

The Use of the Clickers and Electronic Flashcards on the iPhone/ iPod Touch in a Chemistry Classroom

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This mobile learning fellowship studied two potential uses of the iPhone/ iPod Touch. The first was using the iPhone/ iPod Touch as a student handheld response system. The second was as a device to provide ready-made flashcards. Student handheld response systems (clickers) in various forms have been used in classrooms in an effort to increase student participation and learning. One of the issues with this technology is that there are many different clickers that are often used in various classes. This requires the students to carry and keep up with many devices. An integrated technology such as the iPhone/ iPod Touch allows a more technology to be used across campus. This clicker study was a follow-up to two previous studies, which examined the use of clickers in the chemistry classroom. This study focused on the use of the iPhone/ iPod Touch as a clicker using TurningPoint ResponseWare and the effect on student achievement and study time. The study was conducted in two sections of university level introductory chemistry courses where one section served as a control and the other was treated. The study design was quasi-experimental using switching treatments with replication. Student pre- and post- attitudinal surveys were administered to all students in both sections. The students' university grade point average and ACT scores were examined to determine the equivalency of the groups. The quiz and exam scores were analyzed to determine if there was a significant difference in achievement. The quiz and exam scores showed no significant difference in achievement between the control and experimental groups. Students self-reported that the clickers helped them learn the material, however there was no significant change in study time.

This study also employed another tool available on the iPhone/ iPod Touch: Emantras ACUmindwire, which gives the students to opportunity to download pre-made flashcards to use as a study tool for the course. The instructor created approximately

450 flashcards covering a first semester review and 11 chapters. The students were asked to self-report on electronic flashcard use. Twenty-seven percent of the students reported using the provided Emantras ACUMindwire flashcards when studying for quizzes and 49% used the provided flashcards when studying for exams. There was no significant difference in ACT scores, GPA, and exam study time between those students who used the flashcards and those who did not. Students who reported using the Emantras ACUMindwire flashcards showed statistically significant increase of 8% increase on the written part of the exams and 3% increase on quiz scores.

Hypothesis

The use of the iPhone/ iPod touch as a clicker in the classroom via TurningPoint ResponseWare and as study tool via Emantras ACUmindwire will increase active student participation in the learning process and overall achievement in Introduction to Organic and Biological Chemistry.

Methods

Participants

The participants of this study were students enrolled in two sections of Introduction to Organic and Biological Chemistry (OBC), Chem 114, at a faith based private university. There were 34 students in the 8 AM section and 33 students in the 9AM section. OBC fulfills degree requirements for nursing, agricultural science, nutrition, and exercise science majors. This does not fulfill the degree requirements for science majors. The F-test on the students' ACT math scores, ACT comprehensive scores, and grade point average were used to determine the homogeneity of variance between the two sections. For all three, the two groups have equality of variance, ACT math scores: $F(31,29)=1.36$, $p=0.20$; ACT comprehensive scores: $F(31, 29)=1.09$, $p=0.40$; and GPA: $F(32, 32)=1.40$, $p=0.17$ (Table 1).

Instruments

Concept and short answer questions created by the instructor were asked during classroom lectures using clickers to check the students' understanding. The question

types used were multiple choice, true-false, and molecule naming questions similar to the questions that would be asked on the exams. The instructor created four hundred fifty nine flashcards covering both theory and naming questions which students could download to their mobile device. Weekly paper-and-pencil quizzes and exams created by the instructor were used to assess the students' understanding of material covered. Scheduled exams consisted of two parts: a multiple choice section covering mainly theory questions and a written section covering molecule naming and reaction completion questions. Every quiz ended with a one question survey about flashcard use. Exams contained a survey of study time and flashcard use. An opinion survey created by the researchers was administered at the beginning of class and again at the end of class.

Procedure

The quasi-experimental design used switching treatments with replication in two sections of OBC. This class is taught each spring covering the same material using the traditional lecture method. Both sections were presented the same content, by the same instructor. At the beginning of the semester the students were asked to sign an informed consent form followed by the opinion survey. In the experimental section the students answered theory questions in the form of multiple choice, true-false, and ranking questions using the clickers. The students also answered some molecule naming questions using the clickers. The clicker questions were worth 5% of the students' overall grade. The control section was not asked theory questions in class. Both classes received the same information and did in-class paper and pencil practice problems. The first page of the exam contained a survey that asked the student to select a range of time in which the student studied for the exam. The 9 AM section, 33 students, served as the experimental group for exams 1 and 2 and was asked theory questions using clickers with the 8 AM section serving as the control. The 8 AM section, 34 students, was the experimental section when covering the material for Exam 2 and 4 with the 9 AM being the control. The means were then compared between the experimental and control groups on all four exams and twelve quizzes to determine whether there was any significant difference between in the learning of the groups. The mean study time for the groups was also compared. At the end of the semester the

students were asked to complete another opinion survey similar to the pre-survey but worded to reflect this specific course.

In the flashcard portion of the study, the students chose to join the experimental group by self-reporting the use of the prepared flashcards. Twenty-seven percent of the students reported using the flashcards to study for quizzes, while 49% of the students reported using the flashcards before exams. The means and study time were compared between the groups on all exams and quizzes to determine if there was a significant difference in the learning of the groups.

Results

Clicker Use

The total score from the four 60-point exams and twelve 10-point quizzes were analyzed in addition to the multiple choice and written portions of each exam. Survey data was collected at the beginning and end of the semester. The means from the four exams were compared using the t-Test. Although the experimental group had a higher average on the multiple choice portion of the exams, the control group had a slightly higher average on the exam total. There was not enough difference for either to be statistically significant ($p < .05$). (Tables 2 and 3). When t-Test was performed on individual exams, it was found that the 9 AM section performed better on every exam, but the difference was only statistically significant ($p = 0.05$) on the comprehensive final when the sections had received equal treatment (Table 4).

The means on exams can be misleading because of students who score significantly higher or lower than mean can influence the mean one direction or another. Therefore the grade distribution on exams was examined. There was little change in grade distribution between control and experimental, with the experimental sections running a slightly lower grade distribution than the control (Fig. 1)

The effect on quizzes was also examined. Overall for quizzes the experimental group performed slightly worse than the control, an average of 7.9 versus 8.1 out of 10, respectively, but not statistically significant. The quizzes were examined in sets that were given in preparation for each exam, of these only on the quizzes in preparation for exam 3 did the experimental group performed better than the control, but the difference

was no statistically significant. In the quizzes prior to the second exam there was a statistically significant difference, in which the control group outperformed the experimental (Table 5).

In previous studies, students reported in opinion surveys that they learned more in class when clickers were used. The first page of each exam contained a survey that asked the students to report the amount of time they studied for the exam. The instructor explained to the students that their reported study time would not have an effect on their grade and that the instructor would not look at the survey until after the exams were graded and returned. The study times for the experimental and control groups were nearly identical, 3.96 hours and 4.03 hours, respectively.

Opinion questionnaires were administered at the beginning and end of the semester (appendix A). On the first question of the pre-study survey students indicated if they had any previous experience with clickers in any classes. Of those 19% (13) of the students indicated the clickers were used regularly or every day. On the post survey the second question asked "2. Using the clickers in class helped me learn the material more effectively." had 50 (85%) of the students responding positively with 27% strongly agreeing with the statement. Seven questions of the post-survey corresponded clicker use questions on the pre- surveys. There was a general increase in the positive response from the pre- to the post-survey. Question 3 which asked if students felt they learned more if they were required to answer questions or work problems in class remained about the same 58 (89%) positive to 56 (92%) positive, which shows consistency between the two surveys. On Question 4, fifty-eight percent of the students indicated they learned more from immediate feedback on the pre-survey while 90% gave a positive response on the post-survey. The percentage of students who felt they participated in class increased from 61% participation to 84%. In the pre-study survey, 57% percent of the students felt that they would participate more if they were given time to think. In the post-study survey, 90% responded that clickers gave the students more time to think and allowed them to participate more fully in class. The number of positive responses on whether the student would like other courses that use technology increased from 65% to 84%, and the percent which expressed strong agreement went from 9% to 17%. At the beginning of the study, there were only a few students (15%)

that did not feel comfortable with technology which decreased to 5% who were not comfortable using clickers by the end of the study. Very few students found technology a distraction in class on the pre-survey (24%), while even less found the clickers a distraction on the post-survey (7%). In the pre-study survey, 68% agreed that the amount of time they study depends on how much they learned in class. Twenty-eight percent of the students reported that they did not need to study as much for exams when clickers were used. See appendix B for complete results.

Supplied Electronic Flashcard Use

The instructor provided 459 flashcards in a total of 14 stacks which covered 11 chapters and a review of general chemistry concepts. Twenty-seven percent of the students report using the flashcards to study for quizzes while 49% report using the provided flashcards to study for exams. On quizzes, students who studied with flashcards on quiz scores had a higher quiz score average of 8.2 versus 7.9 did not use flashcards. The difference was not statistically significant at the 0.05 level. On the written portion of the exam students who used flashcards had statistically significant higher ($p= 0.02$) average of 26.8 versus 23.9. On the multiple choice section, the control group had a statistically significant ($p=0.04$) higher score. On the overall total, the flashcard users had a higher average, but not statistically significant ($p=0.16$) (Table 6). There is no correlation between ACT score or GPA and students who chose to use the flashcards. There was also no significant difference in study time between the groups.

The pre- and post-study surveys contained questions that addressed the study habits and flashcard use of the students. The most common techniques students used to study were reading the notes and working problems. The tools used by students to study were summarized in Table 7. The students were asked a second time in the Likert portion of the survey about flashcard use. In the pre-study survey, 83% reported that they used flashcards to study. In the post-study survey, 66% reported that they learned more in the class when they used the provided iPhone/ iPod Touch flashcards. This contradicts the 37% of students who reported use of pre-made flashcards to study for science exams.

Discussion

Clicker Use

The clicker portion of this study was a follow up to studies performed the Fall 2006 in the Introduction to General chemistry, the pre-requisite course to OBC, and Spring 2008 in OBC. In the first study it was hypothesized that using clickers in the classroom improved achievement because it gave the students immediate feedback on the material being covered in the class and allowed all students to actively participate. Since no significant difference was found in the student's scores on the quizzes and exams between the experimental and control groups, it was hypothesized that difference was due to teachers changing the instructional method due to the clickers rather than the clickers themselves. The design of the second study was to determine if the need for teachers to change their teaching style to incorporate the clickers caused the improvement in student performance, not the use of clickers themselves.

In the first study a concerted effort was made to have the only difference between the control and experimental groups to be the use of the clickers to provide immediate feedback. The same questions were asked and the same in class problems were worked in both sections, but the students were asked to respond with clickers in the experimental section while in the control section they responded by raising their hand or being called on. In the second study, different questions were asked in a different style in the experimental class. Both sections were asked to work in class paper and pencil problems, but only the experimental section was asked multiple choice, true-false, and ranking concept questions similar to those that would appear on a section of each exam.

Despite asking different types of questions during different times of the lecture in the experimental section, this study did not find any significant improvement in student performance due to the teacher changing the teaching method by including the concept questions and the clickers. The second study found there were no significant gains in student scores on exams and quizzes when students were asked concept questions administered using the clickers during the lecture and for review. Since the means were

so close on the exams it would appear that there was no harm in student achievement. However, the quiz score results showed that the control group did better on the quizzes than the experimental group on seven of the eleven quizzes and the overall average was lower for the experimental group. The unexpected and mixed results may have been due to the students typically preparing less for shorter assessments and possibly the experimental group felt more prepared since they had had the concept type questions in class but as part of normal class procedure instead of concept questions the quizzes were composed of naming molecules, completing reactions, and problems. While the exams included both concept questions and problem, if the students felt they had learned more during class, they may have spent less time studying for exams, negating the effect of the clickers. Therefore, this third study attempted to address the students' study time in response to clicker use.

The experimental group was presented multiple choice, true-false, and naming questions. Unlike previous studies, these questions were worth a small percentage (5%) of the students overall grade. Achievement on exams again was similar for the control (48.06) and experimental (47.81), with the control group achieving slightly higher, but not significantly so, on exams. On quizzes the control group (8.11) also performed slightly better than the experimental group (7.87). Although there is no apparent gain using the concept questions during instruction the students felt they had learned more when the questions administered with the clickers were used. While the students appear to feel that they are learning more and said in the pre-study survey that they study less when they learn more in class, in the post-study survey they reported that they did not study less when they used clickers. This was confirmed by the total amount of study time reported by the groups.

Another factor influencing the results of this study may be the difference in the classes. Based on the homogeneity of variance of the ACT and GPA scores for both classes, the two sections appeared similar. However, the 9 AM section outperformed the 8 AM section on every measure except for the quizzes before Exam I, when the 8 AM section was the control. On the comprehensive final, for which both sections had the same treatment, the 9 AM section score (51.2) was statically significantly ($p = 0.05$) higher than the 8 AM section (47.8). One influence on this difference in score, however,

was that the 8 AM section took their final a day later than the 9 AM section on the last day of finals week.

The use of the technology in the classroom seemed to reduce the anxiety about the use of technology in the classroom but most students were initially comfortable with and prefer classes that use technology. The greatest change from the pre- to post-surveys was in the areas of immediate feedback and participation. This is what was studied in the first study but no significant difference was found but students seem to feel that immediate feedback helps, a change of 32%, and that the technology helps them to participate more in class, a change of 23%. Of course self reported data might change as clickers become more common in the classroom. Now that the university has provided iPhones/ iPod Touches to all students, clickers through the iDevices will be readily available to all teachers and hassles of passing out and collecting equipment will be reduced.

The uses and benefits for incorporating handheld response systems into the classroom continue to be a topic of much debate and research. With the changing demographics and openness to different learning styles occurring in college classrooms, teachers are challenged to diversify their teaching methods. Therefore, there is a need to determine the true benefits of using the clickers for student learning. Some specific areas for further research include the use of clickers with differing teaching styles and in different subject areas, the effect of using the technology with students who have differing technology skills, and the difference in grade levels such as high school students as opposed to the college students used in this study. A study over a longer period of time might demonstrate the effectiveness of the technology. Although no significant difference was found on the exams, the positive response from the students and the instructor's observation that there was more student participation and response, the instructor plans to continue to use the clickers when the technology is available.

Supplied Electronic Flashcard Use

The use of flashcards is not a new technique for studying. While in many classes, especially those that require a fair amount of memorization, this is a tried and

true technique, it is often difficult to convince students that they need to make and use flashcards. Of the students in the two sections of OBC, 53% reported that they had used flashcards to study. In this course, 49% reported using the provided electronic flashcards to study for exams and 23% reported using the flashcards to study for quizzes. Students who used the flashcards had a statistically significant increase in scores on the written part of the exam. There was no correlation between ACT score or GPA and the use of flashcards. Therefore, this increase was not an artifact of better students choosing to use the flashcards. There was also no change in the amount of study time on exam when students used the flashcards, indicating that the increase was not due to students studying more.

While it is the belief of the instructor that it is ideal for students to make their own flashcards, “cards” that can be delivered to a mobile device can have a distinct advantage in that students generally have their phones and to a lesser extent iPods with them. This allows students to have something with them to study when they are waiting between classes, in line, or even in the drive-through.

Tables and Figures

Table 1 *F test to show the equivalence of the two sections*

Standard Measure	Section	Mean	df	F value	F critical	<i>p</i>
ACT Math	8	22.2	31	1.36	1.83	0.20
	9	22.5	29			
ACT Composite	8	23.2	31	1.09	1.83	0.40
	9	23.6	29			
GPA	8	3.32	32	1.40	1.80	0.17
	9	3.24	32			

Table 2 *Comparison of the scores of the multiple choice portion of the four exams using the t-Test*

	<i>Experimental</i>	<i>Control</i>
Mean	22.7	22.6
N	134	131
<i>p</i>	0.85	

Table 3 *Comparison of the scores of the total scores of the four exams using the t-Test*

	<i>Experimental</i>	<i>Control</i>
Mean	47.84	48.06
N	134	131
<i>p</i>	0.82	

Table 4 *Comparison of the experimental and control groups on all four exams and the comprehensive exam using the t-Test*

Exam	Group	Section	Mean ^a	<i>p</i>
1	Control	8	52.1	0.18
	Experimental	9	53.7	
2	Control	9	50.5	0.06
	Experimental	8	46.9	
3	Control	8	47.0	0.17
	Experimental	9	49.2	
4	Control	9	42.6	0.68
	Experimental	8	41.7	
Comprehensive		8	47.8	0.05
		9	51.2	

^a all exams were out of 60 points

Table 5 *The combined experimental and control quizzes for the entire semester and the combined quizzes for each exam compared using the t-Test*

Combined Quizzes	Group	Section	Mean ^a	<i>p</i>
All	Control	NA	8.11	0.10
	Experimental	NA	7.87	
Prior to Exam 1	Control	8	8.98	0.60
	Experimental	9	8.88	
Prior to Exam 2	Control	9	7.97	0.00
	Experimental	8	7.08	
Prior to Exam 3	Control	8	7.07	0.12
	Experimental	9	7.58	
Prior to Exam 4	Control	9	7.98	0.13
	Experimental	8	7.35	

^a All quizzes were out of 10 points.

Table 6 *Comparison of the experimental and control quiz scores for the entire semester, each section of the four exams, and the overall exam scores using the t-Test*

Score type	Group	Mean	<i>p</i>
Quizzes	Control	7.9	0.10
	Experimental	8.2	
Multiple choice on all exams	Control	23.5	0.04
	Experimental	21.7	
Written on all exams	Control	23.9	0.02
	Experimental	26.8	
Total score on all exams	Control	47.2	0.16
	Experimental	48.7	

Table 7 *Reported study techniques. In the pre- and post-study survey, students were asked “which study techniques do you generally use when preparing for a science exam?”*

Study Technique	Percentage in pre-study survey	Percentage in post-study survey
Read the notes	97	94
Read the textbook	72	47
Ask questions with a fellow student	43	40
Make and use flashcards	55	32
Use pre-made flashcards	NA	37
Work problems	90	74
Retype/ rewrite notes	34	31
Others	9	16

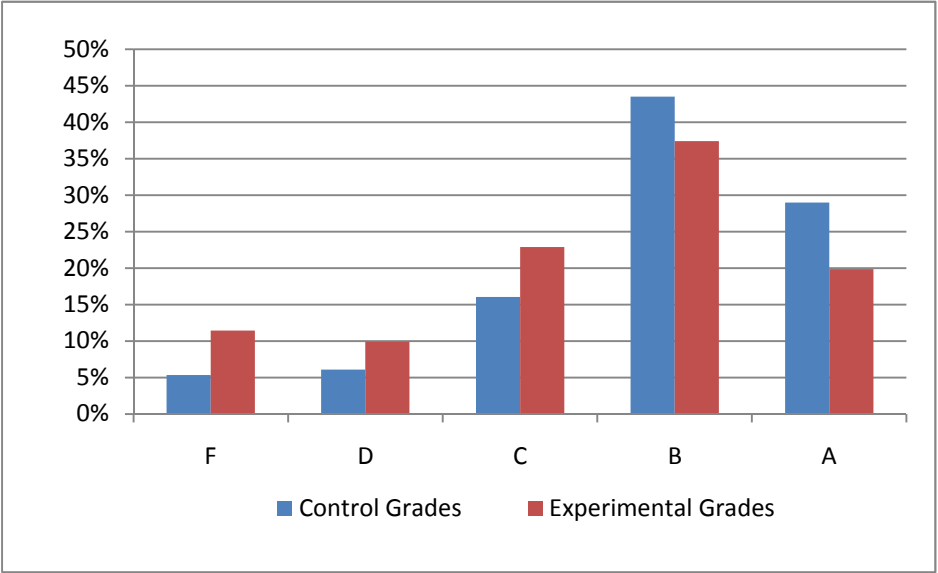


Fig. 1: Grade distribution of grades on all exam of control (blue) and experimental (red) groups.

Appendix A

Improving Student Achievement Using Clicker Questioning in Class
Pre-Study Student Survey

Name _____

Your name will only be used to match your survey with the other data collected. Only the instructor will have the identifying information. No identifying information will be used in the data analysis or publication of results.

1. a. Have you ever used clickers before this class?
Yes No

If yes,

b. How often were the clickers used in the class?

seldom

occasionally

regularly

every class meeting

c. Rate the effectiveness in increasing your performance in the class on a scale of 1 to 5, 5 being very effective. Circle the number that best indicates the effectiveness

.....1.....2.....3.....4.....5
Not Effective Effective

2. Which study techniques do you generally use when preparing for a science exam? (Mark all that apply.)

- _____ Read the notes
- _____ Read the textbook
- _____ Ask questions with a fellow student
- _____ Make and use flashcards
- _____ Work problems
- _____ Retype/rewrite my notes
- _____ Other (describe _____)

Definitions: clickers – any electronic device used in an instruction setting that provides the instructor immediate information about student knowledge or understanding during instruction. This could include student handheld response systems, audience response systems, PDA or computers.

Technology – this includes computers, smart classrooms, SmartBoard (interactive boards), Blackboard, and digital tablets.

Improving Student Achievement Using Clicker Questioning in Class
Pre-Study Student Survey

Name _____

Indicate your degree of agreement with each of the following statements by marking an "X" in the appropriate column.

	Strong agree	Agree	Disagree	Strongly disagree
3. I tend to learn more when I am required to work problems or answers questions in class.				
4. I tend to learn more I if find out the correct answer immediately.				
5. I seldom participate in class unless called on by the instructor.				
6. I would participate more in class if I had more time to think about the answer.				
7. The amount of time I study depends on how much I have learned in class.				
8. I prefer courses that use technology during class to aid students in learning the course material.				
9. I am not comfortable with technology.				
10. I find using technology during class a distraction when trying to learn course material.				
11. I have studied for classes using flashcards (electronic or paper).				

Improving Student Achievement Using Clicker Questioning in Class
Post-Study Student Survey

Name _____

Your name will only be used to match your survey with the other data collected. Only the instructor will have the identifying information. No identifying information will be used in the data analysis or publication of results.

1. Which study techniques do you generally use when preparing for a science exam? (Mark all that apply)

- Read the notes
- Read the textbook
- Ask questions with a fellow student
- Make and use flashcards
- Use pre-made flashcards
- Work problems
- Retype/rewrite my notes
- Other (describe _____)

Definitions: clickers – any electronic device used in an instruction setting that provides the instructor immediate information about student knowledge or understanding during instruction. This could include student handheld response systems, audience response systems, PDA or computers.

Technology – this includes computers, smart classrooms, SmartBoard (interactive boards), Blackboard, and digital tablets.

Improving Student Achievement Using Clicker Questioning in Class
Post-Study Student Survey

Name _____

Indicate your degree of agreement with each of the following statements by marking an "X" in the appropriate column.

	Strong agree	Agree	Disagree	Strongly disagree
2. Using the clickers in class helped me learn the material more effectively.				
3. I tend to learn more when I am required to work problems or answers questions during class.				
4. I learned more in class because if I found out the correct answer to problems and questions immediately.				
5. The clickers did not increase my participation in class.				
6. Using clickers during class allowed me time to think about the answer and participate more fully in class.				
7. When clickers were used in class I did NOT need to study as much for the exams.				
8. I would prefer other courses use the clickers or other technology to aid students in learning during class.				
9. I was not comfortable using the clickers in class.				
10. The clickers were a distraction in this course.				
11. I learned more in this class when I studied using the provided iPhone/iPod Touch flashcards.				

Appendix B

Table B.1
Student response to the pre-study attitudinal survey

Question	N	Percent and Number			
		Strongly Agree	Agree	Disagree	Strongly Disagree
3. I tend to learn more when I am required to work problems or answers questions in class.	65	42%	48%	11%	0%
		27	31	7	0
4. I tend to learn more if I find out the correct answer immediately	65	20%	38%	40%	2%
		13	25	26	1
5. I seldom participate in class unless called on by the instructor.	66	5%	35%	55%	6%
		3	23	36	4
6. I would participate more in class if I had more time to think about the answer.	65	9%	48%	43%	0%
		6	31	28	0
7. The amount of time I study depends on how much I have learned in class.	66	14%	55%	30%	2%
		9	36	20	1
8. I prefer courses that use technology during class to aid students in learning course material.	64	11%	55%	31%	3%
		7	35	20	2
9. I am not comfortable with technology.	66	8%	8%	55%	30%
		5	5	36	20
10. I find using technology during class a distraction when trying to learn course material.	66	3%	21%	59%	17%
		2	14	39	11
11. I have studied for classes using flash cards (electronic or paper.)	66	44%	39%	12%	5%
		29	26	8	3

Table B.2

Student response to the post-study attitudinal survey

Question	N	Percent and Number			
		Strongly Agree	Agree	Disagree	Strongly Disagree
2. Using clickers in class helped me learn the material more effectively.	61	26%	59%	15%	0%
		16	36	9	0
3. I tend to learn more when I am required to work problems or answers questions in class.	61	46%	46%	8%	0%
		28	28	5	0
4. I learned more in class because if I found out the correct answer to problems and questions immediately.	61	41%	49%	10%	0%
		25	30	6	0
5. The clickers did not increase my participation in class.	61	0%	16%	61%	23%
		0	10	37	14
6. Using clickers during class allowed me time to think about the answer and participate more fully in class.	61	25%	66%	8%	2%
		15	40	5	1
7. When clickers were used in class I did NOT need to study as much for the exams.	61	2%	26%	57%	15%
		1	16	35	9
8. I would prefer other courses use the clickers or other technology to aid students in learning during class.	61	28%	56%	16%	0%
		17	34	10	0
9. I am not comfortable using the clickers in class.	61	0%	5%	52%	43%
		0	3	32	26
10. The clickers were a distraction in this course.	61	2%	5%	52%	41%
		1	3	32	25
11. I learned more in this class when I studied using the provided iPhone/iPod Touch flashcards.	61	16%	49%	25%	10%
		10	30	15	6

Table B.3

Student response to exam preparation techniques on post-study survey

Technique	Percent and number using the technique	
	Pre-study	Post-study
Read Notes	97%	94%
	65	58
Read the textbook	73%	47%
	49	29
Ask questions with a fellow student	43%	40%
	29	25
Make use Flashcards	55%	32%
	37	20
Use Pre-made flashcards	Not ask	37%
		23
Work Problems	90%	74%
	60	46
Retype/rewrite my notes	34%	31%
	23	19
Other	9%	16%
	6	10

Table B.4

Student response to prior clicker use on pre-study survey

	Number and percent of students responding				
Students having prior use	29				
	43%				
		Seldom	Occasionally	Regularly	Every class
How often were clickers used?		28%	28%	34%	10%
		8	8	10	3
	Not effective 1	2	3	4	Effective 5
Rate the effectiveness in increasing performance	7%	24%	17%	38%	14%
	2	7	5	11	4