little confusing: the user interface wasn't intuitive to me. But once I figured it out, the features offered were certainly quite good."
- "It's incredibly easy to install, and since it runs off a USB drive, is safe to use without knowing the classroom machine set-up ahead of time. This is because the software is so simple -- which also means that the software is almost too simple. The grading/reporting features weren't quite sophisticated enough to do what we wanted to do: compare different courses on a question-by-question basis. It is possible that we missed the feature in the software that would let us do that, but I don't think we did.

Turning Technologies
- "Overall I enjoyed the clicker software. The interactive ppt allowed for great fun with the game features.
- Feel that the software might be overwhelming to some instructors. Grew frustrated with the anywhere software, as it was not able to do some of the items I wanted it to do (countdown timer, trouble figuring out how to tell what questions were right or wrong)"
- I didn't like how the TurningPoint Anywhere bar was so big and often covered up parts of the screen. Also, in TurningPoint 2008, my questions were often covered by the bar in the upper right hand corner of the screen. It would have been nice to be able to move this around.
Appendix H: Student Survey Results
134 iClicker Responses and 134 Turning Technology Responses

How often, if ever, did you experience technical problems?
- Never: 123 (92%)
- One: 7 (5%)
- 2-3 Times: 2 (1%)
- Often: 2 (1%)
- NO RESPONSE: 0%

Vendor technical support was available when I needed it.
- Strongly Disagree (1): 1 (1%)
- 2: 1 (1%)
- 3: 73 (54%)
- 4: 9 (7%)
- Strongly Agree (5): 22 (16%)
- NO RESPONSE: 28 (21%)

My technical issues were resolved quickly and to my satisfaction.
- Strongly Disagree (1): 1 (1%)
- 2: 1 (1%)
- 3: 66 (49%)
- 4: 12 (9%)
- Strongly Agree (5): 24 (18%)
- NO RESPONSE: 30 (22%)
The response pad/clicker was easy to use:

<table>
<thead>
<tr>
<th>Rating</th>
<th>ICLICKER</th>
<th>TP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree (1)</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>2</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>3</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>4</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>Strongly Agree (5)</td>
<td>72%</td>
<td>94%</td>
</tr>
<tr>
<td>NO RESPONSE</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Edtech Observations:
Some thought iClicker remote was too large.

I had difficulties getting my clicker to work in class.

<table>
<thead>
<tr>
<th>Difficulty</th>
<th>ICLICKER</th>
<th>TP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>One</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>2-3 Times</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Often</td>
<td>8%</td>
<td>95%</td>
</tr>
<tr>
<td>NO RESPONSE</td>
<td>87%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Edtech Observations:
Most iClicker users had trouble with their remotes.
Life of the battery/battery replacement was problematic.

- Strongly Disagree (1)
- 2
- 3
- 4
- Strongly Agree (5)
- NO RESPONSE

The graphs provided by the clicker software were easy to follow and read.

- Strongly Disagree (1)
- 2
- 3
- 4
- Strongly Agree (5)
- NO RESPONSE

Edtech Observations:
TP graphs may have been more difficult to follow and read

The graphs provided by the clicker software included enough information to make a positive impact.

- Strongly Disagree (1)
- 2
- 3
- 4
- Strongly Agree (5)
- NO RESPONSE
The statistics/polls provided by the clicker software were useful.

<table>
<thead>
<tr>
<th>Strongly Disagree (1)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Strongly Agree (5)</th>
<th>NO RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICLICHER</td>
<td>16%</td>
<td>27%</td>
<td>1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP</td>
<td>12%</td>
<td>40%</td>
<td>3%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I would like to use clickers more often.

<table>
<thead>
<tr>
<th>Strongly Disagree (1)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Strongly Agree (5)</th>
<th>NO RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICLICHER</td>
<td>31%</td>
<td>29%</td>
<td>7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP</td>
<td>30%</td>
<td>40%</td>
<td>8%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rate this clicker compared to other clickers you have used in the past:

- Worst product I have used so far
- Not great but I have used worse
- They were about the same
- Not bad but I have used better
- Best products I have used so far
- n/a

<table>
<thead>
<tr>
<th>Worst product I have used so far</th>
<th>Not great but I have used worse</th>
<th>They were about the same</th>
<th>Not bad but I have used better</th>
<th>Best products I have used so far</th>
<th>n/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICLICHER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix I: Student Comments

Did you experience any problems with this vendor or their product? (if so, describe)

iClicker
"-- no problem
- The battery died without the red light saying ""battery low"" went on. This was a problem in class when I was supposed to be using them
- no
- no
- no
- No.
- It was dead when I got it, but replaced quickly and then no problems at all.
- I have not experienced any problems with this product.
- No
- No
- I would have preferred the on/off button to have been a switch on the side because it would accidentally turn on in my bag and waste battery.
- None.
- There should be a ""hold"" button on the device so that it does not turn on automatically in my backpack, as this used the batter
- no
- na
- Didn't experience a problem
- N/A
- No
- No problems
- No
"-- The clicker calculated my grade wrong one of the days so I had to go see my professor and have her fix it in the gradebook. This could have also been a problem with the computer grading system so I am not entirely sure if the clicker is to blame.
- My clicker would occasionally not turn on for no apparent reason.
- not at all
- The on button was too easy to hit. The device would often turn by accident just by contacting other items.
- no.
- no.
- No
- N0
- no
- No problems.
- batteries died in class soon after receiving the clicker. It may be due to accidentally being turned on while in my bag. Maybe implement a way to lock the buttons so it is not turned on by accident.
- No
- No
- No
- No
- No
- No problems experienced
- I did not receive any problems. It lasted the whole semester without any problems.
- it constantly turned off while i was using it.
- No
- None

**Turning Technologies**
- I am still unsure if I can change my answer. There really is no way to tell. I was told that you can just key in a different answer but there essentially is no way to tell if this is true.
- not that much
- Sometimes the results would not show up. Also, sometimes the clickers for the entire class would not work and register with the computer.
- Our class as a whole had some difficulty with the clickers and PowerPoint and sometimes experienced difficulties but I think it was more of the professor-PowerPoint interaction that was affected and not really a problem with the actual clicker.
- Never experienced a problem.
- No
- None.
- no
- No
- None at all.
- No Problems
- no
- I did not experience any problems with this vendor or their product.
- Sometimes the graphs would not show up on the PowerPoint automatically, but did eventually show up after the mouse was clicked a couple of times.
- no
- No
- no problems
- No.
- None.
- No problems
- None
- None
- N/A
- no
- No
- no
- No
- No
- no
- no
- No problems.
- no
- no
- No
- no
- No
- no
- No.
- Nope
- None.
- No
- No.
- None
- Just one time the clicker was lighting up green and I couldn't answer the question the teacher posted but after a few seconds it worked fine again.
- No
Please list any additional comments you have about using this clicker and clicker software:

**iClicker**
- make the size smaller to fit to the pocket size
- I preferred using the turning point clickers more than the iclicker. The turning point clicker is smaller and there were more options available for polling/displaying results. With turning point, the professor could make teams and display which team was winning, it also was able to show who had the most correct answers and who was the fastest. I don't like the iclicker because it is kind of bulky and it tends to turn itself on when I carry it around in my back pack because the buttons are so large.
- it is equivalent to the turning point clicker however it is way larger than it needs to be but being able to use a standard battery for replacement is convenient
- I like that we do not have to purchase the product - useful tool in class to barrow.
- The clicker is too big and cumbersome. It also turns on at random times, which becomes a problem for battery life. Also, the software isn't as cool as the Turning Point. Turning point allowed you to see who got the correct answers and who was fastest and also allowed teams. This made the in class quizzes more fun.
- This clicker was too large and rather heavy to keep in my bag at all times. I would take it out of my bag on days that I didn't have class and often would end up forgetting it the next morning that I did. I liked the small size of the turningpoint better as well as the different graphs it could create as they seemed more accurate more often
- It was a good system to make you think about what you've learned. But it seemed to slow the class down a lot and the teacher got behind on lectures. She used them less when we were behind and we were behind because she used the clickers
- I was skeptical at first at the thought of having to bring a clicker to every class as well as having it being part of my grade. However, as the semester draws to a close I feel like the clicker was a very helpful tool. It helped our class stay more involved in our teacher's lecture as well as helped to point out important information we needed to know. The questions made for a really good review.
- I think the clicker really helped with reinforcing the material covered in class because it allowed you to apply the concepts studied in the same way a test would.
- I had no problems with my clicker. It was very easy to use.
- The I-Clicker was extremely easy to use and it was helpful in the course.
- Pleasant experience.
- I would strongly recommend using this software in specific classes. They are very useful and easy to use. The product helped me understand whether I understand the material we are covering.
- Very helpful in class to review information/test knowledge and allowed me to assess my level of understanding well.
- No comments.
- It was a good way to get participation without having to talk in front of the class. I do not like to talk in front of the class, so I liked it.
- I hate that it was timed, sometimes it was very stressful
- If it could be smaller or a uniform shape it would be better, but it's an easy grade and a good way to learn.
- the only problem I have with it is that it is a little too large.
- the only problem I have with it is that it is a little too large.
- Very easy
Less confusing than turning point and the iclicker seemed to receive my responses faster and more reliably. Also liked that iclicker used regular batteries, whereas turning point required a special round battery. Biggest concern is price and I have a turning point clicker that cost $50 and isn't returnable, so if I have to use the clickers again next semester, I would rather use the turning point clicker that I already own than buy an iclicker.

If the university mandates clicker use in the classroom, they should pay for it. We spend enough money on tuition and textbooks, and I know that I have barely enough money for food, let alone superfluous technology that will only complicate the classroom and take more money out of my pocket. If the university chooses to make their students use clickers and they pay for it, it would be alright with me. However, if students are required to pay more of their own money to pay for them, it is definitely not worth the cost at all. I don't want to have to pay additional costs just to participate in classes I already paid to be in. This is ridiculous.

N/A

"Product was larger than TurningPoint's clicker, which was smaller and easier to carry in a purse, etc.

- The "low battery" light was always on, while TurningPoint never indicated when the battery was low"

Easy to use, easy to keep track of (because of its size)

It made class much more fun than just asking questions and waiting for students to raise their hands, and was anonymous so you didn't feel stupid if you got the question wrong. Using clickers is comparable to being on a game show, and it's a good test of the teacher's clarity and the student's understanding to see the percentage of students who answered each question correctly/the breakdown of the incorrect answers. Definitely should be used more often!!

Very helpful in grasping material better while in class. Made me pay attention.

Size of the clicker was larger, turningpoint was much smaller

Whatever makes it easier for the teachers to use, because the more they use it the better!

Pad was too large, didn't offer anything additionally useful versus the TurningPoint clickers. The graphs were basically the same, but liked TurningPoint because it would let you tally up points for the day to see which "teams" in the lead whereas the iClicker did not have this function. iClicker also turned on all the time when not in use, while we liked the TurningPoint size and the fact it came in a box which we could use to ensure it did not inadvertently turn on when not in use.

- Not at all

- The on button was too easy to hit. The device would often turn by accident just by contacting other items.

- "The university should not implement this program, because it is not fair and an extra financial burden to require students to have clickers, especially for the next semester.

- Do not implement clickers, if I have to pay for it next time. I pay enough to this school in other fees, I don't think it is absolutely necessary. If you wish to integrate clickers into class instruction, that is fine, provided that you don't require students to pay for something they did not request.

- I think the clickers we used were nice, but I saw the other classes clickers and I like the size better.

- This product didn't provide the same amount of interactive options that were available with the turning point system. such as the ability to form teams and play games.

- I liked that the clicker was simple, with only buttons for options A-E. I also liked that it came with a timer clearly visible during the presentation so that we knew exactly when we were to submit our answers.

- I didn't respond to the sections "My technical issues were resolved quickly and to my satisfaction" and "Vendor technical support was available when I needed it." because there was never an instance where I needed to contact technical support or had a clicker issue.

- just make it smaller and it would be better
I like the iClicker. It seemed easy for the Faculty to use. The only thing I didn't like was the size, but there were less problems for the faculty. I do wonder if there can be as many fun games/interactive setups used with the iClicker as were done with the turningpoint software.

- I would like it if it were smaller and more convenient. Also, I don't like the timed factor.

- Clickers were very simple to use and graphs were very easy to comprehend and extremely useful in classroom situations. iClicker was very large, however, and TurningPoint (which I have used in the past) was much more manageable size.

- Helped the whole class to respond, would recommend for classes in the future.

- None

- I like how small it was

- I like that the answers are anonymous, and would prefer if the clickers were only used to compare answers to problems in class rather than quizzes and used in grading because I cannot tell if my answer was submitted or if it can be changed.

- It is a good idea to use the clicker in the classroom.

- Really good way to learn! Very helpful.

- I enjoy being more involved in the quiz taking process. It allows for discussion after the quizzes are taken and provides better feedback. It also allows grades to be posted immediately, which is helpful.

- Na

- I like that the clicker but the graphs got messed up sometimes on the power point

- I really liked this clicker. It was a good size, small enough to fit in my notebook but big enough that I could manage all of the buttons on it. It worked fine and was easy to figure out how to use.

- I wish I could have a confirmation on what answer I submitted. So I knew it got through and it was what I chose.

- Worked well, never had a problem

- I like that clickers allow students to be more interactive in the classroom, and it helps us get an idea of how well we are doing and what things we should study more as individuals

- It should be provided with a case that would protect it from damage. A nice, hard protective case. It's too delicate to be given out without a case. I'd rather pay like $5 for the case instead of $30 for when it breaks.

- n/a

- I believe the clicker and clicker are very beneficial in university classrooms that are rather large in size. They enable the student to actively participate in classroom discussion or assignment, while showing them where their weaknesses and strengths are in notetaking and paying full attention during lecture. They also enable the teacher to see where the class may need more improvement or further explanation of core concepts discussed in class.

- I loved using the clicker...it made class much more interactive and showed the demographics of the class without people revealing their identity regarding what answers they chose. I would definitely recommend it to others.
- I thought that the clickers were very helpful in lecture. They provided a great interactive element which is typically absent in large lectures. The clickers also let me know how I was doing relative to my classmates which I found beneficial. Also the practice problems in class made it easy for the professor to determine if the class was understanding what was being taught and if not they were able to elaborate more and fix the problem immediately.
- This is the biggest waste of student's money. It takes up much needed time in class and is extremely ineffective at helping convey the material. Not only is it a large waste of money, it's a waste of time and effort and I hope the school does not participate in this ever again.
- N/A
- I enjoy using them in class because it gives me an idea of how well i am grasping the material in class
  Very helpful in classroom learning.
- Took away from receiving actual notes/examples from the teacher. Clicker questions were used in place of course material. It made it difficult to learn, this is due to the teacher, not the software. If incorporated correctly, the clickers would be very helpful.
- I liked using the clicker. It was a good size and was durable.
- none
- I would like to see them used in all of my classes.
- not useful to my learning. Software is too simple and does not provide enough useful feedback, besides a simple bar graph to show distribution.
- Expensive tool to show class attendance. I don't think it should be required or used.
- clickers are great!!!
- good stuff
- Too small, easy to lose, no way to tell if you actually pressed a button
- It was a very good way to test yourself during class and was a fun activity that I enjoyed
- It would be good if there was a way to turn the clicker off so when the clicker is either in my pocket or in my backpack the buttons do not get accidentally pressed. This causes the battery life to deplete.
- Not the most efficient way to teach organic chemistry. The clicker and the software worked fine though.
- None
- "This is a nice clicker. I would be kind of pissed off if the clicker had to have its batteries replaced, so the fact that this one is such a low maintenance device (or so we were told) would be a real benefit.
- Clicker technology is a dual-edged sword. On one hand, if used appropriately and wisely, it can highlight what sort of mistakes people are making and lead to more efficient use of class time. On the other hand, it can be used as a crutch in the same way that PowerPoint can, much to the detriment of the quality of the class."
- When half the class gets a question wrong then I would like it if the professor explained that question rather than moving on to get as many clicker questions into the class as possible
- None
- I think it's a great use if the teacher uses it well. Our teacher did a great job so it was fun and educational.