

EPSY690 Action Research Proposal, The Benefits of Web Based Homework.

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Across the nation school budgets are being reduced due to the economic recession and shrinking tax base. Locally school districts have fired many teachers and support staff while increasing class sizes (www.poughkeepsiejournal.com). This has resulted in increasing the already large burden on teachers to find the time to do the multitude of tasks required to ensure students receive a good chance for an adequate education. This past semester I completed 27 hours of observation in Arlington High School. I observed and interviewed 5 chemistry and 6 biology teachers. One of the things I compared was homework, how it was done, how much was assigned and how it was graded. I felt this was an important topic as I recently completed a BA in biology and a second major in chemistry, and found that my performance was directly tied the amount of time I spent on homework. This may sound like a simple concept; however there is much debate in the educational community over the value of homework, with many studies and books claiming that it is not beneficial to student performance.

If home work is somehow unimportant in learning biology and chemistry then it should be eliminated. If it is important then it would be useful to study ways to make the process more effective and time efficient, especially in light of the recent downsizing of school staff. One process for doing this is online home work. This is a system where students complete and submit homework online though a set of numerically definable answers, get immediate feedback and have the results as part of their grade. This proposed study is designed to

determine if there is a benefit to homework in general, if there is a benefit to online homework in particular, and determine the possible advantages as well as identify detractors. The results would help guide decisions on homework policy, and determine if instituting such a system would be worth the investment from shrinking schools budgets.

The debate of the usefulness of homework seems to be cyclical. It has experienced periods of claims that it is oppressive and keeps kids from fully developing into a well-rounded person, taking time from friends, family, sports and other activities, while proving to be unrelated to academic achievement (Canadian Council on Learning. 2009). Other claims are that failure to do homework is a large reason why the US is so far behind other developed nations in academic performance. The question is if homework is necessary to reinforce and develop classroom learning, ingrain concepts and develop critical thinking. In my observations I was surprised at the low level of homework given and completed. Most of the teachers I spoke with indicated that they try not to give much homework, but when they do, usually only 50% of the students complete it. When they do give it is most often to complete something started in class. Chemistry teachers spoke of giving 15 minutes a few nights per week. Many teachers said they no longer have time to grade homework, and just briefly visually inspected and signed off if students had something written. This practice would eliminate not only a critical aspect of feedback, but also leave many unmotivated to complete it. (Hoskins, S., Van Hooff, J., 2005). A CCL (Canadian Council on Learning) review of published research, reported that of the 32 outcomes they studied, 75% showed results of a positive correlation between homework and achievement and that the majority of those outcomes showed a medium to large positive effect on student achievement. The results indicated that the type of homework was an

important factor. For homework to be beneficial it had to be relevant, not too long, and include active learning, not rote reworking of in class assignments. Turnaround time between student completion and feedback was also listed as an important factor. Larger class sizes were shown to negatively effect freshmen students,(Richards-Babb, M.,2011).

With the concerns over teacher time constraints, large class size, and feedback time, it seems one solution to help with these issues would be online homework. Many colleges have incorporated these systems but none of the teachers that I observed have. They all have web pages, but these are used to list assignments and material, not an active homework system. There are many software programs available that can offer students feedback, give third chances, and provide scaffolding through hints and help. They can give teaches feedback on who is on track, who is lagging and what areas are most problematic. One concern often cited with online homework systems is the potential lack of student's access to computers. According to a teacher I interviewed, NYS and many others participate in a consortium for common core state standards with the Partnership for Assessment of Readiness for College and Careers (PARCC). This system will test students online throughout the year, and is scheduled to be fully implemented by 2014. This will force schools to ensure all students have access to computers and are computer literate (www.parcconline.org). As each aspect of life becomes deeply tied to technology, it is only common sense that homework follows, provided it is as effective as current systems.

Neset Demirci developed a study to assess the effectiveness of web-based homework verses paper-based homework. It focused on the effects of how the different mediums and grading

procedures effect achievement. A web-based homework system was developed and implemented for 1 of 2 identical introductory physic classes. The other group was given traditional paper based, hand graded assignments. The groups were compared on conceptual and problem solving performance. He discussed the constraints of paper-based methods as not being able to show multimedia effects, more cumbersome in scoring and recording grades, providing less peer interaction, and less diversity of teacher and peer assessment. The positive characteristics of web-based homework assessment system were stated to be that automated submission and scoring would give more class time for teachers to give feedback and more assignments, increase student homework time, reduce administrative effort, and provide students instantaneous results while things were fresh in student's minds. Negative characteristics were stated to be the inability to observe students reasoning process, which can be done by written homework, less diversity in questions and grading, the ability of students to cheat easily, and technical malfunction issues that arise with software and hardware. The results of the study showed no statistical differences between paper and web based pre and posttest gains, with slightly higher conceptual gains for web based and slightly higher homework scores for paper based. (Demirci,N.2003).

Another study compared learning for fifth grade students who utilized two different types of homework. One group completed homework using a web based computer software system, called ASSISTment System, and the other completed traditional paper and pencil homework. Student learning was measured and the results for both groups were analyzed indicating that students participating in the web based homework learned more than the other group. The article stated some advantages of computer based homework as providing immediate feedback

to students. It saves time for teachers, motivates students to do homework correctly as there is no leeway given in grading, and can aid students through automatic hints and help. The disadvantages were listed as not allowing for review of students work toward the answer, students might do less written out work on paper and try to do more in their head, teachers might have a harder time pinpointing where students are having trouble, and cheating would be easier for students.

The article described the ASSISTment System that was used in the experiment. The system learns from students where they are having difficulties and provides this information to the teachers. It also provides customized feedback to students based on a data base of where others have had issues using scaffolds and hints. It provides teachers information on how much help students needed to complete the questions, identifying students who are in need of greater assistance. The results of pre and posttest gains on material were statically significant in favor of the web based groups, showing almost twice the gain as paper based. (Micheal Mendicino,M., Razzaq,L., Heffernan, N. 2008).

In a study on motivation and academic achievement of 110 undergraduates, second year psychology course, Hoskins, (Hoskins, S., Van Hooff, J.,2005), tried to determine which students voluntarily used the web based system and if the web based system effected student achievement. Students study orientation was measured using an inventory. Web use was measured by the number of times students accessed the interactive class site, online quiz and forum postings. Over all, students who interacted more with the web site and posted comments on black board had higher final grades than those who did not.

A study on the effectiveness of online homework in an introductory science class compared four sections of astronomy students in different homework situations that switched halfway through the semester. Groups were given either graded web based assignments or ungraded traditional assignments. This was coupled with a survey to determine how many hours students spent on homework and how they completed the web based assignments. The results showed no statistical difference between the achievement of the homework groups, but that web based homework students reported spending more time on homework. Outside engagement of students in materials is an important goal and this accomplished it. (Allain,R.,Willaims,T.2006).

In the study, Online Homework, Help or Hindrance? (Richards-Babb, M., Drelick,J. Henry,Z., Robertson-Honecker,J. 2011) addressed problems associated with larger class sizes and student performance in first year chemistry. The Chemistry department found that as their enrollment increased, student performance decreased in large freshmen classes. The study set out to answer the questions; are grade components and online homework components correlated? Does online homework improve success rates in general chemistry? Do students complete online homework and do they recommend its use? How is online homework perceived by students? Is it helpful in learning chemistry content, improving study habits, and improving final grades? The WileyPLUS system was used for online homework. Grades were for homework and quizzes. The final grades were tabulated for the previous 4 years by the same instructor, using the same grades, homework, and quiz systems. For the experimental year, the online system was put into place and homework was replaced by online weekly homework assignments that allowed student third chances to complete homework and accounted for the same 10% of the grade, as in previous years. Students were surveyed to determine the

qualitative questions. The results showed that student performance in the chemistry class improved from between 4-12 % when compared to the average of the previous year's using the traditional homework system. This improvement has been sustained in subsequent years despite the fact that student enrollment has continued to increase. There was a 70% completion rate for all homework assignments and indications that students spent more time reviewing their homework, 80% stating they spent more time on homework. Overall 85% were in favor of the online system in place of a traditional paper based system. This implies that web based homework is a successful tool for helping with large class numbers, that it positively effects students study habits and grades and is well received by students.

These studies indicate that online homework systems can be developed that will increase student performance, outside classroom engagement, and improve study habits. It can decrease teacher workload on homework, allow for more time for class room instruction and help target students in need of greater support. It can provide immediate feedback to students while problems are fresh in their head, encourage them to seek out others for help and get them to think more actively. With all these benefits it is clear that this system could be very useful in high school students. It is therefore a good topic to explore in an action research project.

After reading the literature, it is safe to speculate that the incorporation of web based homework would address many of these issues. The experiment I have designed will effectively compare student groups assigned no homework, Graded paper based homework, and web

based homework. Once the system is set up and teachers are familiar with using it, I predict it will spend 50% less time on homework. The literature would suggest that students completing web based homework would do no worse than students assigned ungraded paper based homework, which was the majority of the homework I witnessed in my observations. I predict that students completing some kind of homework will perform better than students who do not, and web based scores will be higher than paper based. I feel that comparing ungraded homework paper based homework to graded web based as done in one of the studies is not valid as there are many students who are motivated by grades and will not complete the assignment if it is not graded. Furthermore it is indicated in some of the studies that critical thinking and metacognitive skill are utilized more on web based systems (Hoskins, S., Van Hooff, J., 2005). I predict that out of class engagement on material will be stronger on paper based systems as students will have to write out answers, but critical thinking skills and metacognitive strategies will be enhanced by the progressive hints offered by web based system. Homework scores will be higher on the web based system due to timely scaffolding and hints. Students will feel more guided but still have to think for themselves step by step through the problem solving process. I predict that teacher, but not necessarily student feedback will be favorable because of the benefits.

The sample will be a sample of convenience taken from first year high school Regents chemistry students. Two participating high school teachers will be studied, to help avoid teacher effects, as one teacher could be more adept at web based systems than another. Each teacher will teach three of their classes under the experimental conditions. Teachers will be instructed on the use of a web based system such as wileyPLUS, before the beginning of the

experiment. Each teacher will teach 1 of their classes using web based system, 1 class will be assigned the same homework problems with the same grade system, but must write out the answers and hand in. 1 class will receive no homework assigned for the duration of the unit, which can serve as a control for the other two treatments, as well as comparison of its own. Sections will switch after 1 unit, which is approximately 2-3 weeks. At this time written homework will do no homework, web based will do written, and no homework will do web based. All students will be provided the same training in how to use the system 2 days before beginning the unit as web based participants. Achievement will be measured by instituting a pre-test post-test system. At the end of three units, 6-9 weeks, grades will be calculated with homework accounting for 15% of the total grade. Teachers will record how much time in minutes they spend on homework assignments including grading, distributing, collecting and review, in each class and record in a log. Student achievement results will be compiled, as well as overall unit grades based on homework, quiz and test scores as in a normal setting.

Attaining the necessary approvals will be necessary to complete first. The written proposal would have to be reviewed by the department head, then the executive principal, then the superintendent. If they determine that the study is worth merit on improving educational practice, they may approve it. Finally permission slips would have to be sent home to all parents with an option for the child to not participate. This would open another potential threat to validity as it segregates students whose parents are not willing to let them participate, thus reducing the generalizability of the study as these parents would be a part of the normal population. They might have stronger concerns for their children's education and make their

children study more than others. This process would have to begin the year before with permission consent forms being sent to parents of students entering chemistry in the fall.

Students with consent could be grouped in the treatment sections, and non- consenting students in another to receive the regular conditions. Participating teachers would have to be willing to put in time in the summer to learn the online system, coordinate homework assignments to be similar sets, and be trained in experimental procedures. These would include things such as being able to maintain the same level of feedback for each class on homework, how to consistently track their time spent on grading homework, which would be noting start and end times in a book for each class, how to notice variance in student questioning. Students would be trained to time the amount of time they spent on homework including any related reading necessary to complete the assignments, as well as the actual time spent completing it. Students would have to write the times in minute across the top of written homework, and would be provided a space on the online homework as a required question.

Compiled results of achievement, homework grade, test and quiz grade, teacher time on homework, student time on homework, and overall course performance will be statistically analyzed to determine performance comparison for each of the three groups. As all students will participate in each of the treatment sessions, individual student factors should be effectively controlled for. From these results consistent patterns can be established to indicate which treatment yielded the better results and if there was any significant differences between the groups. In addition to this quantitative section, a questionnaire will be completed by students and teachers to assist in interpreting the results.

At the end of session teacher questionnaires will include the following;

How much time per class did you spend on homework (which includes, grading, collecting, redistributing, and providing feedback.)?

What advantages did you find using the web based homework system?

What disadvantages did you experience with the web based system?

From answering questions on homework review, did you observe any notable differences in conceptual understanding in students between web based homework students and paper based? What were some of the differences you noticed?

Student questionnaires would be more definable and scale rated because of the tendency for honesty with anonymous survey answers. They will include the following;

On a scale from 1-5 with 5 being strongly agree and 1 being strongly disagree, answer the following questions:

1. I spend more time on homework when using the web based system.

Strongly agree 1 2 3 4 5 strongly disagree

2. I spent more time on homework using the paper based system.

Strongly agree 1 2 3 4 5 strongly disagree

3. I feel homework from the web based system helped my performance on quiz and test grades. Strongly agree 1 2 3 4 5 strongly disagree

4. I feel the paper based homework helped improve my performance on quiz and test grades. Strongly agree 1 2 3 4 5 strongly disagree

5. I feel homework did not help improve my performance on test grades. Strongly agree 1 2 3 4 5 strongly disagree

6. I feel I learned more on my own on how to do chemistry problems using the web based system Strongly agree 1 2 3 4 5 strongly disagree

7. I feel I learned more on my own on how to do chemistry problems using the paper based system Strongly agree 1 2 3 4 5 strongly disagree

8. What were some advantages you found when using the web based system?

9. What were some disadvantages of using the web based system.

10. Overall which system would you prefer to use (web based, paper based , no homework) and why?

The negative of each question is included to help improve validity. Questions 1 and 2 are asked to correspond to students reported time on homework, and confirm amount of out of

class engagement with the material. Questions 3, 4, 5 are asked to gauge students' perceptions of the usefulness of homework and tie it to the results of the quiz and test performance in the units. Questions 6 and 7 are asked to help measure critical thinking, and metacognitive processes in comparing the two systems. Questions 8 and 9 are asked to help give indications of benefits or flaws in the system that were experienced by students but not detected by teachers. Question 10 was asked to ascertain general acceptance and attitude toward the two systems.

By completing this study the value of homework can either be reinforced, through higher achievement and performance scores, or debunked if there is no statistical significance between non homework and homework groups. The usefulness of web based homework compared to paper based, can be determined, specifically in its ability to save teachers time, increase student engagement with material, reinforce active learning and metacognitive skills, and possibly boost student achievement. If the results show no statistical differences, then the time saving factor for teachers alone could be worth its implementation. The survey can provide valuable insights in troubleshooting systems, and generate ideas for further research. Overall this study can be an aid in determining policy and prioritizing expenditures for school districts when trying to maintain quality while reducing staff.

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