Experimenting Learning Systems in Course Redesign.

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Abstract

Lately, in College and Pre-College Algebra courses, the presenter experimented two non-Pearson's learning systems. An account of students feedbacks and their performances is provided. Paving the way to the experimentation of MyMathLab, an assessment of the technology used is proposed while comments and suggestions from the audience is sought.

1 Introduction

During Summer and Fall 2011, while in the process of redesigning the College and Pre-College Algebra courses, the presenter experimented the learning systems by Cengage (Enhanced WebAssign) and by Hawkes Learning Systems. This presentation is an account of

- students performances, with comparisons between results in past semesters and in those under consideration;
- students feedbacks, with reports of in class and end-of-semester comments;
- the presenter's first impressions, as a potential technology assisted learning facilitator.

Motivations

What do college students need, want, and can afford? This is not just a degression, because our means must match our goals. New regulations are cutting funds (loans or scholarships) for Developmental courses. Probably a *redesign* of the initial Algebra cycle at college will be needed in most institutions. Solutions will likely differ a lot, depending on college enrollment and college mission. Personally a find appealing the *"modular"* approach, that allows students to progress in the College Algebra cycle at their own pace.

The mastery-based and adaptive learning software currently available on the market have many similarities.

- Large banks of exercises.
- Algorithms generating infinitely many exercises and tests.
- Mastery level: they keep on checking the mastery of a topic, then move on to the next one.
- Adaptive check: if there isn't an improvement, an earlier topic is checked.

One can have a course management system associated to the learning aid, or some kind of exporting features which interact independently, for example one can export grades to Blackboard. Some learning systems are internet based, that is they are installed on a remote server, like WebAssign by Cengage, and other are local, that is they are installed on the instructor/student PC, like Hawkes Learning Systems (HLS). They all offer great advantages for both students and instructors such as

- instantaneous feedback for each student;
- statistics and detailed time reports that can help the instructor focus on specific topics to review.

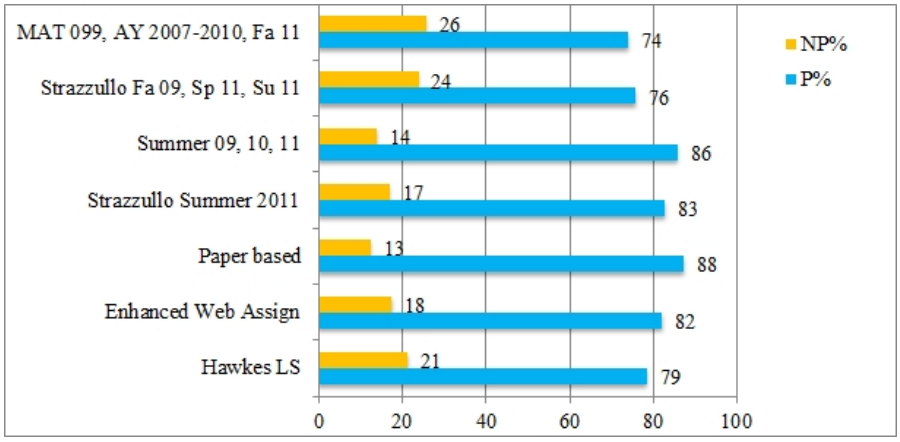
During both experimentations I had to use three distinct textbooks, one for each learning system and the standard one for the paper-based course. I used a common "table of contents", that is I was concurrently covering the same topics in all classes. The original idea was to use the same book for both algebra courses, but the College Algebra curriculum had to be integrated by handouts. Instruction delivery was lecture-based, but the experimental classes where held in a computer-lab, where students were able to follow the lectures while using the learning systems. Exams were the same in all courses and paper-based.

2 Comparisons

I must thank Cheryl Norris at the Reinhardt University Office of Institutional Research and Effectiveness for providing the data I used to compare the performances under consideration. A passing grade, included in the P%, is considered from the School of Mathematics and Sciences point of view, that is a letter grade of A, B, or C, while the NP% includes D, F, and W (withdrawn). Incomplete grades (if any) were not considered.

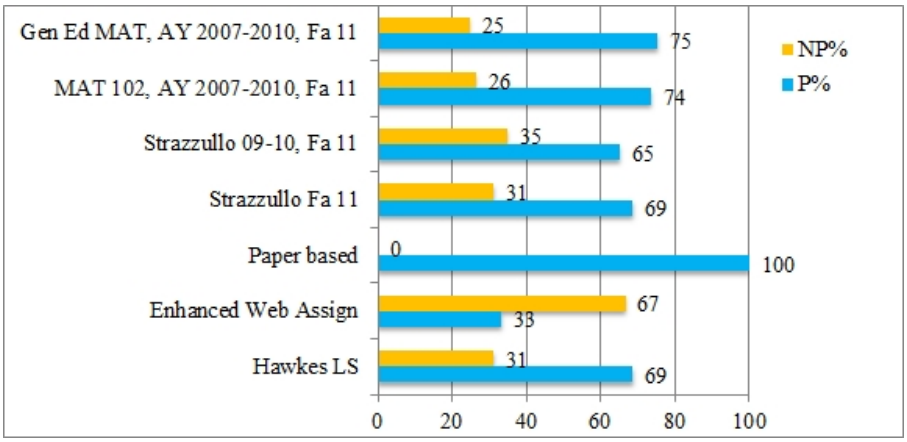
Developmental Algebra

Between Fall 2007 and Fall 2011 we had 780 MAT099 students, 47 in the sample.



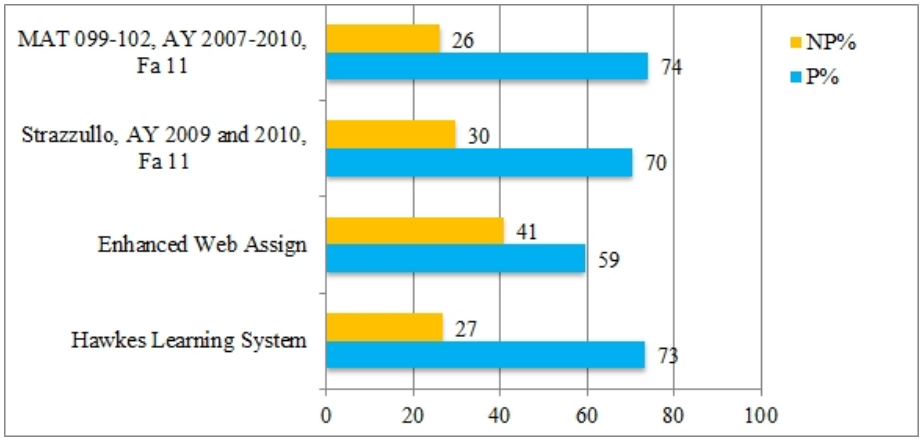
College Algebra

Between Fall 2007 and Fall 2011 we had 1634 Gen Ed students and 1247 MAT102, 48 in the sample.



Bottom Line

Aggregated statistics for both Algebra courses:



We can infer that HLS has proved its effectiveness, reaching the same passing rates of the paper based courses at the first try. On the other side EWA had a bad start.

3 Comments

Comments . . .

Here they follow some comments by the students, reported without any adjustment (grammar or spelling checks):

> "i hated the online hw"
>
> "I ended up liking Web Assign, but it took quite a while to get used to."
>
> "The software [HLS] is absolutely insanely frustrating, glitchy, bug-filled, and absolutely impossible."
>
> "Go back to paper homework instead of using a math program in the computer. The software is a new program. [. . .] Sometimes we had to figure out exactly what form the software wanted for an answer [. . .]"

Here we can see comments related to the technical issues that these learning system might create. Users must first of all learn how to use the systems, then they can benefit from them. A dedicated computer lab with support staff is needed before and during the semester. We can't relay on students or instructors technological readiness. Most of all, this generation of traditional students has been raised with "user-friendly" softwares, unused with hands-on personalized setups, like DOS, Windows 95, or MS Word required. Today we might spend many hours on a social network, but many of us just run to tech-support as soon as something unexpected happens on our machines. The passive attitude we have toward computers (and technology) is reducing the potential that these tools have.

. . . continued

> "The Hawks on-line learning system was time-consuming."
>
> "[The instructor] assigned a lot of homework that gave me lots of practice to learn the material we'd cover in class."

Some hope! At least this technology works for many. But what about "working backward"? Students can't check the back of their book in order to see an answer and work backward their way to the right steps. This is a major shock for many of them and a big obstacle to the acceptance of these systems. Again, hope comes from the new generations. Many high schools are adopting computer assisted learning systems and we might be close to Wolfram's proposal:

> "Stop Teaching Calculating, Start Teaching Math."

4 Considerations

It is clear that the *learning objectives* of the College and Pre-College Algebra courses must be updated. *Problem solving skills* are the main objectives, but for example the memorization of the quadratic formula or the formula for the present value of an annuity are not essential. Remains of general education purposes the ability of formulating equations that describe real life situations (*word problems*) and even the ability of computing fractions (divide a 3 feet lumber in 4 equal blocks and say the measure of each block in inches), but we can not ignore the fact that a generic worker will not solve quadratic equations by hands. Concerning the experimentation here reported we can conclude that:

- Learning Systems are proving their effectiveness.
- Hands-on tech-support must be available on campus.
- LS will be the final bridge between on-line and on-campus Math.
- We are going to become (hopefully we are already) *learning facilitators*.