

Technology in the Classroom: A brief analysis of a core course at West Point

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This paper was completed and submitted in partial fulfillment of the Master Teacher Program, a 2-year faculty professional development program conducted by the Center for Teaching Excellence, United States Military Academy, West Point, NY, 2007.

ABSTRACT: This paper addresses the use of technology in one of the core courses at the United States Military Academy, SS201/SS251 - Introduction to Economics, and how the use of a new technology known as Aplia, online based economics courseware, affected the students' performance in the course. *Specifically I will address how using online testing combined with hard copy testing affected student grades.*

While I believe that technology as a whole enhances education, I believe that if not used properly, its benefits will not be fully realized. My hypothesis in writing this paper is that combining on-line testing with hard copy testing on the same exam will yield inferior results than you would see with an all hard copy test, specifically in the Introduction to Economics Course. I used data from 4 semesters of testing with data from over 2100 tests to yield my results.

The end result supported my initial overall hypothesis, and for follow on research I would like to look at data for the homework portion of the course, which was based on the Aplia software, and relate it to test scores.

Technology in the Classroom: Is it worth it?

Several groups have reviewed the literature on technology and learning and concluded that it has great potential to enhance student achievement and teacher learning, but only if it is used appropriately. (Cognition and Technology Group at Vanderbilt, 1996) 206 CITE

Technology has caused controversy throughout history and that controversy will continue to exist as new technologies bring new reasons for resistance. The Luddites in England in the 1600s, were factory workers who attacked a factory destroying equipment in response to the industrial machines "taking away" their jobs. This example of the frustration caused by the technology replacing humans causing resistance became known as the Luddite Fallacy and is used in economics classes today. It is a fallacy because their suggestion that they would be worse off with the new technology was actually

unfounded. With the advent of technology, more things could have been produced and more jobs could be created as a result of that technology. Therefore in the end, as we see today, people are better off because of technological advances. Yet, today in the classroom, there are teachers who still continue to fight innovation and technology arguing that it takes away from the personalization of the education process. Some even go as far as to write about how detrimental technology is to teaching. In an article in 2005, Patrick Allitt, a professor of history and director of the Center for Teaching and Curriculum at Emory University wrote “Experiment with a no-Web, no-e-mail semester. You’ll love it, and your dean will love you.”¹ The point I think we’re missing here is that the job of the instructor should not be to try to get the dean to love you, but instead to try to educate students in an effective way that hopefully results in **them** appreciating you, not your dean.

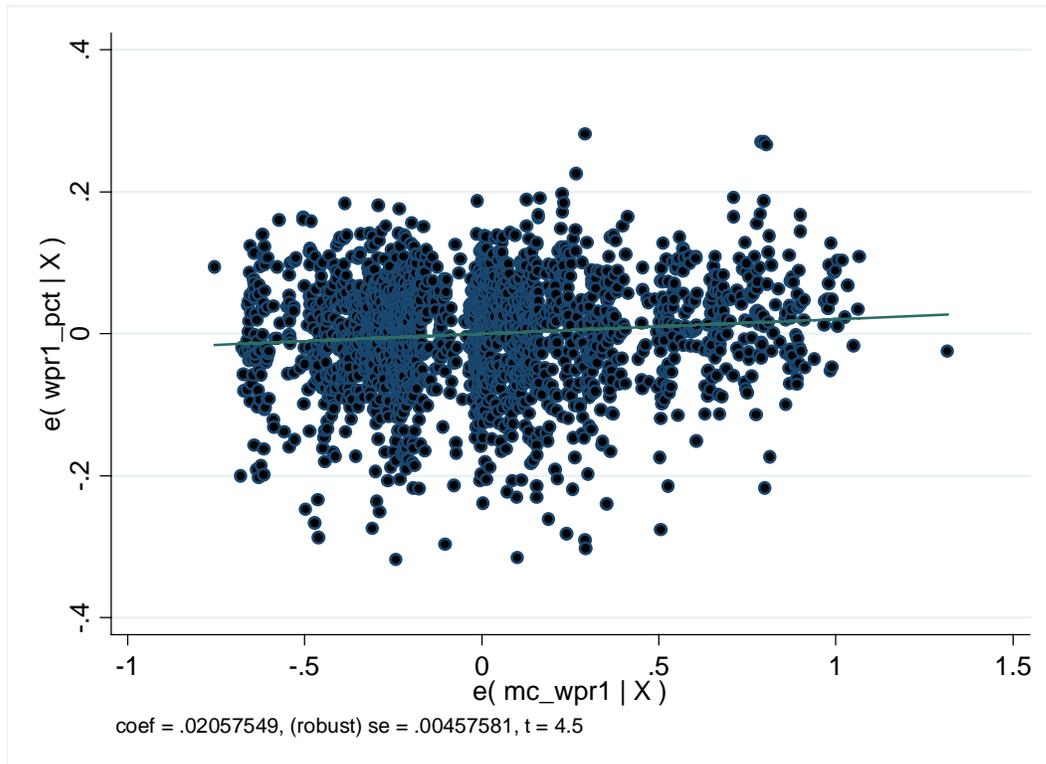
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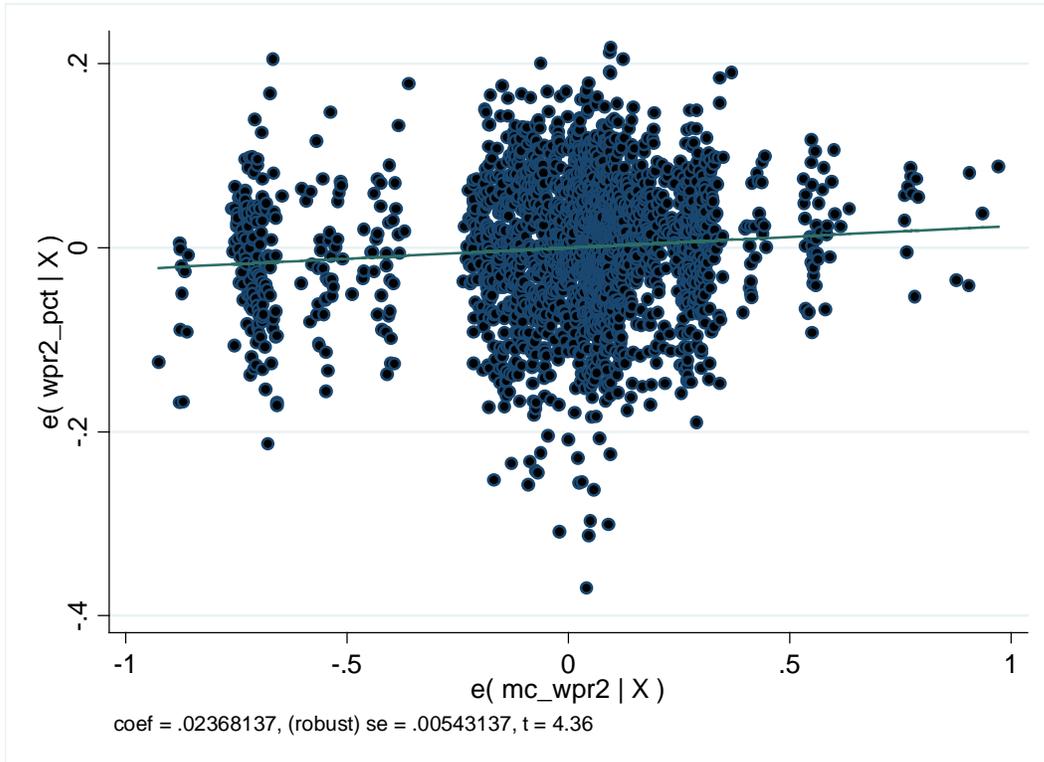
¹ Allitt, Patrick, Professors, Stop Your Microchips, The Chronicle of Higher Education, Vol 51, Issue 42, p. B38

For the core Economics course, we have two major graded exams worth 125 points each and two smaller exams worth 50 points each out of a 1000 point course. For the two major graded exams, we previously had students take the multiple choice portion of the course on-line using the Aplia software. This portion of the test was worth 50 points (40%), out of a possible 125 points. During the test, some of the students were unable to log on to take the on-line portion of the test, and fortunately we had a contingency plan for this. Our plan involved providing hard copy multiple choice questions for those who could not get online for the test. Reasons for students not being able to get online varied from batteries dying on laptops and not having a power cable to laptops not being properly configured for wireless access.

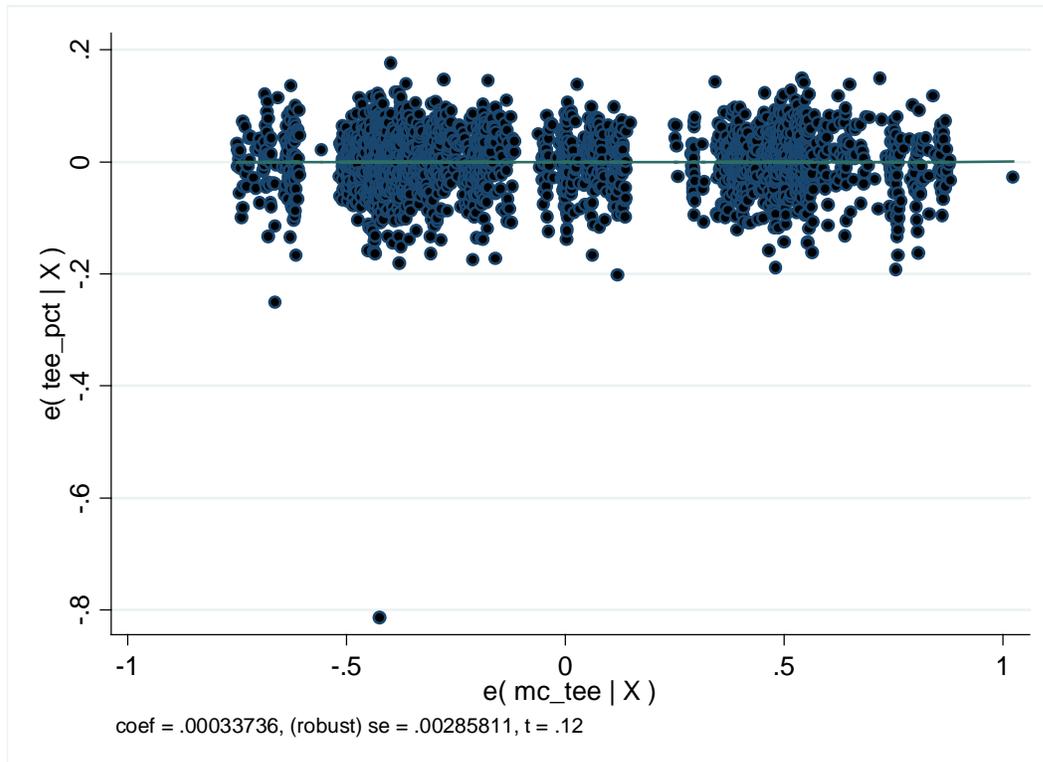
The data below shows the regression data for the percent increase in students' grades as a result of the students taking the test all hardcopy verses combining hardcopy and on-line testing



As you can see, there is a general trend that students who took the test via strictly hardcopy did better than those who used hardcopy in conjunction with on-line testing. Specifically, students who took the test all hardcopy did 2.05% better on WPR1. On WPR2, students did 2.36% better. See graph below.



Finally on the Term End Exam, students' grades were not significantly altered by the combination of on-line and hardcopy testing.



According to the Northwest Educational Technology Consortium, one of the problems discovered when trying to integrate technology in the classroom is that often they lack a component for evaluating the success and effectiveness of the program.² Luckily for our program, the Aplia software made it easy to compile data and look at it to see how its use worked for our students.

In our data, I attribute the increase in scores for hardcopy only tests for WPR1 and WPR2 to the fact that in a 55 minute time period that cadets are given to complete the exam, much of that time was spent going back and forth between on-line multiple choice questions and the hardcopy test. For those students who did solely the hardcopy test, the entire exam was in one place and they could easily refer back to multiple choice questions if they desired. I attribute the insignificant difference between scores for the

² Northwest Educational Technology Consortium, "Challenges to Technology Program Evaluation" June 2007, <http://www.netc.org/planning/eval/index.php>

on-line and hardcopy test to the strictly hardcopy test for the Term End Exam is that in a 3.5 hour time period, cadets have sufficient time to go back and review their answers for the multiple choice questions submitted on-line, if they so choose. They are not constrained to the 55 minute time period that they were during WPR1 and WPR2.

Sparking my interest in researching this was an article we read from the Master's Teacher Program discussing the use of technology in the classroom. While I had been a huge advocate of technology in the classroom prior to reading that article, the article actually made me go back and seriously look at **how** technology was being used in the classroom. What I've concluded as a result is that technology is still a wonderful thing to use in the classroom, but it has to be used correctly and effectively. In the case of what we were doing with our test, technology was good, and it made grading easier, but we weren't using it correctly. It was actually detrimental to the cadets' grades. The content of the test was the same regardless of whether it was on-line or graded, but the results were worse with combining both methods when testing.

According to an article by Arthur Chickering and Zelda Gamson, one of the seven principles for good practice in undergraduate education is encouraging active learning.³ While I believe that we were attempting to do exactly this by getting cadets involved with technology in testing, our approach ended up going against what we desired.

In direct opposition to Mr Allitt mentioned earlier in this paper who wrote about receiving praises from your dean as a result of having a "no-web no-e-mail semester," Carole A. Barone, embraces technology in her article "Technology and the Changing Teaching and Learning Landscape." She explains that in today's classroom, students

³ Chickering, Arthur and Zelda Gamsom, Seven Principles for Good Practice in Undergraduate Education

“expect to try things rather than hear about them.”⁴ So while I’ve critiqued our methods of testing students by showing that the students performed better with the all hardcopy versions of our test, I still support our efforts in trying to incorporate the on-line testing. Because it is the will to try something different that eventually will lead to better teaching methods. Those that choose to hold fast to old “proven” methods often lose their students over time, which to me is a major failure of an educator.

So while the quote below illustrates the discovery that we made with the intro to Economics course, luckily it wasn’t seriously detrimental to the students’ learning. “Technologies do not guarantee effective learning, however. Inappropriate uses of technology can hinder learning.”⁵

I submit that it will be a long time before the arguments over whether technology is helping more than hindering education fade away. Being from the relative “new school” in that the internet was introduced as I was mid-stream through my undergraduate career, I’ve been able to see technology go from relatively non-existent to enabling teachers and students to do a great deal more than in the past.

The article “Professors, stop your microchips” was the classic ‘old school’ professor who is not willing to let go of the past. I sincerely understand his arguments over the drawbacks of technology, but I submit that all of his issues could have been solved if taken on in an proactive way versus a reactive way. For instance, in my economics classes, I tell students that they may not use their laptops for the first five lessons. Many complain at first, but they get over it. By lesson 5, I weed out those who

⁴ Barone, Carole A., Technology and the Changing Teaching and Learning Landscape, AAHEBulletin.com, May 2003

⁵ Allitt, Patrick, Professors, Stop Your Microchips, The Chronicle of Higher Education, Vol 51, Issue 42, p. 206

were just going to use it to surf the internet and keep only those who genuinely use their laptops to take notes. Those who wanted to use their laptops for non-class purposes make the decision to not even waste bringing their laptop to class. It's extra weight that they must carry around. While those who genuinely use their laptops for class will endure the burden of dragging it to class to take notes. Even then there is the risk of the occasional "surfer in class." I solve that problem by randomly stopping class and having everyone put their hands in the air. Then I take a stroll around the classroom to see what is up on everyone's screen. I have yet to catch anyone doing anything that they shouldn't have been doing. I'm sure that most of that can be attributed to the fact that we're at West Point and cadets in general are pretty good at following rules.

As for students contacting you outside of office hours, one of the things that makes a great teacher in my view is being available beyond the normal workday. Now if a student is emailing me at 1:00 a.m. it is probably because I've told him/her that I'm normally up at that time. But disregarding an extreme incident like that, I actually encourage students to contact me at home, whether it be by email or phone if they are having problems and need help. I view it as my duty to be available to my students. Again, this is likely due to the fact that I'm a military officer and I make myself available for my soldiers 24/7 and feel that I should do the same for my cadets.

The author also spoke about the drawbacks of software like PowerPoint and on this issue I agree with him. I actually quit using PowerPoint as a means to teach after my first semester teaching. I still use it for administrative data, but to teach, I use the old fashioned chalk board. I find that students pay attention when they see a professor writing on the board. They also tend to take more notes when I write on the board.

When they see things on a slide, they tend not to copy it because often the professor goes on to the next slide before the student can copy all the information from the slide. One of my students asked me once why I didn't use PowerPoint and I told him that students didn't take good notes when I used PowerPoint. Then another student followed up with "Sir, that's because it's easy to put something on PowerPoint, but if you take the time out to write it on the chalkboard, then it must be pretty important." To which I said, "Good point."