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“A Meeting of Minds”: Using Clickers for Critical Thinking and Discussion in Large Sociology Classes

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Abstract

Because lecture-based teaching limits student learning, many instructors are interested in pedagogical strategies that support critical thinking, student participation, and group discussion in large classrooms. Audience response systems, or “clickers,” are an emerging tool for addressing this problem, but predominant pedagogical models for clicker use developed in the natural sciences often do not encourage the “inquiry-guided learning” that is useful in sociology. This article introduces readers to clicker technology and outlines a new pedagogical model for clicker use designed to address sociological learning goals, including critical thinking, applications of concepts to real-life experiences, and critiques of sociological methods. The authors discuss the effects of clickers for classroom interaction and students’ experiences in three undergraduate sociology courses, using quantitative and qualitative data about students’ perceptions of the effects of this pedagogical model on learning. The results suggest that the model positively affects participation, critical thinking, and classroom interaction dynamics. The authors conclude with practical suggestions for instructors considering implementing clickers in sociology courses.

Keywords

clickers, student response systems, active learning, student learning, critical thinking

Many instructors struggle to improve students’ participation, understanding of course concepts, and critical thinking within the context of large classes, in which lecturing seems to represent the only practical option. The limitations of lecturing for student learning have been documented (Boud 1981; McKeachie and Hofer 2002), and recently scholars have begun turning to active, “inquiry-guided learning” (Atkinson and Hunt 2008). But how can teachers implement active learning in large classes? Instructors across disciplines have increasingly begun relying on a new technological tool, audience response systems, or “clickers,” to increase attendance, participation, engagement, and learning. However, learning goals important to many sociologists, such as fostering critical thinking, applying course

concepts to real-life experiences, and critiquing sociological methods, are not addressed by many of the clicker-based pedagogical models currently in use in the natural sciences. In this article, we describe how clickers work and introduce a new pedagogical model that sociologists can use to address discipline-specific learning goals. To illustrate the model, we provide examples of clicker questions and discuss how they can be implemented

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in lectures. We present students' assessments of the model's effectiveness for learning on the basis of quantitative and qualitative data collected in three undergraduate sociology courses, and we conclude with practical tips for instructors.

BACKGROUND

Many college and university courses, like the three studied here, maintain large enrollments of 50 to several hundred students. In large classes, structural constraints challenge instructors who wish to teach in any manner other than a lecture format. Lecturing can sometimes be interspersed with discussions in which some students ask questions or make comments, but typically, few opportunities are available for students to critically evaluate, discuss, or apply what they are learning during class (Trees and Jackson 2007). Although it is easy to assume that the quiet, attentive audience before us is learning while we are teaching, some have argued that lecturing alone may not be effective enough for making our students' learning "stick" in the long term (e.g., Duncan 2005; Mazur 1997). Instructors who teach large courses face additional challenges compared with smaller, seminar-style courses: It is more difficult to track attendance, and students who miss class may have trouble learning course material and keeping up with assigned readings. Other basic learning goals, such as keeping students engaged (Hoekstra 2008) and encouraging critical thinking during class (Cooper and Robinson 2000), are also difficult to facilitate in the large group. In response to these challenges, sociology instructors are increasingly turning to "active learning" strategies or inquiry-guided learning (Atkinson and Hunt 2008). In the context of a traditional course, this often leads to pedagogical strategies that "break up" lectures with questions and discussion. In the past, some have asked students to answer questions by holding up colored cards, in an effort to encourage undergraduates to think actively during class, instead of remaining in a passive, information-receiving role. However, recent research suggests that the use of audience response systems, popularly known as clickers, may be more effective for fostering participation and active learning in the social sciences (Stowell and Nelson 2007).

A clicker is a battery-powered device containing buttons (for example, marked A, B, C, D, and E) that can be used to ask students questions during class. The instructor attaches a receiver unit to a computer and projector, and clicker software runs

simultaneously with a slide show program such as Microsoft PowerPoint. When an instructor wants to ask a clicker question, he or she projects a slide containing the question and starts a timer. Under existing pedagogical models for clicker use in the natural sciences, students are usually encouraged to talk with one another about clicker questions before submitting their answers. A receiver unit compiles the responses, and the instructor can then project a histogram or bar chart onto a screen to display the breakdown of students' votes. Depending on the pedagogical strategy used with an audience response system, this learning tool can be used to add variety to the learning environment (by increasing audiovisual stimulation), encourage critical thinking (by discussing clicker voting patterns), reward regular attendance (by giving students credit for answering clicker questions), and motivate students to read and learn course material.

Although clickers are a promising new technology, they are simply a pedagogical tool. Instructors who use clickers must think carefully about the pedagogical strategies they will use. Standard pedagogical strategies for clicker use have evolved in the natural sciences (e.g., Duncan 2005; Mazur 1997), using peer discussion of course concepts through "ConcepTests." ConcepTest questions are multiple-choice clicker questions that ask students to apply course material. Designed to foster problem-based learning, ConcepTests prompt students to use what they are learning during class instead of waiting for homework or exams to do so (Hoekstra 2008). In a recent book, Bruff (2009) provided an overview of much of what we have learned about clickers thus far; readers can consult this book for general information about clicker pedagogy. Overall, clickers provide effective opportunities for applied learning in large courses. Recent research suggests that clicker use may be beneficial for enhancing students' understanding of course concepts (Gauci et al. 2009), even when none of the students in a peer discussion group originally knew the correct answer (Smith et al. 2009).

A PEDAGOGICAL MODEL FOR CLICKER USE IN SOCIOLOGY

When teaching with clickers for the first time, the first author wrote several ConcepTest-style questions assessing students' correct application of sociological theories and concepts. Students

Figure 1. Learning Goals, Clicker Question Types, and Sample Questions		
LEARNING GOAL	QUESTION TYPES ADDRESSING IT	SAMPLE QUESTIONS
Attendance and participation	<input type="checkbox"/> All question types	
Understanding course material	<input type="checkbox"/> Reading quiz questions <input type="checkbox"/> Concept test-like questions	
Critical thinking about theories and concepts	<input type="checkbox"/> Opinion questions <input type="checkbox"/> Past experience questions <input type="checkbox"/> Student-designed questions	<i>Reading quiz question:</i> In the reading, what gender combination led to the lowest likelihood of negotiating, as well as a poor evaluation if the job candidate does negotiate? A. Female evaluator, female candidate B. Female evaluator, male candidate C. Male evaluator, female candidate D. Male evaluator, male candidate E. There were no differences
Relating material to real-life experiences and data	<input type="checkbox"/> Demographic questions <input type="checkbox"/> Past experience questions <input type="checkbox"/> Student-designed questions	<i>Opinion question:</i> How much do you personally think cultural factors explain differences in evidence of violent behaviors between men and women? A. Not much at all B. A little C. They are sometimes useful D. They explain most of what we see E. Don't know/other
Critiquing sociological theories and methods	<input type="checkbox"/> Student-designed questions <input type="checkbox"/> Demographic questions <input type="checkbox"/> Past experience questions <input type="checkbox"/> Opinion questions	<i>Past experience question</i> When you were growing up, which of your parents earned the most money? A. Don't have two opposite-sex parents/one or both didn't work/varied from year to year B. Dad usually earned a lot more C. Dad usually earned a little more D. Mom usually earned a little more E. Mom usually earned a lot more
Improving the learning experience	<input type="checkbox"/> Instant feedback questions <input type="checkbox"/> Reading quiz questions <input type="checkbox"/> Concept test-like questions <input type="checkbox"/> Past experience questions <input type="checkbox"/> Opinion questions	<i>Concept test-style question:</i> Does the sex labeling of occupations affect supply-side gender discrimination, demand-side gender discrimination, or both? A. Supply side only B. Demand side only C. Both (correct answer) D. Neither E. Don't know/other

Figure 1. Learning goals, clicker question types, and sample questions

worked hard at answering these questions, but they seemed intensely focused on getting the correct answer at the expense of thinking critically about the concepts they were applying. Using ConcepTest-style questions in sociology resulted in a learning community that felt examination oriented, rather than a cooperative exploration of course material, and these questions seemed too “detached” from real-life experience. This initial attempt to apply a pedagogical model developed in the natural sciences to clicker use in a sociology course fell short because the pedagogy attached to clicker use must be designed to address discipline-specific learning goals. Many sociology instructors support constructivist approaches to learning, which argue that students should regularly practice applying, discussing, evaluating, and critiquing course concepts in the classroom (Anderson

1987). The pedagogical model for clicker use described below outlines clicker question types specifically designed to help students use their sociological imaginations. Following Mills’s (2000:213) original directive, our pedagogical model pushes students to resist resting “content with existing classifications” by encouraging them to “criticize and clarify” their existing cognitive schemas for sociological concepts.

The model does this by interspersing clicker questions with lecture segments, small- and large-group discussions of course concepts, and instructor metanarratives about why clickers are being used. As we will show, our pedagogical model for clicker use follows several of the strategies offered by Bean (1996) for encouraging critical thinking, by conceptualizing clicker questions as “tasks” that (1) “let students link concepts in

[a] course to their personal experiences,” 2) provide opportunities for “students to teach difficult concepts to [other] new learners,” 3) “have students role-play unfamiliar points of view,” and 4) result in “raw data” that can be used to foster critical analysis of what is being learned (p. 131). Although every instructor has a different set of learning goals, many sociologists would likely support a core set of teaching and learning goals for sociology. In Figure 1, we outline basic learning goals, such as wanting students to attend, participate, and develop thorough knowledge of course material. We also articulate more advanced goals, such as fostering critical thinking, critiquing sociological methods, helping students relate course material to real-life experiences, and encouraging discussions of clicker questions. As advocated by Atkinson and Hunt’s (2008) inquiry-guided learning, our pedagogical model envisions clicker use as a means to cultivate “increasingly independent questioning and constructing” of conceptual knowledge.

For clickers to be useful in sociology, the pedagogy attached to them must move beyond a “problem-based” model to incorporate discipline-specific learning goals. Figure 1 introduces seven types of clicker questions, which can be used to address the specific goals listed in the figure. Our pedagogical model consists not only of specific types of clicker questions but is designed to promote critical sociological thinking (Grauerholz and Bouma-Holtrop 2003:491, 493) by using clicker questions to help students “evaluate, reason, and question ideas and information.” By examining clicker question response data within a small group or large class, participation is encouraged in a manner that helps students apply sociological concepts and fosters greater awareness for how social and cultural contexts shape beliefs and behavior. The pedagogical model does this by interweaving clicker questions during class with a combination of short lectures, small-group discussions, large-group discussions, and instructor metanarratives about why clickers are used so as to foster active learning and independent critical thinking.

Question Types

Similar to the ConcepTests used in the natural sciences, *concept test questions* are typically used after ideas or theories have been introduced in lecture. Accompanied by small-group discussion,

these questions encourage students to solidify their knowledge by applying course concepts or theories to new empirical situations. Examples of these and other question types can be found in Figure 1. Note that when students are given participation credit for answering clicker questions, it is important to write as fully inclusive a set of response options as possible, so that everyone can “click in” an answer.

Reading quiz questions evaluate students’ knowledge of material from assigned readings. Although any course material is fair game, our pedagogical model promotes assessing students’ knowledge of the most important concepts and findings from assigned readings. With this approach, the dual purposes of motivating students to do the reading and teaching them to read carefully to identify major themes and concepts are met. A sample question about an article by Bowles, Babcock, and Lai (2007) can be found in Figure 1. With these questions, response options need not be exhaustive, because students are given credit only for correct answers.

Opinion questions solicit students’ perceptions of sociological ideas and findings to initiate discussion in a manner that encourages critical thinking of course concepts. Opinion questions can be asked before starting a new unit, after a lecture, or both to ascertain whether students’ opinions have changed. They can also be used to teach students how to critique survey question wording or evaluate a theoretical explanation for an empirical finding; the latter approach is addressed by the sample question in Figure 1. Opinion questions never have correct answers. Instead, the histograms of response data that emerge are used to prompt large-group discussions about the breakdown of opinions, beliefs, and values that exist in the learning community. In this way, the response data generated by the clicker question can be used to push students to thoughtfully consider the social and cultural contexts that have shaped their beliefs.

The next two question types capitalize on the fact that a class full of students is a valid sociological data set, from which instructors can gather useful information as fodder for discussion. *Demographic questions* can be used to illustrate differences between the student population and the U.S. population, to relate course material to personal data, or to critique research methods. For example, using a modified question from the 2000 U.S. census, we asked students to use clickers to indicate their race. Because

the 2000 U.S. census question design did not include the term *Hispanic* or *Latino/a* in the question about race, we were able to use this question to prompt in-class discussion about the social construction of racial and ethnic categories. By displaying a slide containing the actual 2000 U.S. census data and overlaying the histogram of newly collected student responses, we were able to hold an effective discussion about the nature of research methodology and survey question design.

By answering *past experience questions* and viewing the resulting histogram of responses, students can determine how their experiences compare with those of others in the class. When used to assess theories, past experience questions allow for real-time hypothesis testing in a manner that fosters critical thinking about the generalizability (or lack thereof) of sociological theories to different study populations. The sample question in Figure 1 pushes students to critique theories about the household division of labor by soliciting data on students' own families of origin. Sometimes the limit of five response options necessarily forces a diverse catchall category (see Figure 1), but this limitation can be used to foster critical thinking if the class discusses the implications of survey methodology for potentially marginalizing atypical groups. Response options for opinion, demographic, and past experience clicker questions can be further divided by social categories (e.g., age, gender) to test ideas about group differences. For example, we have divided yes-or-no questions by gender (resulting in four response options). Ensuing in-class discussions of the relative proportions of "yes" and "no" responses in each gender category are used to reveal similarities and differences in gendered experiences. In this way, clicker questions can be used to help students "perceive and understand that their individual life choices, circumstances, and troubles are shaped by larger [social] forces," such as race, class, and gender (Grauerholz and Bouma-Holtrop 2003:493).

In upper-level classes, instructors can encourage students to *design their own clicker questions* to further explore ideas learned in class. This can be done in the form of an assignment in which students write their own clicker questions or as a standing invitation whereby students are invited to create clicker questions "on the fly" (most clicker technologies allow instructors to write and run questions on the spot). Student-designed questions can be used to support the learning goals

of encouraging critical thinking, relating course material to real-life experiences, and empirically testing hypotheses discussed in class. Finally, *instant feedback questions* can be used to gather information useful for improving a course. When instructors want feedback from students, clickers provide an efficient means for soliciting anonymous information. Instructors can choose to display the histogram of students' responses and hold a discussion about how the instructor or students could improve the class, or they can choose to keep the response information private.

A Demonstration of the Model

How can these various question types be integrated into a single class session? An example from an introductory sociology of gender class illustrates the interweaving of lecture, clicker questions, and discussions. The instructor starts a unit on gender and the household division of labor with a 5-minute lecture segment relating household labor to an earlier unit on the workplace. Students then collaborate in large-group discussion to create an inclusive definition of household labor. Responses are listed on the blackboard, and students are encouraged to include "invisible" types of labor, such as kin-keeping. Next, the instructor uses a past experience question asking students to report which of their parents does more household labor on the basis of the definition the class just created, discussing their families' situations with their neighbors. Revealing the distribution of responses, the instructor leads a large-group discussion of gender inequality in household labor. Students are encouraged to offer real-life information about why the divisions of labor might have been inequitable in their families (e.g., families trying to maximize income). The instructor uses this discussion as a springboard for 10 minutes of lecture on human capital explanations for who does the housework. Then, a concept test question is used to test students' understanding of this theory by applying it to a new empirical situation in which the woman outearns the man. To cap off the lesson, an opinion question encompassing small-group discussions of students' answers prompts students to consider how useful they personally think human capital explanations are for explaining who does housework. The concluding large-group discussion helps students identify shortcomings in the human capital explanation. Lasting about 45

minutes, this example addresses all but the last of the goals from Figure 1.

ASSESSMENT

Four sources of data, gathered from three undergraduate sociology classes at a large public university in 2007 and 2008, offer initial evidence for the effectiveness of this pedagogical model. Methods included (1) participant observation of student and instructor behaviors pertaining to clicker use; (2) survey questions soliciting anonymous data on student attitudes about the course, the use of clickers, and the specific types of questions used in our pedagogical model ($n = 350$, a 75 percent response rate); (3) anonymous one-page free-writes asking students to assess clicker use and specific types of clicker questions ($n = 456$); and (4) in-depth, semistructured qualitative interviews ($n = 10$) with randomly selected students exploring a variety of topics related to clickers. This multimethod approach to data collection generated a wealth of information on the effects of clickers with this pedagogical model, only some of which is presented here because of space constraints.

More than three quarters of the students had used clickers in a previous course. Students' perceptions of the overall pedagogical model being used with clickers were frequently positive. A survey in four sections of an introductory sociology of gender course ($n = 294$) asked, "How do you feel about answering questions using clickers in this class?" Within each section, about half of the respondents liked or loved using clickers, and another third were neutral. Sixteen to 25 percent disliked using clickers somewhat or a lot. Given that these students were required to use clickers to answer reading quiz questions in every class, these findings are surprisingly positive. In another course on the sociology of friendship that did not use graded quiz questions, we found students to be even more positive about clickers.

The pedagogical model proposed here views clicker questions as "jumping-off points" for critical thinking, discussion, and collaborative analysis. For sociology students, a key benefit of using clickers is the *public display of student responses*. When histograms of responses are displayed, their implications can be discussed, and students can get real-time feedback on their understanding of course concepts. Opinion and past experience questions are particularly effective at prompting

whole-class discussions, because students see instant results from their own demographic confirming or refuting the ideas they are studying. One interviewee described this powerful effect:

[Histograms] show where everybody's at and give us real specifics. Like, we read statistics in books all the time . . . [but] where are they getting their information from? Who are their subjects? We are sitting in this classroom right now, discussing this question, and [the graph of responses] is giving us real data.

Although the responses generated by a socioeconomically privileged group of young people may not reflect the U.S. population, students are still prompted to think critically about the extent to which sociological theories and concepts fit the experiences of "people like me."

Our pedagogical model strives to foster attendance and participation by awarding students points for answering clicker questions. As a result, the number of students attending these "clicker classes" was high. The clicker survey ($n = 294$) asked, "How has the use of clickers affected your attendance in this class?" Across four sections of the gender course, 50 percent to 55 percent of respondents felt that clicker use had a strong or somewhat strong positive effect on attendance. Data from a third course on drugs in society asked this same question. Across three sections, 53 percent of these students ($n = 90$) said that clickers had a strong or somewhat strong positive effect on their desire to attend class regularly. However, instructors implementing clickers should be aware that student "backlash" against attendance tracking was rare but consistent in our findings (1 percent to 7 percent of the sample said that clickers had a negative effect on their attendance, depending on course section).

Socially, clicker use alters the learning environment because it brings more students to class and encourages them to take the course more seriously. Observation confirms that clicker use affects the learning community by generating greater participation during class. Clicker use increases participation in two ways: (1) It allows shyer students who might never contribute verbally to actively participate as they answer clicker questions and see their opinions reflected in the resulting histograms of clicker responses, and (2) these histograms reveal diversity in students'

views and experiences, prompting students to speak up to explain their responses. One student wrote, "The use of clickers gave me a chance to express my opinion. I am shy and don't like to speak in front of large groups, so using clickers gave me the opportunity to feel like I contributed." In interviews, students claimed time and again that clickers fundamentally change large-group interaction to foster a more active learning environment: More bodies are present, more voices are being heard, and students are interacting with one another about what they are learning during class.

Overall, many students felt that using clickers under this pedagogical model increases engagement in the class and fosters feelings of solidarity in the learning community. As a student wrote, "Using clickers made the class feel more personal, as you could actually see people's opinions, anonymously and immediately. I really enjoyed the 'safe' feeling to the environment." Another student related this community feeling back to the learning process: "That's what college is supposed to be about, a meeting of minds, not just one mind." Because large classes can feel isolating when students are not given opportunities to interact, clickers and other pedagogical tools that can turn large classes into "meetings of minds" are particularly useful for fostering critical thinking within our discipline. Many students identified the positive effect clicker use has on their ability to think critically and apply sociological ideas to their own experiences. Across two sections of the introductory gender course ($n = 155$), 60 percent to 80 percent replied that opinion and past experience questions were very or somewhat useful "for helping you to think and learn." An interview quotation illustrates the power of clicker questions for helping students use their sociological imaginations to critique personal experiences:

I use it for the purpose of looking at my own life and being like, "Hey, this is gendered." 'Cause even though people say this is no-brain stuff [and] they see it every day . . . they don't really think about these things in terms of their own lives. They might think about it for other people . . . but they don't think of themselves as being gendered or playing a role at all. I like [using clickers] because it makes me look at my family and be like, "Hey, we're very gendered, we're

structured the way society says we're supposed to be structured."

Overall, we believe the prompting of both small- and large-group discussions about course concepts is the most important strength of the proposed pedagogical model for clicker use in sociology. In our discipline, the crucial stage for critical thinking and discussion occurs after the histogram of student responses is posted, because viewing histograms of response data facilitates critical thinking and discussion of sociological concepts. In our observations, the posting of clicker question response data creates a useful "space" for critical thinking that is highly beneficial to the learning process. Students want to examine (and, for some, explain) the responses they have chosen, and discussing the class's responses reveals similarities, diversity, norms, social change, and so on. Facilitating effective clicker-prompted discussion requires the instructor to be vigilant, both in encouraging students to participate verbally and in seeking to elicit a diversity of views, but we feel that the resulting discussions are more productive than relying on a simple lecture method. In a free-write, one student in the drugs course summarized the effectiveness of clicker-prompted discussions for learning:

I think asking people to offer explanations for their clicker choices is important and should be done even more. Although people weren't always eager to speak up, when discussions started on controversial issues, it led to some of the most enlightening moments of the course.

STRATEGIES FOR INCREASING THE EFFECTIVENESS OF CLICKERS

In this final section, we highlight specific behaviors and strategies sociology instructors can use to make clickers more effective. For a more complete list of suggestions, download Hoekstra and Mollborn (2009).

First, the critical thinking encouraged by clicker use is only as good as the clicker questions instructors write and the teaching plans they embed them in. Faculty members must set aside adequate time to write questions and decide how they will be

used to achieve teaching goals. Writing clicker questions can be time-consuming, because it is sometimes difficult to determine how to construct response options. However, questions and response options need not be flawless: Imperfect question wording can be used to spur critical thinking about survey question design. Because teaching with clickers usually involves reducing nuanced answers to five categories, students' critical thinking about clicker question design echoes larger debates among sociologists about the usefulness of survey methodology. Here, instructors can create useful "teaching moments" by encouraging students to discuss the advantages and disadvantages of using quantitative methods that feature closed-ended responses.

Second, our pedagogical model promotes the regular use of instructor metanarratives to appropriately frame the use of clickers for students, explaining why clickers are being used. This is particularly important for social science instructors who are using clickers for the first time, as many students have been socialized to use clickers under the "problem-based" clicker pedagogy used in the natural sciences. In our experience, students benefit most from clicker use when instructors explain how clicker-prompted class discussions may help them learn concepts more effectively. Citing research on the benefits of clicker use may be helpful. Instructors should strive to help students recognize the value of active learning and the specific learning goals that clicker questions are designed to achieve.

Third, the second author's supplemental observations of a variety of courses featuring clicker use under different pedagogical strategies suggest that students respond most positively to clickers when their role in evaluating students is clearly delineated ahead of time. See Hoekstra and Mollborn (2009) for helpful suggestions for evaluation using clickers.

Fourth, the syllabus should state that having another student "click in" responses when a student is absent is considered cheating. Data collected for the second author's dissertation suggest that this behavior occurs in clicker courses across disciplines. Because clickers are a relatively new technology, many students do not yet consider "clicking in for someone else" a form of academic dishonesty, so instructors need to make this expectation explicit.

Fifth, instructors will need to think through whether to include questions with right and wrong answers in their models for clicker use. When

students are awarded additional points for correct responses, this affects classroom interaction dynamics because the amount of stress that students attach to clicker use rises.

Finally, instructors must consider issues of confidentiality and ethics, especially with regard to past experience questions. Students said that clicker questions asking about anonymous but highly personal information (e.g., past sexual experiences or drug use) were often the most interesting, memorable, and useful questions for learning in sociology. However, because such questions can evoke strong emotions for some students, instructors need to take care to always include a response option that offers participation credit for those who prefer not to respond. For example, when introducing a unit on gender and violence, the first author used an anonymous clicker question asking how many students personally knew a woman who had been physically abused by an intimate partner. When the majority of the class answered "yes," the histogram of responses made a strong impression about the ubiquity of intimate partner violence in our society. In cases such as these, instructors should work to ensure that students' responses to sensitive questions remain private. This can be done either by using an anonymous polling option (available on some clicker systems) or by asking students to trade clickers with a neighbor.

CONCLUSION

Audience response systems, or clickers, are powerfully changing the learning process in many natural science courses. Many instructors in the social sciences are beginning to take note of these benefits and considering using clickers in sociology, but they should carefully contemplate how to implement this technology in a manner that will be most beneficial for learning in our discipline. To be effective in sociology, the pedagogy attached to clickers should incorporate students' own voices during the learning process by means of a wider variety of clicker question types than is typically used in the natural sciences. In this article, we identify a variety of clicker question types, which can be combined with small- and large-group discussions and instructor metanarratives to create a useful pedagogical model for clicker use in sociology. We also offer preliminary evidence that this model

fosters learning and critical thinking in large undergraduate sociology courses. Although we chose to focus on students' own assessments of the pedagogical model's effectiveness for their learning, objective measures of the effects of clickers on learning in sociology are still needed. Assessments of the potential effects of clicker use for other learning environments within sociology, such as smaller, more advanced classes, will help clarify the potential benefits of this pedagogical model.

In conclusion, clicker technologies are an especially good fit for the discipline because a class full of students represents a valid sociological data set that can be used to prompt discussion and critical thinking of sociological theories and concepts. If an instructor is already using a form of slideshow technology, clicker questions can be integrated into existing course formats with relative ease. Although some instructors may not consider all of the learning goals we identified to be important for their courses, whenever a pedagogical framework consisting of closed-ended clicker questions is appropriate, instructors can use this flexible tool to address any learning goal they choose. Effective use of clickers moves students away from feeling like "just one mind," isolated in a sea of strangers. Combined with effective pedagogy, clickers can be used to "transform everyday [experiences and] consciousness into sociological self-consciousness" (Dandaneau 2009:9) in a manner that is powerfully effective for the teaching and learning of sociology.

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NOTES

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REFERENCES

Anderson, Charles W. 1987. "Strategic Teaching in Science." Pp. 73-91 in *Strategic Teaching and Learning: Cognitive Instruction in the Content Areas*. Alexandria, VA: Association for Supervision and Curriculum Development.

- Atkinson, Maxine P. and Andrea N. Hunt. 2008. "Inquiry-Guided Learning in Sociology." *Teaching Sociology* 36(1):1-7.
- Bean, John C. 1996. *Engaging Ideas: The Professor's Guide to Integrating Writing, Critical Thinking, and Active Learning in the Classroom*. San Francisco, CA: Jossey-Bass.
- Boud, David. 1981. *Developing Student Autonomy in Learning*. London: Kogan Page.
- Bowles, Hannah Riley, Linda Babcock and Lei Lai. 2007. "Social Incentives for Gender Differences in the Propensity to Initiate Negotiations: Sometimes It Does Hurt to Ask." *Organizational Behavior And Human Decision Processes* 103(1): 84-103.
- Bruff, Derek. 2009. *Teaching with Classroom Response Systems: Creating Active Learning Environments*. San Francisco, CA: Jossey-Bass.
- Cooper, James L. and Pamela Robinson. 2000. "The Argument for Making Large Classes Seem Small." Pp. 5-16 in *Strategies for Energizing Large Classes: From Small Groups to Learning Communities*, edited by MacGregor, J. San Francisco, CA: Jossey-Bass.
- Dandaneau, Steven P. 2009. "Sisyphus Had It Easy: Reflections of Two Decades of Teaching the Sociological Imagination." *Teaching Sociology* 37(1):8-19.
- Duncan, Douglas. 2005. *Clickers in the Classroom: How to Enhance Science Teaching Using Classroom Response Systems*. San Francisco, CA: Pearson Education.
- Gauci, Sally A., Arianne M. Dantas, David A. Williams and Robert E. Kemm. 2009. "Promoting Student-Centered Active Learning in Lectures with a Personal Response System." *Advances in Physiology Education* 33(1):60-71.
- Grauerholz, Liz and Sharon Bouma-Holtrop. 2003. "Exploring Critical Sociological Thinking." *Teaching Sociology* 31(4):485-96.
- Hoekstra, Angel. 2008. "Vibrant Student Voices: Exploring Effects of the Use of Clickers in Large College Courses." *Learning, Media and Technology* 33(4): 329-41.
- Hoekstra, Angel and Stefanie Mollborn. 2009. "A Practical Guide to Implementing Clickers in the Sociology Classroom." Available at <http://www.colorado.edu/ibs/hb/mollborn/papers/Practical%20Guide%20to%20Implementing%20Clickers.doc>.
- Mazur, Eric. 1997. *Peer Instruction: A User's Manual*. Upper Saddle River, NJ: Prentice Hall.
- McKeachie, Wilbert James and Barbara K. Hofer. 2002. *McKeachie's Teaching Tips: Strategies, Research, and Theory for College and University Teachers*. Boston: Houghton Mifflin.
- Mills, C. Wright. 2000. *The Sociological Imagination*. Oxford, UK: Oxford University Press.
- Smith, M. K., W. B. Wood, W. K. Adams, C. Wieman, J. K. Knight, N. Guild, and T. T. Su. 2009. "Why Peer

- Discussion Improves Student Performance on In-Class Concept Questions.” *Science* 323(5910):122-24.
- Stowell, Jeffrey R. and Jason M. Nelson. 2007. “Benefits of Electronic Audience Response Systems on Student Participation, Learning, and Emotion.” *Teaching of Psychology* 34(4):253-58.
- Trees, April and Michelle Jackson. 2007. “The Learning Environment in Clicker Classrooms: Student Processes of Learning and Involvement in Large University-Level Courses Using Student Response Systems.” *Learning, Media and Technology* 32(1):21-40.

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