

**A Socio-Cultural Analysis of the  
Use of Clickers in Higher Education**  
**Rough Draft**

**Dissertation Proposal**  
Angel Hoekstra  
PhD Candidate, Sociology

**Proposed Defense Date: Tuesday, May 13, 1-3pm**

Dr. Leslie Irvine, Chair  
Dr. Stefanie Mollborn  
Dr. Kathleen Tierney  
Dr. Margaret Asirvatham  
Dr. Douglas Duncan

Note to committee members: I have not yet begun work on the two sections highlighted below because I think it will be useful to hear from each of you, after you have read the draft, regarding what you think needs to be included. Dr. Irvine, if you could give me a sense of what the project timeline should look like, or what you expect from it, when you give your feedback, I'd appreciate it. For the other committee members, any suggestions on what you need/want to see in the conclusion, as well as wording or organizational suggestions with regard to the rest of the paper, are greatly appreciated. Happy reading!

## **Dissertation Prospectus Outline**

### **I. Introduction**

### **II. Research Methods**

- a) Participant Observation
- b) Survey Questions
- c) Student Free Writes
- d) Interview Data, Coding and Analysis

### **III. Project Timeline**

### **IV. Working Chapter Outline**

### **V. Conclusion**

### **VI. References**

### **VII. Appendices**

- a) Sample: Survey Questions
- b) Interview Guiding Questions

## Introduction

---

Audience response systems, or “clickers,” represent a form of teaching technology fairly new to higher education.<sup>1</sup> Clickers are currently used in elementary schools, high schools, and universities in sites around the country (e.g. University of Massachusetts-Amherst; Purdue University; University of Colorado at Boulder; Harvard University; The Ohio State University; University of Texas at Austin), and they are increasingly being used abroad (e.g. China, Australia, UK). Qualitative research into the ways in which clickers affect students as *social* and *emotional* beings, however, is sparse. Similarly, to my knowledge, no attempt has been made to analyze clickers as a *cultural product* in use during a specific historical period in time. The proposed dissertation will provide a socio-cultural analysis of the use of clickers in higher education classrooms. Using a mixed methods approach, I explore the diverse ways in which audience response systems affect American college students.

In the pedagogical manner by which the technology is most commonly used today, clickers emerged in American higher education classrooms in the early 1990s. The technology was used primarily in natural science courses such as Physics, for the purpose of determining whether (and to what extent) students were gaining “conceptual understanding [for] the subject” (Judson and Sawada 2006, 34). First used by, and then researched within, the natural sciences, existing research on clickers relies primarily upon quantitative methods designed to assess the effects of clickers for student learning and retention (e.g. Roschelle, Penuel, and Abrahamson 2003; Rice and Bunz 2006). While

---

<sup>1</sup> Clickers are known by a wide variety of terms beyond “audience response systems,” such as “personal response systems,” “classroom communication systems” or “zappers” (Keller 2007). In an effort to maintain continuity with the current literature and for ease of use, the technology will here be referred to by its popular name, “clickers.”

inquiry into the potential learning benefits of clickers is important and certainly useful, little attention has been paid to the ways in which students qualitatively experience the role of clickers in the classroom. Existing research (e.g. Trees and Jackson 2007) suggests clickers dramatically change the learning environment and the student experience of constructing new knowledge; qualitative research designed to provide greater explanatory depth into the trends being observed in survey data is needed.

Recently, Penuel, Abrahamson, & Roschelle (2006, 2) called for greater attention to the *communicative* and *interpretive* behaviors of students as they use clickers, so that educators might better understand “how teaching and learning unfolds in these networked classrooms.” Following this call, the proposed dissertation investigates how students interpret their experiences with using clickers to learn new concepts. The research design elicits diverse perspectives from students by examining perceptions of clickers in four courses: Sex, Gender, and Society (sociology), Journalism I, General Chemistry I, and Stars and Planets II (astronomy). In addition, two other courses were observed – Animals in Society and Introduction to Sociology – in order to enrich the resulting analysis of the effects of clickers for teaching and learning in sociology. As mentioned, the thesis will work to place the views and experiences of the study participants into their larger cultural context, with the goal of increasing scholarly understanding for clickers as a cultural phenomenon that appeals to a specific generational cohort of American students.

Through the “interactive” pedagogical format promoted by scholars today (e.g. Mazur 1997, Duncan 2005), clickers encourage active engagement during the learning process by offering students regular opportunities to apply course concepts *during* class. The professor begins class by lecturing for a short time (10-15 minutes) on the central

concepts assigned in the reading/s for that day. The professor then posts a multiple-choice question prompting the students to analyze, apply, or critique this material. Provided students are encouraged to discuss the material, posting a “clicker question” transforms the relatively calm, passive learning environment produced by lecturing into a surprisingly noisy, engaging learning experience. Students turn to their neighbors to discuss the concepts; challenging one another to explain the reasoning behind their beliefs and confirming shared ideas. After a few minutes of peer interaction, students are notified that they have a small amount of time left to “click in.” When the time expires, the Audience Response System displays a histogram of student “votes.” The histogram produced by the technology allows both students and the professor to visually confirm how well the students are grasping the concept/s. Usually, the professor then spends a small amount of time “going over” the clicker question before returning to his or her lecture. Whether the professor’s primary purpose in using the ARS is to encourage students to think critically, to facilitate group discussion, or to prompt students to work cooperatively with their peers, current researchers believe “the key is to emphasize authentic, minds-on engagement” that increases student understanding for the concepts being learned (Judson and Sawada 2006, 33).

Though widely used today, this interactive pedagogical model has only recently begun to be identified within the literature as an effective means with which to use clickers to augment student learning and engagement (Abrahamson 2006). In a recent paper, Judson and Sawada (2006) explain that early models of clickers were in use in American higher education classrooms as early as the 1960s. The pedagogy in use with the technology at the time, however, was based upon a Skinnerian model of stimulus-response

that focused upon student responses as observable, measurable indicators of learning behavior. Following behaviorist theory, social or emotional effects resulting from use of the technology would be dismissed as insignificant mental constructs that cannot reliably be measured. In sum, the theory shaped the pedagogy used with the technology. Unlike contemporary audience response systems which allow *public display* of student response data in the form of histograms, early student response systems were used primarily as “lecture pacing tool[s:]... instructors would pause a lecture, ask students a multiple choice question, request a response from students” and then use the data display (seen only by the instructor) to determine whether to “slow down or speed up” the pace of lecture (Judson and Sawada 2006, 31). Under the Skinnerian approach, early ARS users did not see histograms of their peers’ responses, nor were they encouraged to discuss concepts with their peers during class. Despite fairly positive student evaluations of the technology at the time (Bapst 1971, Brown 1972, Garg 1975), clickers virtually dropped out of view during the 1980s (both in use and in the literature) as a result of a few studies suggesting the Skinnerian pedagogical model did not lead to significant gains in student learning (e.g. Bessler 1969, Cassanova 1971, Littauer 1972).

In the early 1990s, a team of researchers composed of NSF-funded physicists and instructors at Harvard University developed an audience response system with the technological capacity for efficiently tabulating and publicly displaying student votes.<sup>2</sup> Implementation of this system in Physics Education Research (PER) prompted the development of the interactive pedagogical model (Mazur 1997) in use today. Currently, research on audience response systems is in the early stages of understanding *why* a pedagogical model which is “learner-centered, knowledge centered, assessment centered,

---

<sup>2</sup> This system, Classtalk II, was first used at Harvard University in 1993 (Abrahamson 2006).

and [strongly advocates the creation of a] learning community” is most effective for providing learning gains (Abrahamson 2006, 13; Beatty, Leonard, Gerace, and Dufresne 2006). Much of this research utilizes a conceptual change model<sup>3</sup> based in constructivist pedagogy, arguing that students are more likely to grasp course concepts and better retain information when they are permitted to discuss what they know with peers who are at similar levels of cognitive ability (Judson and Sawada 2002). A recent theoretical paper by Penuel, Abrahamson, and Roschelle (2006), however, claims the conceptual change model does not adequately explain how changes *in interactions* brought about by the technology alter student and faculty *participatory behavior*. These researchers argue for greater depth of analysis into the “emergence of new classroom-level dynamics” brought about by the use of clickers, calling for a *socio-cultural analysis* of the use of clickers focusing upon “both the *social* dynamics of classrooms in fostering individual learning, [as well as] the role that the classroom and wider *cultures* play in shaping the ways people talk [about, or interpret] and participate in [clicker-assisted] learning activities”(Penuel, Abrahamson, and Roschelle 2006, 193; emphasis original).

The proposed dissertation will function as a response to that call. The thesis will provide in-depth, qualitative research into the nature of how clickers affect college students as they struggle to learn new concepts. By critically observing students as they use clickers, and directly soliciting their interpretive reactions to the ways in which clickers affect them as they learn, the proposed dissertation will forge ground for a new and necessary line of research within this field. Specifically focusing upon the social and emotional effects of the ARS for the learning process will provide a missing piece to the puzzle of existing research regarding the ways in which clickers help improve discipline-

---

<sup>3</sup> See Penuel, Abrahamson, and Roschelle, 2006.

specific conceptual learning/retention. Specific bodies of literature I expect should be helpful to exploring the multi-faceted nature of the effects of clickers include:

- Literature on student behavior as it applies to the learning process, especially with regard to passivity, engagement, and motivation in contemporary classrooms
- Current literature on the use of clickers from disciplines in the natural sciences
- Current literature on the use of clickers from disciplines in the social sciences
- Literature from social psychology pertaining to identity, emotion management, and the development of the self
- Contemporary cultural writings focusing on features of the generational cohort/s of students currently using clickers; with a particular focus on how American cultural attitudes/beliefs may influence student interpretations of clickers

An audience response system is a teaching tool, and like any other, the pedagogical model used in conjunction with the technology will strongly influence whether students perceive the addition of clickers to be helpful to the learning process. In addition to exploring student interpretations, the thesis must also examine the relationship between these perceptions and the specific pedagogical models being used in the courses observed, because existing research on clickers suggests a significant percentage of students dislike or would strongly prefer not to use clickers in class.<sup>4</sup> I expect the nature of student discontent with clickers has not been explored in greater detail because existing research has measured student attitudes through quantitative surveys, which simply cannot “get at” the detail behind these trends. It is easy to gloss over or “look past” student discontent with clickers when the data suggests that “most” or “the majority” of students approve (or are neutral about) the use of clickers. Still, others have suggested the effectiveness of clickers is “dependent upon social, not technological, factors” (Trees and Jackson 2007, 27); it will be important to explore how the pedagogy used in conjunction with the ARS affects student perceptions of the technology. In the process of exploring this link, the thesis will

---

<sup>4</sup> For example, Kaleta and Joosten (2007) surveyed 2684 students from 19 disciplines: 19% felt clickers were not beneficial to their learning. Overall, based upon the studies I have reviewed, between 5-20% of students indicate they do not feel clickers are useful or helpful to learning.

offer critical analysis of the emotions that students' experience while using clickers. By effectively "giving students a voice" with regard to the technology, the proposed dissertation should provide useful information for instructors in a variety of academic disciplines for years to come.

### **Research Questions:**

- 1) Socialized into an individualistic, self-esteem oriented culture, how do students in today's generational cohort ("GenMe") experience clickers as a social phenomenon?
- 2) How does the use of clickers affect solidarity (or the development of a learning community) among students in large college classrooms?
- 3) What emotions do students report experiencing as a result of using clickers, and how might these emotions affect behavior?
- 4) What are the similarities and differences among student experiences when using clickers in natural science courses vs. social science courses?
- 5) How might gender affect student decisions as they use clickers?  
(Is this different in social science courses vs. natural science courses?)
- 6) How does the instructor's pedagogy for clickers affect student perceptions of their usefulness? How influential is the instructor's (amount/content of) meta-narrative upon resulting student perceptions/interpretations of clickers?  
(“sage on the stage” vs. “guide on the side” transition in higher education)

### **Abbreviations for research questions to be used throughout the thesis:**

- RQ1: Social effects of clickers
- RQ2: Solidarity
- RQ3: Emotions
- RQ4: Discipline specific effects of clickers
- RQ5: Gender
- RQ6: Pedagogy/meta-narrative

## Research Methods

---

THE TASK OF THE ETHNOGRAPHER IS NOT TO DETERMINE 'THE TRUTH'  
BUT TO REVEAL THE MULTIPLE TRUTHS APPARENT IN OTHERS' LIVES.

- Emerson, Fretz, and Shaw, *Writing Ethnographic Fieldnotes* (1995, 3).

This dissertation will explore the diverse meanings students construct in response to their experiences with using clickers in college classes. As a developing ethnographer, I approach the study of student perceptions of the effects of clickers through the theoretical perspective of symbolic interaction. Proponents of symbolic interaction suggest that human beings behave toward objects on the basis of the meanings those objects have for them (Mead 1934, Blumer 1969). Similar to social construction theory, interactionists argue subjective meanings are not essential to any person, situation, or object encountered in the social environment. Instead, humans actively construct, evaluate, and modify their interpretations of objects, situations, and others within the context of social experience. During the five-year period in which I have observed students working with clickers, I have come to understand that undergraduates attach a variety of symbolic meanings to these little devices.

Ethnographic methods are well suited to exploring student interpretations of clickers. Ethnography is designed “to capture [a] multitude of subjects’ views of a theme, [to] picture a manifold and controversial human world” (Kvale 1996, 7). Ethnography nicely complements the epistemological stance of symbolic interaction by encouraging the researcher to work diligently to develop understanding for the subjective meanings constructed by subjects in the research setting. The process is fairly simple: the ethnographer carefully observes interaction as it occurs in the natural setting and then discusses her observations with the subjects under study, seeking clarification or correction

of her ideas when appropriate. The end product, however, is a complex portrait of social life that “sticks closely” to the experiences of the people under study. Ethnography supports the interactionist position that the *meanings* things have for people are important in their own right (Mead 1934), and worthy of research. Interpretations of “what it is like” to use clickers, then, arise as students come into contact with objects (e.g. clickers, clicker questions), situations (e.g. peer discussion), and others (e.g. peers, the professor) in the classroom.

To effectively capture the diversity underlying student experiences with clickers, this dissertation utilizes a multi-method approach that includes participant observation, survey questions, student free writes, and qualitative interviews. The population under study consists of students from the University of Colorado at Boulder who used clickers during the five-year period from 2003 - 2008.<sup>5</sup> A recent institutional report (Keller 2007) suggests the research site is appropriate to an exploratory study of the effects of clickers. Along with two other universities (U-Mass and Purdue), CU-Boulder leads the nation in implementation and research on Audience Response System technologies. Keller’s campus-wide survey (2007, 2) demonstrates how quickly use of the technology has increased: following initial implementation of ARS technology in the Physics department in 2001, clicker use at CU has grown to encompass 19 departments which together offer 80 courses that utilize clickers. Clickers have come to affect the lives of a large number of students at this university. In the spring semester of 2007, “clickers were used by 10,011 unique students... students using clickers made up 44% of all undergraduate students [at CU]” (Keller 2007, 5). The fact that clickers have come to be used by such a large portion

---

<sup>5</sup> Formal participant observation was initiated in the fall of 2004 and continued into December 2007. The survey data to be used in the thesis spans a time frame from fall 2003 - spring 2008. Two audience response systems were observed during this time: H-ITT (infrared ARS) and i-clicker (radio-frequency ARS).

of the undergraduate population at this university in such a short period of time strongly suggests the proposed thesis is warranted. In the following sections, I detail each of the research methods used, clearly identifying how each of these methods corresponds to the research questions guiding the dissertation.

## **Participant Observation**

I observed students use clickers in order to become familiar with the interactive, teaching, and learning aspects of the classroom settings featured in this thesis. Gaining a sense of what it is like to be sitting in the classroom, amongst other students, as they use clickers, is crucial to my ability to accurately understand student perceptions of the technology. Observation provides a crucial platform from which to seek understanding for student interpretations of clickers as they are expressed in the other methods utilized in the research program. I have observed students use clickers in four disciplines: Sociology, Journalism, Chemistry, and Astronomy. Specific courses observed include: Introduction to Sociology; Sex, Gender, and Society (2 semesters); Animals in Society; Drugs in US Society; Principles of Journalism; General Chemistry I (3 semesters); and Astronomy II: Stars and Planets. Courses were chosen from disciplines in both the natural and social sciences in order to gain a sense for how the technology is being used pedagogically in different fields.

Initial contact with each of the professors whose courses were observed was made through networking; I received faculty approval before observing. Courses observed represent typical “large university classes:” they range in size from 100 to 500 students and feature rows of seats bolted to the floor. During observation, I assumed the role of a student and attempted to blend in as much as possible. I “dressed down,” brought a

notebook and pen, and given my youthful appearance, likely appeared to be simply another student taking notes during class. I intentionally sat in different areas of the classroom in order to assess whether students may experience clickers differently depending upon where they choose to sit relative to the professor. Observation notes varied in content depending upon the particular course observed,<sup>6</sup> but contained a great deal of comparable information across courses. I noted the ways in which clickers affected the nature of student attention and engagement, calculated the amount of time between lecture “pieces” and clicker questions, described student behavior as observed in peer group discussions, worked to get a general feel for the level of solidarity among students in the class, noted when students seemed confused by clicker questions, and so forth. The following two tables summarize the data contained in observation notes:

---

### **Types of information recorded in observation notes**

- Number and type/nature of clicker questions given during the class
- Placement of clicker questions: beginning, end, or spaced out throughout the class
- Pace of instructor during lecture: slow, medium, fast
- Average number of students in attendance (measured through clicker responses)
- Aspects of instructor pedagogy used with clickers: e.g. PowerPoint or overhead projector, instructor posture, voice tone, facial expressions, general attitude toward clickers
- Level of professor meta-communication regarding clickers: low, medium, high
- Nature of meta-narrative and language used (e.g. “The main points I want you to get are...”)
- General sense of how well the professor explains response categories after clicker questions; e.g. does instructor explain why incorrect answers do not apply, or only the correct answer?
- Level of student verbal participation solicited by clickers: low, medium, high
- Level of learning community solidarity established in a particular course, compared with others
- Measures of student engagement: verbal comments about clickers to peers, verbal comments heard during peer discussions of clicker questions, facial expressions, entire group levels of engagement
- Measures of student disengagement: yawning, pen twirling, shifting in seats, fidgeting
- Noted visual histogram representations of how well students are grasping new concepts
- Noted when technologies faltered or did not work and faculty/student reactions

---

<sup>6</sup> For example, I counted gendered instances of participation in the Sex, Gender, and Society course in order to gain data useful for an analysis of how clickers affect the gendered nature of participation in that class... this method was not possible, however, in the larger Chemistry and Astronomy courses, where counting student participation would not have been feasible for a single researcher.

---

## Quantitative summary of observation data

Breakdown by course observed:	Class days observed	Pages of notes
General Chemistry		
Fall 2004 – observed 3 sections	16	57
Spring 2005	6	24
Fall 2005	5	16
Introduction to Sociology:		
Fall 2006	10	30
Sex, Gender, and Society:		
Spring 2007	13	52
Fall 2007	20	56
Animals and Society:		
Fall 2007	7	36
Principles of Journalism:		
Fall 2007	4	33
Astronomy II:		
Fall 2007	6	33
<b>TOTAL:</b>	<b>87 classes observed;</b>	<b>320 pages of notes</b>

---

Data collected in observation notes will be useful for addressing RQ2 (Solidarity), RQ4 (Discipline specific effects of clickers), RQ5 (Gender), and RQ6 (Instructor pedagogy/meta-narrative).

## Survey Questions

Quantitative survey responses were requested of students in all six courses observed for the purpose of accessing the larger population of student attitudes about clickers existing in each particular course. Utilizing survey questions in combination with qualitative methods fostered a rich, interactive process whereby themes discovered in survey responses could be more carefully explored in student free writes and interviews. In addition, gaining access to student attitudes through survey responses at times allowed me to evaluate whether subjective interpretations made during observation (e.g. levels of solidarity or engagement among students in a particular course) reflected the actual, perceived experiences of students.

Survey questions requested information regarding population demographics, as well as student attitudes about (or perceptions of) clickers; responses to the latter category were accessed using a five-point Likert scale. Responses were collected using the Audience Response System, and with the exception of one or two scheduling conflicts, I was present each time survey responses were collected. Sitting in and observing the administration of survey questions enabled me to confirm the process went smoothly: on the few occasions when a question was poorly written or students seemed confused, I made note of the incident so that I could later discard the data produced by that particular question. Requests for survey responses were always preceded by an instruction overview designed to: 1) communicate the purpose of the survey, 2) encourage students to respond in an honest and sincere manner, and 3) provide students with contact information should they have a question or a comment about the research. The survey questions were always formally posted (on an overhead or PowerPoint slide) by the instructor teaching the course; most often at the beginning of class after daily announcements, to allow a little extra time for tardy students to arrive before the survey began. On many occasions, I stood up at the front of the class and introduced myself to the students before requesting their participation in the survey; I felt the best way to encourage students to respond honestly and sincerely was to communicate that a real person would be using the data. I introduced myself and explained the purpose of my research as “to give students a voice” regarding the use of clickers at CU.

To illustrate the types of information solicited, a sample of survey questions is provided in **Appendix A**. The questions included represent a random sample of all survey questions used: the appendix is not all-inclusive, nor should the reader assume that all of

the questions included in the list were used in all six courses surveyed. The number and variety of survey questions given were always shaped by the expectations of the instructor regarding how much time should be taken from class to collect responses. The data produced through the collection of survey responses should be useful for addressing RQ1 (Social effects of clickers), RQ2 (Solidarity), and RQ3 (Emotions). The following table summarizes response percentages for each student population surveyed:

---

### Survey data response percentages

Breakdown by course observed:	<u># of st. enrolled</u>	<u># of survey questions given</u>	<u>Average st. response %</u>	<u>Avg. (N)</u>
General Chemistry				
Fall 2004 – observed 3 sections	900	51	68%	(610)
Spring 2005	400	52	71%	(285)
Fall 2005	900	8	54% <sup>7</sup>	(485)
Introduction to Sociology:				
Fall 2006	460	10	27% <sup>8</sup>	(125)
Sex, Gender, and Society:				
Spring 2007	100	14	68%	(68)
Fall 2007	100	16	82%	(82)
Animals and Society:				
Fall 2007	100	5	88%	(88)
Principles of Journalism:				
Fall 2007	110	5	75%	(82)
Astronomy II:				
Fall 2007	120	8	81%	(97)

---

### Student Free Writes

<sup>7</sup> In fall 2005, eight survey questions were given in general chemistry in the middle of November; this administration date was chosen by the professors teaching the course, who were under pressure to address a great deal of material before the final exam. This response percentage indicates that even when clickers are being used in large courses, students often stop attending near the end of the semester.

<sup>8</sup> The instructor teaching this Introduction to Sociology course was using clickers for the first time during the semester I observed; students were not given course credit of any kind for using clickers in this course and many students stopped attending class very early in the term.

Asking students to write about their experiences with (and interpretations of) clickers was not originally included in the research plan. This method was added during the fourth year of the data collection process in order to gain an additional point of access to students' subjective views regarding the use of clickers. While interviewing is time-consuming and demands financial resources, free writes provide a low-cost means by which to determine *which* subjective themes about clickers are most salient to students. Free writes were requested of students during three semesters (Summer B 2007, fall 2007, and spring 2008), in the courses being observed during that time period (Drugs in US Society, Animals in Society, Journalism I, Astronomy II, Sex, Gender, and Society). A quantitative summary of data compiled in student free writes follows:

---

<b>Number of student free writes collected, thus far:</b>	<b>460</b>
Breakdown by courses observed:	
Sex, Gender, and Society: Fall 2007	158
Sex, Gender, and Society: Spring 2008	61 <sup>9</sup>
Animals and Society:	75
Drugs in US Society:	22 <sup>10</sup>
Principles of Journalism:	71
Astronomy II:	73

---

Free writes were requested of students late in the research process in order to assess whether students maintained salient themes about the use of clickers that may not have been accessed by the research methods originally in place. Students were asked to free write about clickers once in each of the courses listed above, with the exception of the *Sex, Gender, and Society* course, where students were asked to free write twice (additional data

---

<sup>9</sup> Two “rounds” of free write data are to be solicited in each Sex, Gender, and Society course observed, for use in an upcoming article by S. Mollborn and A. Hoekstra. The second round of free write data for the current (spring 2008) Sex, Gender, and Society course will be collected after spring break.

<sup>10</sup> As I am teaching my Drugs in US Society course with clickers again this summer, I expect I will ask my students to free write anonymously in that course again, in order to see what themes are salient.

was gathered for the purpose of producing a research article on the use of clickers in that particular course). I discuss the process of soliciting free writes for the other four courses first, and then describe the process used in Sex, Gender, and Society.

In Drugs in US Society, Animals in Society, Astronomy II, and Journalism I, students were asked to “write for a few minutes about how you feel about the use of clickers in this class.” The form follows (space for students to write in has been omitted):

---

Clicker Free-Write, Fall 2007

Thank you for choosing to participate in this brief free-write today. Please know your response is entirely voluntary. I greatly appreciate your time in sharing your thoughts on clickers! ☺

First, which of the following items do YOU personally own? (*a measure of familiarity with technology*)  
 cell phone     laptop computer     IPOD

Have you used clickers in another course besides this one? \_\_\_\_\_  
If so, which courses?

How do you feel about the use of clickers in this class? If you like (or enjoy) using them, why? If you do not like them, or you feel the clickers could be used more effectively, how?  
----- (page break) -----

Which of the following types of clicker questions have you seen used in this class?

**Factual Recall Questions:** questions that ask you to recall information from the course reading or from a prior lecture

**ConceptTests:** questions that ask you to plug in numbers to solve a problem or apply a concept

**Critical Thinking Questions:** questions that ask you to think critically, to give your opinion on a course topic, or to evaluate a course idea in some way

**Past experience Questions:** questions that ask you to provide anonymous data on your past experiences for the benefit of the entire class viewing the histogram data

How do you feel about the following types of clicker questions as they are used in this class? Are they useful? If you dislike a specific type of question, why?

Finally, **do you feel that you usually have enough time** to answer clicker questions in this class?  
 Yes                       No

... If you generally feel that you do **NOT have enough time** for clicker questions in this class, could you take a moment to describe **WHY** you think this may be the case?

Thanks for participating and helping me with my research on student attitudes toward clickers!

---

In addition to accessing themes salient to students (through the first open ended question), the free write is designed to determine the *types of questions* students saw being used by the instructor in each particular course, and how students felt about the effectiveness of those questions. This method addresses RQ6, concerning each specific instructor's pedagogy with clickers, through the eyes of the students in the course. Next, because the collection of free write data was anonymous, many students expressed strong emotions about clickers that should prove useful for addressing RQ3.

In the Sex, Gender, and Society course, free writes are to be solicited twice over two consecutive semesters, to determine *which* salient themes may be durable over time. Free writes were requested in recitations; as the TA last semester, I solicited them myself, while the current TA is soliciting them according to the process I used (described below):

---

Free Write #1 Instructions; Neutral prompt

1) Give them *\*at least\** five minutes to write,  
2) Explain that this activity is their opportunity to offer feedback to the professor on how the clickers are going for them: it will help Angel Hoekstra with her dissertation research, but the data is primarily useful for Dr. Mollborn so that she can make changes with the clickers if necessary;

3) Write the following prompt on the board:

"Please take out a sheet of paper, and write anonymously (do not include your name) for a few minutes about how clickers are going for you in this class so far this semester. Specifically:  
- Are clickers helping you to better understand the course material?  
If so, how?  
- What is it like to use clickers in a sociology class, do you like it?  
- What do you think about the GRAPHS that we show each after clicker question?"

Explain that they do not have to respond to all three questions, they can just choose one to write about if they want.

4) Consider the students who get there early to recitation: start them on writing when they get there... after all, why have them wait until "on the hour" to begin writing when you could give them an extra few

minutes to write as everyone else filters in? This makes for richer data and gives them more time to write.

5) Be sure to explain after all of them get there, when you go over the formal instructions, that participation in the free write is entirely voluntary. It is their opportunity to provide feedback to the instructor on clicker use; please directly say to them: "please respond in an honest and sincere manner if you do choose to participate."

Be sure to state: "we are looking for well-rounded data, so whether you like clickers or not, we are interested in what you have to say. This is anonymous, write whatever you want!"

6) Write my email address on the board for any students who may have questions about my research: Angel.Hoekstra@colorado.edu

---

Careful attention was paid to the process of soliciting free writes: students were assured their responses were entirely voluntary and would in no way affect their grade, they were encouraged to respond honestly regardless of whether they liked or disliked clickers, and the administration process was designed to utilize time effectively so as to solicit the richest data possible in the short period of time available.

The second round of free writes given in Sex, Gender, and Society closely followed the format shown above (used in the other courses), but inquired with greater depth (more "open space" for writing) about the *specific types of questions* used in the course and how effective students felt each type of clicker question was for helping them to learn the material. The information gathered by this free write prompt will be useful for addressing RQ4 (Discipline specific effects of clickers) and RQ6 (Pedagogy/meta-narrative), because both the types of questions used and student reactions to the effectiveness of those questions varied by the discipline of the course observed. Overall, free write responses tapped into a wealth of information regarding student attitudes about clickers. In addition, free writes accessed a few entirely new topics that I was able to later explore in interviews. For example, as a result of the anonymity of free writes, students who were uncomfortable with using clickers as a result of having a *learning disability* wrote about their experiences.

In interviews, I was able to draw upon the information these students provided to more effectively explore the effect of having a learning disability, and the anxiety that can be provoked by using clickers to earn points.

## **Interviews**

Theorists working from the perspective of symbolic interaction argue that seeking out the constructed meanings of human actors provides the researcher with the greatest amount of knowledge regarding potential reasons for individual choices and subsequent behavior. Observation and survey questions do not permit access to individual student interpretations regarding “what it means” to use clickers, so I set out to understand what it is like to use clickers by directly asking students about their experiences with them in qualitative interviews. Richardson (1995: 218) argues soliciting narratives “is the best way to understand the human experience because it is the way humans understand their own lives. It is the closest to human experience and hence the least falsifying of that experience.” In December 2004, I examined themes contained in participant observation notes and survey data to carefully draft a set of interview guiding questions. In the spring of 2005, I conducted twenty semi-structured interviews to collect student interpretations of the effects of using clickers in General Chemistry I.

Students were recruited through in-class announcements and a flyer, and all interviews took place in a faculty office on campus. Interviews were conducted in an informal, conversational, yet professional manner. Initial questions were designed to establish rapport by allowing the student to talk about general features of college life. Beginning the interview with a conversation on “college student life” helped the interviewer and interviewee to find common ground. Encouraging the interviewee to take

the role of the expert early on establishes a dialogue where both parties contribute to the “co-creation” of knowledge (Kvale 1996). Subsequent questions were designed to facilitate relaxed conversation, to help the interviewee feel as comfortable as possible in sharing their experiences about using clickers in class. Interviews were audio-recorded and informed consent was secured from all participants. The interviewees were advised that the recording device could be stopped at any time during the interview. Interviews lasted between 28 - 120 minutes of a scheduled two-hour time slot, and no participants requested that the recording device be stopped. Students were paid \$20 for their participation in Chemistry interviews, and the CU Chemistry department funded these interviews for the benefit of improving teaching in their department.

Initial review of the data from the first twenty interviews suggested the majority of these students felt quite positive about using clickers to learn chemistry concepts. To better understand the views of students less favorable to using clickers, in the fall of 2005 I intentionally recruited students who disliked (or had concerns about) the use of clickers in *General Chemistry*. Eight more interviews were completed, for a total of twenty-eight interviews with students using clickers in chemistry. This interview sample (N=28) consists of sixteen young women, ten young men, and two non-traditional students (61% female, 39% male). The original interview sample was surprisingly balanced by gender, but a considerable percentage of “second round” respondents (recruited to discuss anxiety and/or frustration with using clickers) were female. Nineteen interviewees self-identified as white or Caucasian (68%); five as Asian American (18%). Nineteen were freshmen (68%), and fifteen (54%) had used clickers in at least one prior course.

In the current semester (spring 2008), I am working to interview students about what it is like to use clickers in a sociology course, *Sex, Gender, and Society*. The guiding questions used for these interviews are very similar to the original set of guiding questions used with students enrolled in General Chemistry. These guiding questions are given in **Appendix B**. Similar to the procedure used in prior interviews, participants were solicited by email, following an in-class announcement by the professor describing the nature of my research. Sociology students chosen to participate in interviews were randomly selected from the course enrollment list.

---

<b>Number of student interviews conducted:</b>	<b>36 (+ 4 more)</b>
28 interviews from two semesters of students in general chemistry	
5 interviews from Sex, Gender, and Society students enrolled in course in fall 2007	
3 interviews <b>thus far</b> from Sex, Gender, and Society students enrolled in course in spring 2008	

---

Perusing the set of interview guiding questions should communicate to the reader that this method is designed to provide the greatest depth of information for the thesis. The interview questions are designed to address the following research questions:

**RQ1: Social effects of clickers** (e.g. describing what it is like to use clickers during peer discussions of course concepts, effect of using clickers on student role behavior)

**RQ2: Solidarity** (e.g. effect of clickers on learning community dynamics; peer groups)

**RQ3: Emotions** (specific section of interview questions designed to solicit student experiences with emotions as related to or prompted by ARS use)

**RQ4: Discipline specific effects of clickers** (e.g. discussing what it is like to use clickers to learn chemistry; what it is like to use clickers to prompt critical thinking in sociology)

**RQ5: Gender** (specific section of questions designed to solicit experiences by gender)

## **Interview Data Coding and Analysis**

The Human Research Committee at the University of Colorado has approved all data collection methods for this dissertation under protocol 0804.17. The protocol was last updated 11/18/07 and is effective until 11/2008. Student free writes are read and coded directly off of the forms; interview data is transcribed before coding occurs.

Following symbolic interaction, I approach the coding and analysis of qualitative data with an eye for locating and preserving the symbolic meanings students attach to their experiences with clickers. I code and organize by hand, through in vivo coding (Coffey & Atkinson 1996); a form of open coding designed to allow categories to emerge from the data (rather than systematically producing codes and then applying them to the data set). While coding and analyzing data, I read through the document (free write or interview transcript) and highlight short phrases representative of what Ryan & Bernard (2000: 780) term *thematic units*, “chunks of text that reflect a single theme.” For example, I read every free write in full, marking down on a summary sheet the thematic units contained within the text and setting aside particularly powerful free writes to be later typed up in full. Similarly, when coding interview data, I start with a transcript and read through it by section, coding data under simple theme, and then separating coding themes into smaller categories when necessary.

For example, the coding category *active* contained a variety of related statements after the initial round of coding:

Examples of student statements initially coded into category, “Active”:

“All the students are talking, consulting each other...”

“You’re like, intrigued, you want to get this question right.”

“I think these active, engaging conversations are stimulating...”

“Using clickers makes it more likely that students won’t fall asleep in this lecture hall.”

I then arrange the extensive list of thematic units included under the particular coding category (“active”) into divergent sub-themes, creating categories of greater and greater abstraction. During analysis, I periodically review the coding categories to determine whether they are too slim (needing to be collapsed back into a different theme) or too comprehensive (needing to be broken down further). Coffey & Atkinson (1996) emphasize that ethnographic coding and analysis are separate but related activities, and I found this to be the case. Moving back and forth between the original coding category and the list of more abstract groupings, I revise some coding decisions along the way to produce a group of thematic categories reflecting the ideas contained in the initial category. Examples of coding categories created from the initial “active” group include:

Coding categories created to reflect themes in “active”

What it is like to use clickers

Benefits of explaining ConcepTests to peers

Allows for self-test of whether student understands the material

Immediate application of concepts being learned

Finally, I review interview transcripts, the coded data, and the resulting thematic categories until I feel I no longer needed to create new categories. When each new interview unit can comfortably be placed into an existing grouping, the researcher has reached saturation and is then ready to begin writing up the data.

XXXXXX

Committee members: what questions do you have about the coding and analysis process that have not been addressed here?

Methods suggestions from meeting with Kathleen:

- objective of using this method,
- how was the data gathered,
- what information did this method yield,
- which research questions can be addressed with this data

## **Project Timeline**

### **Spring 2008**

- Interview 10-12 sociology students
- Complete dissertation prospectus
- Receive feedback from Dr. Irvine before sending to committee members
- Send to committee members one month before planned defense date
- Prospectus Defense Date scheduled for May, 2008

### **Summer 2008**

- Begin writing one chapter of the dissertation
- End summer with a well laid chapter outline for the book

### **Fall 2008**

Continue analysis and writing, with additional data collection if needed.

### **Spring 2008**

## **Working Dissertation Chapter Outline**

---

[If these are all chapters, you'll want to condense some. A guideline and suggestion:](#)

[Introduction](#)

[Methods](#)

[GenMe](#)

[Data 1: Using clickers: compare natural/social sciences](#)

[Data 2: Student responses: learning communities, emotions](#)

[Data 3: Clickers and the self](#)

[Conclusion](#)

[I would suggest folding your “suggestions for teachers” into the conclusion. You have not really done research on enough aspects of GenMe to comment on teaching in general, but you can make recommendations about clicker use.](#)

Introduction

- Brief literature review on use of clickers
- Contributions of this analysis to our understanding of the role of clickers
- “About the Author”: how I got interested in this project; role of researcher

**METHODS**

Social and cultural context: GenMe and the use of technologies

- GenMe cultural characteristics
- Influence of competing technologies (Gergen)
- Research on effects of multi-tasking for student learning
- Call for keeping GenMe students engaged without patronizing them

Experiencing clickers in courses in the natural sciences

- Chemistry
- Astronomy

Experiencing clickers in courses in the social sciences

- Journalism

- Sociology
- Teaching with clickers in the Social Sciences

#### Development of functional learning communities

- Active, cooperative, engaging

#### Emotional responses to the use of clickers

- Joy/fun
- Frustration
- Anxiety/fear
- Students with disabilities

#### Clickers and the self

- Developing student status; role behaviors
- Development of self through clicker questions:
  - o Natural sciences: emphasis on students committing to an answer, relationship of learning to work with peers and disciplinary language
  - o Social sciences: development of self through examining past experiences, answering critical thinking questions, discussions with peers

#### Section for professors: Suggestions for how to teach GENME students

#### Conclusion

#### References

#### ? Sample Clicker Questions for Social Sciences

### **Conclusion**

#### Limitations, Obstacles, issues that need to be addressed

Angel: this is highlighted, so I'm assuming you want feedback here. I don't expect students to have conclusions in a proposal. The proposal and defense focus mainly on methods and analysis. I don't need to see conclusions. It's good that you addressed limitations, though.

### **Limitations**

- Generalizability of the research is tempered by the specific structural characteristics of the population under study: primarily middle to upper-middle class, white college students who are used to using multiple technologies in their day to day lives...
- Similarly, the courses being studied here are primarily large lecture courses in a public (R1) university; most faculty on this campus are heavily focused on research and publications; they may be more likely to use clickers for some reasons (e.g. potential to publish results learned from teaching one's own students with clickers; working in large lectures fosters desire to minimize the impersonal distance fostered by large lecture halls) but less likely to use them for others (e.g. research

institutions place less value on teaching accomplishments and more on research work, so drive to innovate in teaching may be diminished; professors who want to focus on their publications and personal scholarly development may be less attuned to student needs than faculty at small teaching colleges)

### Other issues to consider

- Does not address in depth the faculty side of the equation: will not address the attitudes of faculty who have specifically rejected using (i.e. chosen NOT to use) clickers in their classrooms
- What general effects of clickers might be beneficial to the learning process regardless of the size of the student group taught? Would these benefits effectively substitute for the features of a smaller (recitation-style) class?

## References

---

[Other than Mead & Blumer, where is the sociology? This has to be sociological.](#)

- Abrahamson, L. 2006. "A Brief History of Networked Classrooms: Effects, Cases, Pedagogy, and Implications." Pp. 1-25 in *Audience Response Systems in Higher Education: Applications and Cases*, edited by D. A. Banks. Hershey, PA: Information Science Publishing.
- Bapst, J.J. 1971. *The Effect of Systematic Student Response upon Teaching Behavior*. Unpublished doctoral dissertation, University of Washington, Seattle. (ERIC Document Reproduction Service No. ED060651).
- Beatty, I.D., Leonard, W.J., Gerace, W.J. and R.J. Dufresne. 2006. "Question Driven Instruction: Teaching Science (Well) with an Audience Response System." Pp. 96-115 in *Audience Response Systems in Higher Education: Applications and Cases*, edited by D. A. Banks. Hershey, PA: Information Science Publishing.
- Bessler, W.C. 1969. *The Effectiveness of an Electronic Student Response System in Teaching Biology to the Non-Major Utilizing Nine Group Paced Linear Programs*. Muncie, Indiana: Ball State University.
- Blumer, Herbert. 1969. *Symbolic Interactionism: Perspective and Method*. Engelwood Cliffs, NJ: Prentice Hall.
- Brown, J.D. 1972. "An Evaluation of the Spitz Student Response System in Teaching a

- Course in Logical and Mathematical Concepts.” *Journal of Experimental Education*, 40(3), 12-20.
- Casanova, J. 1971. “An Instructional Experiment in Organic Chemistry, the Use of a Student Response System.” *Journal of Chemical Education*, 48(7), 453-455.
- Coffey, A. & P. Atkinson. 1996. “Concepts and Coding.” *Making Sense of Qualitative Data*. Newbury Park, CA: Sage.
- Duncan, D. 2005. *Clickers in the Classroom: How to Enhance Science Teaching Using Classroom Response Systems*. San Francisco, CA: Pearson Education.
- Emerson, R.M., Fretz, R.I. and L.L. Shaw. 1995. *Writing Ethnographic Fieldnotes*. Chicago, IL: University of Chicago Press.
- Garg, D.P. 1975. *Experiments with a Computerized Response System: A Favorable Experience*. Paper presented at the Conference on Computers in the Undergraduate Curricula, Fort Worth, TX. (ERIC Document Reproduction Service No. ED111355).
- Judson, E. and D. Sawada. 2006. “Audience Response Systems: Insuper Contrivances or Inspiring Tools?” Pp. 26-39 in *Audience Response Systems in Higher Education: Applications and Cases*, edited by D. A. Banks. Hershey, PA: Information Science Publishing.
- Kaleta, R. and T. Joosten. 2007. “Student Response Systems: A University of Wisconsin System Study of Clickers.” *Educause Center for Applied Research*, vol. 10 (May).
- Keller, Chris. 2007. *On the Use of Clickers at CU*. San Francisco, CA: Bedford, Freedman, and Worth Publishing.
- Kvale, Steiner. 1996. *InterViews: An Introduction to Qualitative Research Interviewing*. Thousand Oaks, CA: Sage Publications.
- Littauer, R. 1972. “Instructional Implications of a Low-Cost Electronic Student Response System.” *Educational Technology: Teacher and Technology Supplement*, 12(10), 69-71.
- Mazur, E. 1997. *Peer Instruction: A User’s Manual*. Upper Saddle River, NJ: Prentice Hall.
- Mead, George H. 1934. *Mind, Self, and Society from the Standpoint of a Social Behaviorist*. Chicago, IL: University of Chicago Press.
- Penuel, W.R., Abrahamson, L. and J. Roschelle. 2006. “Theorizing the Transformed Classroom: Sociocultural Interpretation of the Effects of Audience Response Systems in Higher Education.” Pp. 187-208 in *Audience Response Systems in Higher*

*Education: Applications and Cases*, edited by D. A. Banks. Hershey, PA: Information Science Publishing.

Rice, R. E. and U. Bunz. 2006. "Evaluating a Wireless Course Feedback System: The Role of Demographics, Expertise, Fluency, Competency, and Usage." *Studies in Media & Information Literacy Education* 6: 1-10.

Richardson, L. 1995. "Narrative and Sociology." In *Representation in Ethnography*, J. Van Maanen, Ed. Thousand Oaks, CA: Sage.

Roschelle, J., Abrahamson, A.L. & W.R. Penuel. 2003. *CATAALYST: Towards scientific studies of the strategic integration of learning theory and classroom network technology to improve teaching and learning*. Menlo Park, CA: SRI International.

Ryan, G.W. & H.R. Bernard. 2000. "Data Management and Analysis Methods." In *Handbook of Qualitative Research, 2<sup>nd</sup> Ed.* N.K. Denzin & Y.S. Lincoln, Eds. Thousand Oaks, CA: Sage.

Trees, A. and M. 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: 21-40.

## **Appendix A – Sample Survey Questions**

---

How do you feel about answering questions using clickers in this class?

- A) I love it
- B) I like it
- C) I am neutral
- D) I dislike it somewhat
- E) I dislike it a lot

Had you used any type of clickers before this class (in another class or in high school)?

- A) Yes
- B) No

How has the use of clickers affected your **attendance** in this class?

- A) Strong positive effect on attendance
- B) Somewhat positive effect on attendance
- C) No effect on attendance
- D) Negative effect on attendance

I have met people in this class because we are encouraged to interact during ConcepTests and I would feel comfortable going to him/her/them if I missed a day and needed class notes.

- A) Strongly agree
- B) Agree
- C) Neutral
- D) Disagree
- E) Strongly disagree

Do you usually talk with or get help from another student during ConcepTests in this class?

- A) Regularly
- B) Sometimes
- C) Infrequently
- D) No

When IR clickers are used in this class, how comfortable do you feel when exchanging ideas with another student?

- A) Very comfortable
- B) Somewhat comfortable
- C) Neither comfortable nor uncomfortable
- D) Somewhat uncomfortable
- E) Very uncomfortable

Do you own a cell phone?

- A) Yes
- B) No

Do you own an IPOD/MP3 player?

- A) Yes
- B) No

Do you feel interested or excited when answering ConcepTests in this class?

- A) Very often
- B) Somewhat often
- C) Not very often
- D) Never

Do you feel nervous or anxious when answering ConcepTests in this class?

- A) Very often

- B) Somewhat often
- C) Not very often
- D) Never

Do you feel disinterested or bored when answering ConcepTests in this class?

- A) Very often
- B) Somewhat often
- C) Not very often
- D) Never

How often do you read the assigned material before you come to this class?

- A) Very often
- B) Somewhat often
- C) Not very often

Do you think that this classroom seems impersonal due to the size of the class?

- A) Often
- B) Sometimes
- C) No

Is using clickers in this class sometimes fun or rewarding?

- A) Yes, often
- B) Yes, sometimes
- C) No, not really

## **Appendix B - Interview Guiding Questions**

---

### **Exploring Effects of Clicker Technology For Undergraduate Learning in Large Sociology Classrooms**

**St. Name:** \_\_\_\_\_ **Int. Pseudonym:** \_\_\_\_\_

*Brief introduction to qualitative interviewing:* more like a conversation than an interview;  
no right or wrong answers; looking for detail and their insights into this topic.  
- *introduce IPOD recording system, test for functioning*

#### **I. Introduction, general student background (~5 minutes)**

To begin, I would like to start by talking a little bit about your impressions of college life.

- Would you say that going to college is a privilege or a right? Why?

- What do you think you are supposed to learn about yourself during your college years?

## II. Student social interaction as experienced in Sex, Gender, and Society (~5 minutes)

Ok, now let's move on to talking specifically about clickers. As a student myself, I am interested in the social relationships that students sometimes form in their classes.

- What was it like to use clickers in Sex, Gender, and Society?  
**Probe:** Can you walk me through, step-by-step, what typically happens when you used your clicker to answer a question in this class?
- When we were NOT answering reading questions, did you usually talk with another student during the clicker questions in Sex, Gender, and Society?  
**If not:** Why do you think you did not talk with others during this time?  
**Probe:** Who? Women or men or both? (or: Girls or guys or both?)  
**Probe:** Did you sit with this same group of students regularly?
- Would you say that you gained a better understanding sex and gender concepts because of using clickers over the course of the semester in this class? **Probe:** Why? Or, why not?

## III. Using clickers in the classroom (~ 10 minutes)

Next, I would like to get your feedback on how using clickers in Sex, Gender, and Society affected your learning experience.

- Do you think that using clickers in this class was beneficial to your learning?  
Why, or why not?
- Do you feel that the use of clickers and clicker questions helped you to be better prepared for the exams? Why, or why not?
- Was there anything about using clickers in this class that you disliked?
- Did you dislike using clickers for any other reasons, besides the reason/s that you just described?
- Did you like using clickers in this class? If so, why?
- Do you have any suggestions on how clickers might be used more effectively in Sex, Gender, and Society?

## V. The impact of time upon clicker-induced social interaction (~ 5 minutes)

Observing students use clickers in your class has led me to consider how much impact time may have upon students when they answer clicker questions. Tell me,

- Did you usually have enough time to answer clicker questions in this class?  
**Probe:** How often would you say that you run out of time?
- Was it ever difficult for you to sit and pay attention in this class?  
**Probe:** Why, or why not?
- What do you think of the idea that clicker questions can be used to “break up a lecture” into smaller, more manageable pieces?  
**For clarification, if they ask for it:** Could clicker questions make sitting through the lectures more manageable by “breaking up lecture” with activity?

#### **VI. Gender** (~ 5 minutes)

I am also interested in hearing about how it might be different to experience clickers and clicker questions depending upon whether you are a guy or girl. Tell me,

- Do you feel that there are differences between how guys and girls experience using clickers Sex, Gender, and Society?
- Do you feel that the gendered clicker questions were helpful to learning?  
**Show them the examples of gendered clicker questions.**  
**Probe:** Why or why not?
- If you came to class one day, and had to sit alone, and then wanted to turn and ask a fellow student sitting near you about one of the clicker questions, do you think it would be easier to ask a girl, a guy, or just as easy to ask a person of either gender?

#### **VIII. Student emotions** (~ 5 minutes)

I am also interested in the emotions that students might feel in the classroom, because I don't think that people very often think of the idea that students might be dealing with feelings or emotions as they are trying to learn. Tell me,

- Did you experience emotions when using clickers in Sex, Gender, and Society?  
**Probe:** What emotions or feelings did you feel?
- Did you experience anxiety or frustration when using clickers in this class?  
**Probe:** Can you tell me a little more about that?
- Is using clickers to answer questions sometimes fun or rewarding?

#### **IX. Usefulness of Specific Types of Clicker Questions** (~ 5 minutes)

- What do you think was the purpose of using **reading quiz questions** in Sex, Gender, and Society?

- Do you feel that the **reading quiz questions** were beneficial to learning?
- What do you think was the purpose of using **past experience questions** in Sex, Gender, and Society? **Show them an example of this type of question.**
- Do you feel that past experience questions were beneficial to learning? How?
- What about **critical thinking questions**... what do you think the purpose of using these types of questions was? **Show them an example.**
- Do you think that these types of questions were beneficial to learning? How?
- What was it like to see the graphs of other student's answers when you were using clickers in Sex, Gender, and Society?
- Do you feel that seeing these graphs of student data could be beneficial to learning sociology concepts? If so, how?  
(privilege, opinions, testing research trends in real life)
- Overall, what do you think about the method that Dr. Mollborn is using in this class with clickers? Dr. Mollborn uses different types of clicker questions for different learning purposes... in your opinion, does this model work? Is it beneficial to learning?

## X. Conclusion

- Is there anything else about using clickers that you feel we should talk about, that we have not yet covered?
- Overall, do you feel that the use of clickers in this class increased your motivation or desire to learn the course material?

Thank the student for his or her time! ☺