Using Online Textbooks and Homework Systems: In Particular MyMathLab and WebAssign

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Abstract
Major textbook companies are providing homework grading and testing services to educational institutions for a very nominal fee. These services can be used to provide the teacher with relief from long hours of tedium grading assignments, quizzes, and tests. They also give the student instant feedback on the correctness of their responses. The jury is still out as to whether or not these services actually improve learning.

Introduction

In an effort to meet the ever growing threat of digital pirating and illegal distribution, textbook companies are racing against time to find ways to market textbooks in a profitable way. Some of the larger textbook companies are producing extensive Internet services to try and lure teachers to adopt their books and to stay with them. These online services include e-texts, online homework programs as well as quizzes, tests, and examinations, online grade programs, and online communication options to use between teachers and students and between students and their classmates. I have used two of these services from competing companies, and this talk explores some of the features as well as frustrations I have encountered.

The first such service I tried, MyMathLab, I used in teaching hybrid classes in Elementary Algebra and College Algebra at Riverside Community College. Later I used WebAssign, a service from a different company, because of its online homework program for an Introduction to Linear Algebra at La Sierra University.

Common features of MyMathLab and WebAssign

One of the features of both MyMathLab and WebAssign is an e-text. If students are willing to use an e-text instead of a printed textbook, they can sign up for the program for approximately one-third of the cost of a printed textbook. If they choose to buy a new text, they can register for the service for a very nominal fee extra. If they have a textbook or buy a used textbook, then registration costs the same as for the e-text.

Another common feature it that the services include places for the teacher to upload syllabi and other resources for the course. There is also provision to display announcements the teacher—and the textbook company—want the student to see.

In both of these services students can do their homework, quizzes, tests, and exams online. The programs include algorithms so that each student's assignments are enough different that simply

copying from another student is impossible. For example if one student has to solve the equation $3x + 4 = 7$, another student might be asked to solve $5x + 2 = 12$ for the same numbered problem.

What I did

At the community college I had the opportunity to teach both Elementary Algebra and College Algebra in an accelerated format. Accelerated meant teaching each class in 8 weeks rather than the usual 16 weeks using approximately 5 hours of lecture a week. Hybrid in theory meant I was to lecture on every second section in the text and require paper and pencil homework, and the students were expected to cover the other sections independently and submit homework electronically using the features of MyMathLab (Pearson). In actuality we found that briefly covering all of the course sections in the lecture proved better for most students. I taught each of these classes in three different semesters from August 2009 through December 2010 at Riverside Community College.

My full time work is teaching at La Sierra University. Recently, my department chair encouraged me to try using an online system for a class at LSU. Because of the multiple sections of each course offered at the elementary levels, he did not want me experimenting at those levels. So from September to December of 2010 I chose to teach a non-accelerated Introduction to Linear Algebra course using WebAssign (Cengage) electronic homework. Naturally, comparing the two systems at such different levels is not fully possible. What I can do is give an overview of the major similarities and differences between the two.

Similarities between the systems

Exploring the similarities, I noted that in both programs students had the choice of using an e-text for the course. Another feature that is the same in both systems is the ability to submit homework electronically. Students can submit some or all of their homework electronically. Since the answers are all open ended, they can submit each question electronically and get immediate feedback on their answers. I typically allowed them to make five attempts at getting their answer correct. (The teacher has the option of setting how many attempts students are allowed.)

There are plusses and minuses for allowing multiple attempts. On the positive side, this encourages a student to stick with the question until he or she gets it right. Since the responses are open-ended, a particular response might not be in the format that the website was expecting. Multiple attempts mean students can experiment with getting their format to match the one the website is expecting. On the negative side, this allows students to simply guess at the right answer until they get it right.

Another similarity between the two systems was the computer enforced submission deadlines for assignments, which I found particularly helpful. While I might have a soft heart toward a particular student's hardships, the computer program enforces deadlines impartially. I set the due dates to correspond to the beginning of the next class. This meant that trying to finish the homework was not an excuse for being tardy.

Each system has a very limited palette or toolbar of symbols that allows users to submit, fractions, radicals, exponents, matrices, etc. Yet both are quite exacting about how answers are entered. This proved frustrating at times and became the reason why I allowed up to five attempts to submit an answer. The toolbar in WebAssign seemed a little bit more intuitive than the one in MyMathLab, although both provided enough tools so the student could write an appropriate answer (see Figure 1).

Figure 1. Tool bars for MyMathLab and WebAssign.

The MyMathLab toolbar is on the left and that of WebAssign is on the right. Each named bar on the WebAssign toolbar opened further mathematical symbols, as did the "More" button on the MyMathLab toolbar on the left.

In both systems students appreciated the immediate feedback. When given a choice, the vast majority of students opted for--and in fact begged for--the opportunity to submit their work electronically. On the other hand, they were often frustrated because the computer did not accept some equivalent forms of a correct answer. For example if the question asks for the equation of a line it might accept $y = 3/2\ x + 7$ but would not accept $y = 1.5\ x + 7$.

In terms of support, sales representatives from both companies were initially very helpful. Yet when problems arose or when we discovered errors in the program, it was almost totally impossible to get any response out of the textbook company. I finally I quit trying to phone or e-mail them because I could never get a person on the phone nor any response to my messages.

Both textbook companies advertised that the student could print out the portions of the textbook they needed. In practice however, these companies made it very difficult do anything more than simply view the text on the screen.

When I was lecturing on a portion of the book, I liked to project it onto a screen since most students did not possess a printed copy of the text, nor was there sufficient room in the classroom for all students to bring their laptops. However, it was impossible to enlarge the text to make it easily readable from the back of the classroom. I found this seriously restrictive. Another disadvantage connected to this is that in most of the classrooms where I used the computer, the screen covered a portion of the white board. This limited the amount of writing I could have in front of the students at any one time.

Related to the homework systems, both seemed to do much the same thing. They created individualized homework assignments and quizzes. They kept a grade book that was limited because one couldn't upload scores into it. On the other hand, one could download the scores from the online grade book into a spreadsheet such as Microsoft Excel.

Differences between MyMathLab (by Pearson) and WebAssign (by Cengage)

When looking at the differences between the two services, MyMathLab came across as cumbersome. The interface is uninspiring and very non-intuitive to me. I could easily "paint myself into a corner." For example, I would be working with the e-text, and then when I wanted to switch to the Homework/Test Manager. There was no way I could seem to get there short of going back almost to the login screen. Probably this is because everything is done with pop-ups, which I normally keep switched off. Yet an advantage it offered was that as a teacher I could easily see what the students see when they log in.

To me WebAssign seemed simpler to operate. It was not driven by pop-ups. I could also enlarge the font sufficiently so it could be read from anywhere in the classroom. However, in neither program can the view of the textbook be widened enough to see the full width of the page once it has been enlarged so that students can read it. Probably the most annoying feature with WebAssign was that the graph "paper" on which the student had to draw graphs was fixed for values of x and y between -11 and 11 (see Figure 2). But the random question generator had no such limitations. Therefore, if a graph was part of the answer, it would often be impossible for the student to get it correct. This is a feature I kept trying to bring to the attention of the sales rep or one of the tech's, to no avail.

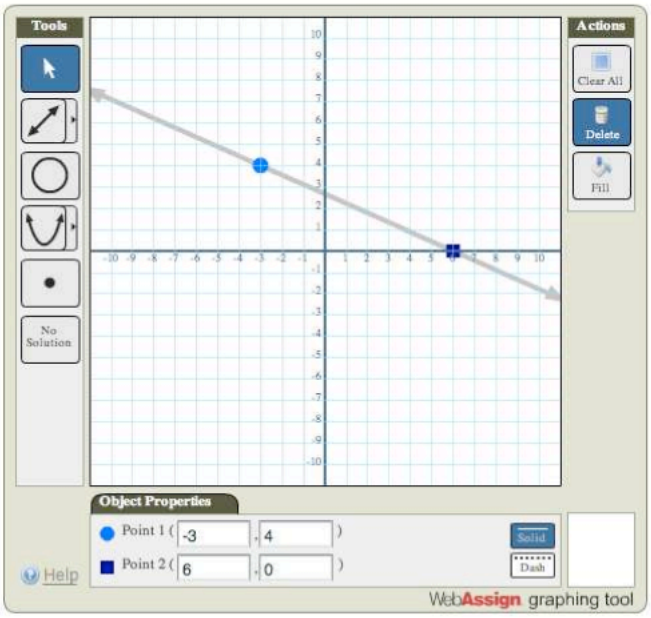

Figure 2. WebAssign graph template

Both programs gave hints as to how to do exercises. When I used it, the WebAssign version for my linear algebra text, however, must have still been in the programming stage because, after we got past the first chapter, the hints were non-existent. They would simply refer the student back to the beginning of that chapter in the text. MyMathLab, on the other hand, provided hints for completing exercises throughout the text.

Pedagogical Concerns

Looking back, I see that allowing students multiple attempts at getting the right answer may have been counterproductive. On tests, which were all pencil and paper, they had only one chance, of course, to get the correct answer.

While immediate feedback is very helpful for the students, I am concerned that it might encourage sloppy thinking. Rather than learning to actually critically evaluate their own thinking, they may only wait to see what the omniscient computer gives as a reply. They become willing to accept whatever the computer tells them as actually being true.

The literature I found about how well students learn using this type of service is divided in its evaluation. Some scholars indicate that, as far as the students are concerned, on-line homework does not hurt them. LaRose writes, "We find that students working homework on-line appear to do no worse in the course than those with pencil-and-paper homework, and may do better."[i] Allain and Williams concur: "Results show that there are no significant differences in conceptual understanding or test scores."[ii] Their study was conducted in a science class. Brewer also found little difference between traditional and online students: "The results of the study found that while the treatment group generally scored higher on the final exam, no significant difference existed between the mathematical achievement of the control and treatment groups."[iii] In a study

conducted on "web-based versus paper-based homework" done for physics classes, Demirci states, "In general, statistically no significant differences were found."[iv] Lenz[v], Bonham[vi], and Hauk and Sequalla[vii] also all weigh in on the side of there being no significant difference in performance between students who submit web-based homework and those who turn in paper-and-pencil homework.

On the other hand, some researchers found that the online students did not do as well. Moosavi, for example, states "Regardless of whether achievement is measured in terms of a single semester test, comprehensive final exam, course average, or test performance across the semester the results presented here indicate that students perform better in traditional classes than in CAI classes regardless of the CAI curriculum used."[viii] Furthermore, he goes on to indicate that students using Thinkwell Computer Aided Instruction (CAI) did better than those using MyMathLab.

One would be surprised, of course, if there were no findings supporting online homework. Affouf finds a strong correlation between achievement on the web-based homework assignments and achievement in the final examination.[ix] Mendicino likewise reports that with a "group of 28 students, students learned significantly more when given computer feedback than when doing traditional paper-and-pencil homework."[x]

So the jury is still out as to whether or not there is any real benefit to the students in using online homework systems. Why then, should we spend the extra time it takes to set up the system for our courses? The answer is because of the much larger amount of time, especially in subsequent courses, we as teachers can save when it comes to grading homework and quizzes.

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[i] LaRose, P. Gavin. "The Impact of Implementing Web Homework in Second-Semester Calculus," *Primus* v20 n8 p 664-683, 2010.

[ii] Allain, Rhett, and Troy Williams. "The Effectiveness of Online Homework in an Introductory Science Class," *Journal of College Science Teaching,* v35 n6 p28-30 May-June 2006.

[iii] Brewer, David Shane. "The Effects of Online Homework on Achievement and Self-Efficacy of College Algebra Students," (2009). *All Graduate Theses and Dissertations*. Paper 407. http://digitalcommons.usu.edu/etd/407

[iv] Demirci, Neset. "Web-Based vs. Paper-Based Homework to Evaluate Students' Performance in Introductory Physics Courses and Students' Perceptions: Two Years Experience," *International Journal on E-Learning* v9 n1 p27-49 Jan 2010.

[v] Lenz, Laurie. "The Effect of a Web-Based Homework System on Student Outcomes in a First-Year Mathematics Course," *Journal of Computers in Mathematics and Science Teaching* v29 n3 p233 Aug 2010.

[vi] Bonham, Scott W. "Comparison of Student Performance using Web and Paper-Based Homework in College-Level Physics," *Journal of Research in Science Teaching* v40 n10 p1050 Dec 2003.

[vii] Hauk, Shandy, and Angelo Sequalla. "Student Perceptions of the Web-Based Homework Program WeBWorK in Moderate Enrollment College Algebra Classes," *The Journal of Computers in Mathematics and Science Teaching* v24 n3 2005.

[viii] Moosavi, Seyed A. "A Comparison of Two Computer-Aided Instruction Methods with Traditional Instruction in Freshmen College Mathematics Classes," From his 2009 Ph.D dissertation. See http://proquest.umi.com/pqdlink?Ver=1&Exp=02-19-2016&FMT=7&DID=1965077861&RQT=309&attempt=1&cfc=1

[ix] Affouf, Mahoud. "An Assessment of Web-Based Homework in the Teaching of College Algebra," *International Journal for Technology in Mathematics Education,* v14 n4 p63 2007.

[x] Mendicino, Michael. "A Comparison of Traditional Homework to Computer-Supported Homework" *Journal of Research on Technology in Education* v41 n3 p331 Spr 2009.