Regular Performance Feedback in Relation to WPR Scores

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**Introduction**

Throughout a student’s educational career, they will be assessed and evaluated in a wide variety of methods. Within a mathematics course (of which this study was conducted), students will be evaluated by problem sets called homework, quizzes, and the traditional method of having a high value exam over course material. One question which has crossed the mind of many instructors’ is “which method of evaluation, graded homework or quizzes, will improve a student’s overall performance in the course?” or “what mixture of quizzes and homework works best?” Many studies have been done on whether homework is beneficial to a curriculum. Many other studies show that when homework is graded, students will perform better on quizzes. However, I am not looking at which method is better, but rather how the consistent feedback from regularly scheduled evaluation events will affect the overall student performance on a course examination. This paper will discuss this question and see which evaluation method combined with timely (next lesson) feedback had more of an impact on overall performance on course wide exams.

**Literature Review**

Quizzes and homework are widely used to facilitate the learning of assigned material; many instructors use both methods in order to assess their students. Ryan and Hemmes demonstrated the usefulness of graded homework versus non-graded homework and compared each to quiz performance results. Ryan and Hemmes state, “Points were available for homework submission under this condition; points were not available under the no-points condition. The group-mean percentage of homework assignments submitted and quiz grades were higher for all chapters under the point’s condition than in non points condition (Hemmes, 2005).” Their main hypothesis was that when a homework assignment is assigned a point value, students will perform better on
graded events such as quizzes or exams. This conclusion was based on the belief that because a point value is assigned to homework, the student will spend time on their homework and ensure the accuracy of their answers. In addition, Harris and Sherman came to the somewhat obvious conclusion that when homework is assigned and accurately completed their grades are better associated with academic performance (Sherman, 1974). What is interesting in this study however, is the focus on consistent regular feedback, what form that feedback takes is arbitrary to this study.

Our experiment will look at the effectiveness of assigning frequent homework (often every lesson), assigning frequent quizzes (often every two or three lessons), and a combination of the both. I have looked at 4 sections, two of which were given regularly assigned homework, one given regularly assigned quizzes and the remaining section was assessed using a combination of both homework and quizzes.

**Testing Procedures**

During the Spring 2011 and fall 2012 semester data was collected from four MA364 (Engineering Mathematics) sections. MA364 is a service course to four different engineering departments with the curriculum dispersed across three very different mathematical concepts. These include vector calculus, differential equations and partial differential equations. During each block homework and quizzes were grades and the data collected. These scores were then compared to the students block end exams (Written Partial Reviews or WPR). For each section and each block, it was noted what type of assignments were given. The three options were: 1) homework only, 2) quizzes only, and 3) a mixture of quizzes and homework. Both quizzes and homework were designed to evaluate student’s understanding of published course objectives. These objectives were the base of the WPR questions. The WPRs were identical for each section; however, the format of the homework and quizzes differed by instructor. WPRs are graded in mass,
using the same rubric. All assigned homework and quizzes were graded and returned to students by the very next class period.

Data Analysis
The following information was gathered during the semester and compiled following the end of each semester.

Table 1: MA364
Regular Assigned Lesson Homework

<table>
<thead>
<tr>
<th>Section</th>
<th>Block</th>
<th>HW</th>
<th>Quiz</th>
<th>WPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I</td>
<td>75%</td>
<td>77%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>85%</td>
<td>88%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>82%</td>
<td>82%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I</td>
<td>72%</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>88%</td>
<td>82%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>84%</td>
<td>84%</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: MA364
Regular Assigned Lesson Quizzes

<table>
<thead>
<tr>
<th>Section</th>
<th>Block</th>
<th>HW</th>
<th>Quiz</th>
<th>WPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I</td>
<td>82%</td>
<td>74%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>88%</td>
<td>85%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>78%</td>
<td>83%</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: MA364
Regular Assigned Lesson Homework and Quizzes

<table>
<thead>
<tr>
<th>Section</th>
<th>Block</th>
<th>HW</th>
<th>Quiz</th>
<th>WPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I</td>
<td>68%</td>
<td>77%</td>
<td>78%</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>82%</td>
<td>92%</td>
<td>88%</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>75%</td>
<td>81%</td>
<td>85%</td>
</tr>
</tbody>
</table>
From the data above in the above tables, I believe it is evident that the regularly assigned homework without regular quizzes resulted in the best results in so far as WPR scores. This belief is from both the quantitative values as well as the qualitative ‘feel’ of the students. I feel as though the mixture of both homework and quizzes had the least beneficial effect.

**Discussion**

The sections which were subjected to assigned homework every lesson I believe outperformed the other sections in though it was not obvious in comparison to the section which was subjected to both homework and quizzes. I feel the least significant approach to aiding learning was with the strategy of giving regularly assigned quizzes. I feel that students used these as opportunities to ‘cram’ study for a quiz, which then lulled them into a false sense of security with their own understanding of the material. I feel this then gave the students less urgency to study for significant graded events such as a WPR. The combination of both homework and quizzes did have results that were consistent with a homework only approach and in some instances even scored slightly higher than the homework only approach I do not feel as though the class had as much of an overall grasp of the concepts so much as they did a surface level understanding. The cadets in the course end survey showed a bit of a love-hate relationship with the regular homework. Several comments were critical of having math homework ‘hanging over their head’ on a regular basis. Many others however, expressed how much they appreciated the daily homework as a way to keep them constantly engaged in their math and not allowing them an opportunity to slack from it. The quiz heavy approach received the least amount of appreciation in the surveys. In fact, quizzes as a whole did not receive much support whether as stand alone, or when combined with homework.
Looking at figure 1, it is evident that for the most part, homework scores match very closely to WPR scores. Analyzing cadet feedback and performance the regular assignment of homework problems and feedback from those problems has a positive effect on WPR performance. They have a bigger effect than I believe quizzes possess. I believe quizzes reinforce the 'stump and dump' philosophy of WPR preparation.

A correlation was found between higher homework grades and higher WPR grades. I did not find a significant correlation between quiz grades and WPR grades. However, even the correlation between homework grades and WPR was not statistically significant. I do think it would be worth repeating the experiment with a much larger sample size. While the correlation might not have been significant for our small sample size, there was a correlation that I feel would benefit from further study.
Conclusion and Recommendations

After performing our analysis, the following conclusions can be made:

1) A regular set of performance feedback measure (in our case homework) has the greatest effect on WPR performance overall.

2) The regular feedback options which included a quiz did not have the desired effect and I do not believe positively affected WPR performance.

Recommendations for future research on this topic include:

1) Consider different mixes of homework and quizzes.

2) Consider a larger sample of differing abilities.

3) Consider different courses. Apply this concept to other math courses and other subjects to see if this concept is applicable across the spectrum of courses.

4) Look at the point value assigned to both quizzes and homework and how it affects performance.
Bibliography

