GPS in the classroom: using rubrics to increase student achievement

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ABSTRACT

Can the use of rubrics sharpen student focus and thereby increase achievement? Will the use of rubrics help students to prioritize their time, using time more efficiently when completing homework? This study examines grade differences between accounting students given a rubric to assist them in honing in on the specifics of a financial analysis project versus students who are not given the rubric. The successes and "ah ha" moments as they relate to realizations of how what changes faculty approach to communicating, teaching and grading are discussed. Suggestions of possible options for professors to adapt their grading policies to help students develop the skills necessary to be successful in the college environment are presented.

Keywords: rubric, teaching strategy, grading, communication, classroom

INTRODUCTION

College and University courses could be more beneficial if they were similar to flights in commercial aircrafts cruising at 30,000 feet. At that height, students can see the entire forest, the whole picture, and understand what the course objectives are. As the plane descends from cruising altitude, the trees come into clearer view and the students can see the details of each tree and know from the big picture view how each tree fits into the bigger picture of the forest. Unfortunately for students, there is no airplane ride the first day of class; students are dropped off right at the entrance of the forest and must find their way through the trees, with the aid of a professor tour guide. Fortunately for students, professors are armed with an extremely useful tool, a type of GPS, which will help aid students in navigating the forest and reaching the final destination. The use of rubrics in the college classroom can provide students with a valuable roadmap, a picture taken from 30,000 feet that will help break down the objectives of the course into smaller and more manageable tasks. This paper will analyze the results of student achievement between two sections of a financial accounting course in which students completed writing projects throughout the semester. One section was distributed a rubric for guidance while the other section was provided only a standard set of instructions. The research for this project was conducted at St. Norbert College. The College is a Catholic liberal arts college with an average annual enrollment of approximately 2,000 students and is located in De Pere, Wisconsin.

A COLLEGIATE PARADIGM SHIFT

The mission statement of St. Norbert College states, in part, that its mission challenges us to educate the whole person intellectually, spiritually and personally. Further it states the goal is to promote student learning that include skill development in critical and analytical thought, quantification, synthesis, problem solving and communication. It is the college's belief that these life skills cannot be mastered through what many college classrooms have come to represent; hours of lecture followed by a scantron exam serving as the measurement tool for assessment. It is time educators recognize today's employers and, society as a whole, are demanding a more well rounded worker that not only possess the technical skills of a particular trade or craft, but also the ability to communicate that knowledge effectively with clients and coworkers. The goal is to develop students that can do more than simply memorize content for exams.

TAKING A PLAY FROM PRE-SECONDARY EDUCATION

Rubrics have been an effective assessment tool in pre-secondary (grades 6 – 12) education classrooms as a means of providing guidance to increase student achievement. Research has shown that assessment and the use of rubrics will increase learning and student achievement.

> "Can assessment raise standards? Recent research has shown that the answer to this question is an unequivocal "yes." Assessment is one of the most powerful educational tools for promoting effective learning. But it must be used in the right way. There is no evidence that increasing the amount of testing will enhance learning. Instead the focus needs to be on helping teachers use assessment, as part of teaching and learning, in ways that will raise pupils' achievement. ''[1]

Pre-secondary education classrooms have shown that rubrics, used as a method of assessing student achievement, leads to increased learning by making known to students the goals, objectives and grading criteria before the project begins. This allows students the freedom to see the whole forest before venturing into the trees.

> "Ultimately, we want students to grow to be independent. For them to do that, they have to have a sense of what the criteria [are] that make them successful. For a long time, the criteria [have] been a mystery to students.''[2]

Previously, colleges could get by without the use of rubrics because the tool was not needed in the professor's toolbox. In the past, the mid-term and final exams were a professor's only means of assessment. Today, professors need new instruments to evaluate and assess student achievement. Furthermore, a list of topics on the final exam will not increase student achievement on a research project and presentation. With a multiple choice exam, assessing student achievement is black and white, bubble the right dot or bubble the wrong dot; multiple choice does not leave an excessive amount of gray area. The same is not true in presentations and research papers, assessing student achievement lies entirely in the gray area.

Rubrics allow instructors to present to students a roadmap, which should lead them down the path of success in which the student can self assess along the way. The rubric should encourage the student to ask the following questions, to help ensure achievement of the project and course objectives:

Where Am I Going? The rubric should provide a clear and understandable vision of the learning target. It should provide examples and models of strong and weak performances. [3]

Where Am I Now? The rubric can offer regular descriptive feedback throughout the completion of the project. It further can teach students to self-assess their project and provide a set of standards for students to set project goals. [3]

How Can I Close the Gap? The rubric can be used by professors as a design for lessons to focus on one learning aspect or quality. They can help students focused revision within their projects and further engage students in self-reflection and let them keep track of and share their learning. [3]

Rubrics can be used as a tool to help lift the fog from the student's road to success. They will help reduce the gray area in assessing student achievement in projects and presentations by clarifying the spirit of the project and the criteria for assessment. After all:

> "There are no right grades, only justifiable grades.''[4]

Rubrics have been proven at pre-secondary levels of education to be an effective tool for increasing student achievement. What the project hopes to discover is whether rubrics can increase student achievement at the collegiate level.

RESEARCH RESULTS

The research project was conducted in the fall semester of 2009 at St. Norbert College within three separate sections of a Financial Accounting course. This course is primarily a sophomore level class. Two of the sections were taught by one author, while the third section was taught by another. The first author's sections consisted of 24 and 12 students respectively, while the other's section consisted of 24 students. All three sections were assigned an identical three-part analysis project due at various times throughout the semester. Students were split into groups and were required to select a publically traded corporation that would be analyzed via their respective annual report. Groups were responsible for preparing an assigned financial

analysis along with a written report documenting their research. The first author's two sections (test group) were provided a rubric with specific expectations and instructions (see exhibit 1) while the other author's section (control group) was only given a standard set of instructions.

A survey was administered by instructors in all three sections following the completion of the final part of the project (see exhibit 2).

In total, 49 students completed the survey, 28 students (18 male) using the rubric, and 21 (10 male) without access to the rubric. Of those with the rubric, 12 had taken a previous accounting class, 7 were accounting majors, 0 were freshman, 20 were sophomores, 6 were juniors, and 2 were seniors. Of those without the rubric, 2 had taken a previous accounting class, 2 were accounting majors, 1 was a freshman, 9 were sophomores, 8 were juniors, and 3 were seniors.

Two-sample t-tests were conducted to test whether there was a significant difference in high school as well as college grade point average (GPA) for students in the section with a rubric compared to students without a rubric. Students with a rubric had an average high school GPA of 3.48 (s = 0.36) and college GPA of 3.07 (s = 0.54). Students without a rubric had an average high school GPA of 3.53 (s = 0.45) and college GPA of 3.13 (s = 0.52). No statistically significant differences were found at either the high school level (t = 0.41, p = 0.69) or the college level (t = 0.35, p = 0.73), indicating that students with a rubric were not at a significant advantage compared to students without a rubric.

Students were asked a number of questions related to the clarity of the assignment, with responses ranging from '1' indicating 'Very Unclear' to '5' indicating 'Very Clear." First, students were asked "How clear was the learning objective of each assignment?" No statistically significant difference was found for those using the rubric (mean = 3.93, s=0.81) and those without the rubric (mean = 4.14, s=0.96, t = 0.82, p = 0.21).

Next, students were asked, "How clear were the writing organization (including spelling and grammar) requirements of each project part communicated by the professor?" Two sample t-tests were used to see if students with the rubric rated the communication more clearly than those without the rubric. While students with the rubric found the instructions clearer (mean = 4.143, s = 0.848) than those without the rubric (mean = 3.81, s = 1.12, no statistically significant differences were found (t = -1.14, p=0.131).

Next, students were asked, "How clearly did the professor communicate the requirements related to gathering information from a variety of relevant resources (non-financial data)?" for each of the three parts of the project. Two sample t-tests were used to see if students with the rubric rated the communication more clearly than those without the rubric. While students with the rubric averaged higher on each part (Part 1, mean=4.25, s=0.89; Part 2, mean=4.07, s=0.78; Part 3, mean=4.07, s=0.81) than those without the rubric (Part 1, mean=3.95, s=0.97; Part 2, mean=3.91, s=1.00; Part 3, mean=3.90, s=1.04), no statistically significant differences were found (Part 1, t= -0.64, p=0.14; Part 2, t= -0.64, p=0.26; Part 3, t= -0.61, p=0.27).

Students were then asked, "How clearly did the professor communicate the requirements related to the accuracy and logical presentation of financial data and ratios?" for each of the three parts of the project. Two sample t-tests were used to see if students with the rubric rated the communication more clearly than those without the rubric. As with the previous results, students with the rubric averaged the communication higher on each part (Part 1, mean=3.96, s=0.92; Part 2, mean=4.00, s=0.90; Part 3, mean=4.00, s=0.98) than those without the rubric (Part 1, mean=3.81, s=1.12; Part 2, mean=3.81, s=1.12; Part 3, mean=3.86, s=1.15), but no statistically significant differences were found (Part 1, t= -0.51, p=0.31; Part 2, t= -0.64, p=0.26; Part 3, t=

-0.46, p=0.33).

Students were also asked, "How clearly did the professor communicate the requirements related to the analysis of financial data to their respective benchmarks?" for each of the three parts of the project. Two sample t-tests were used to see if students with the rubric rated the communication more clearly than those without the rubric. Once again, students with the rubric averaged higher on each part (Part 1, mean=3.93, s=0.94; Part 2, mean=4.00, s=1.02; Part 3, mean=4.07, s=1.00) than those without the rubric (Part 1, mean=3.76, s=1.18; Part 2, mean=3.67, s=1.15; Part 3, mean=3.67, s=1.24), but no statistically significant differences were found (Part 1, t= -0.53, p=0.30; Part 2, t= -1.05, p=0.15; Part 3, t= -1.12, p=0.14).

Finally, students were asked, "How clearly did the instructor communicate the requirements relating to synthesizing the financial and non financial data into a logically supported conclusion?" Two sample t-tests were used to see if students with the rubric rated the communication more clearly than those without the rubric. In this case, students without the rubric (mean=3.90, s=1.14) actually found the instructions clearer than those with the rubric (mean=3.75, s=1.17), but no statistically significant difference was found (t= 0.47, p=0.68).

It was also of interest whether students without the rubric utilized help through teacher assistants (TAs) or the professor more often than those with the rubric. Two sample tests were used and while students without the rubric (mean=3.05, s=1.63) sought help from TAs more often than those with the rubric (mean=2.86, s=0.97), no statistically significant differences were found (t= 0.48, p=0.32). Similarly, students without the rubric (mean=3.10, s=1.73) sought help from the professor more often than those with the rubric (mean=2.36, s=1.70); however, a difference was found at the .10 level of significance (t= 1.49, p=0.07).

Students were also asked to rate their satisfaction with their team members as well as the grade they received on each of the three parts of the project, with '1' indicating 'Dissatisfied' up to '5' indicating "Satisfied." Two sample t-tests were run to see if there was a significant difference, and none was found for working with team members (t= -0.27, p=0.79). For parts 1 and 2 of the project, no significant differences in satisfaction with grade (Part 1, t= 0.55, p=0.59; Part 2, t= 0.82, p=0.42) were found for those using a rubric (Part 1, mean=3.71, s=1.30; Part 2, mean=4.18, s=1.19) compared to those without a grade (Part 1, mean=3.90, s=1.14; Part 2, mean=3.90, s=1.14). However a statistically significant difference was found for part 3 at the .05 level (t= 2.11, p=0.04), as students with the rubric (mean=4.50, s=0.79) were more satisfied than those without a rubric (mean=3.76, s=1.45).

Students were also asked to rate their effort for each part of the project, with '1' indicating 'low' effort up to '5' indicating 'high' effort. It was expected that students without the rubric would have to exert more effort than those with the rubric to guide their efforts. While students without the rubric (mean=3.9, s=1.14) did exert more effort on part 1 than those with the rubric (mean=3.71, s=1.30), no statistically significant difference was found (t= 0.55, p=0.59). However, for parts 2 and 3, significant differences were found at the .10 level (Part 2, t=1.49, p=0.07; Part 3, t= 1.59, p=0.06) as students without the rubric (Part 2, mean=4.62, s=0.50; Part 3, mean=4.71, s=0.46) exerted more effort than those with the rubric (Part 2, mean=4.36, s=0.73; Part 3, mean=4.46, s=0.64).

The last section of student input asked, "How strongly did the project enhance your understanding of the material presented throughout the semester?" with '1' indicating 'very weak" to '5' indicating 'very strong.' Two sample t-tests were conducted and there was no significant difference (t=0.04, p=0.52) between those with the rubric (mean=3.61, s=0.92) and those without the rubric (mean=3.62, s=0.97).

Finally, two sample t-tests were conducted to see if students who had the rubric performed better on each section of the project than students who did not have the rubric. Table Four highlights the results. For part 1, students scored with the rubric scored significantly higher (t-value = 3.60, p-value = .001). For part 2, there was no significant difference (t-value = 0.74, p-value = .233). For part 3, students with the rubric scored significantly higher (t-value = 2.09, p-value = .033).

CONCLUSION

Overall, sections in which students were distributed the rubric did score significantly higher on two of the three sections of the project. However, the student survey results indicated no statistical difference in their feelings about professor communication, project clarity and satisfaction with the project on the whole. While the rubric may in fact have helped students perform better, the survey indicated that students did not realize this afterwards.

As this project continues in the future, several limitations associated with our research will be eliminated. In the future, attempts to control the differences in teaching style will occur by having all instructors teach a semester without use of the rubric and then teach the following semester with the rubric in order to control for differences in teaching styles and to collect more data overall. Further, it is difficult to make a strong case right now without a larger sample size and there is excitement to see if preliminary evidence is indicative of student achievement in future classes.

REFERENCES

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Exhibit 1:
Scoring Rubric for Financial Analysis Project

Performance Levels	Writing Mechanics	Information Seeking/Selecting and Evaluating (non data information)	Accuracy and Presentation of Financial Ratios	Narrative Description (analysis/synthesis) of Financial Analysis	Summary and Conclusion
Exemplary (A)	Few or no spelling and grammar errors throughout the entire write up, organized as assigned, and with clear and logical beginning, middle, and end.	Student(s) gathered information from a variety of sources, including appropriate licensed databases (excluding company website). Sources are relevant, balanced and include critical readings relating to the question at hand. Information was carefully analyzed and drew appropriate conclusions supported by evidence.	Accurately calculates the ratios and presents them in appropriate charts or tables, and organizes them into logical categories.	Elaborates on each of the financial ratios; relates and integrates them in logical ways comparing them to relevant benchmarks.	Summarizes the discussion of ratios and their relationships clearly to logically reason to a conclusion answering the assignment question. Information is logically organized with smooth transitions.
Above Average (B)	Occasional, independent spelling and grammar errors, organized as assigned, with a discernable beginning,	Student(s) gathered information from a variety of relevant sources (excluding company website). Student(s)	Calculates most ratios accurately and displays them in charts or tables in a logical manner.	Describes the ratios clearly and relates them to some others and some relevant benchmarks.	Summarizes the discussion of the ratios and their relationships adequately and presents a

	middle, and end.	product shows good before was made in analyzing the evidence collected.			logical conclusion answering the assigned question.
Adequate (C)	Repetition of one or two types of spelling or grammar errors throughout the write up (i.e., do rather than due, there instead of their, agreement errors, etc.) with a less organized presentation .	Student(s) gathered information from a limited range of sources (including company website). and displayed minimal effort in selecting quality resources. Student(s) conclusions could be supported by stronger evidence. Level of analysis could have been deeper.	Miscalculates several ratios and presents them randomly in less clear tables and charts.	Describe ratios adequately, but is less likely to relate them to other ratios and minimally refers to any benchmarks.	Briefly summarizes the discussion about ratios and relationship s and a conclusion with little logical direction.
Below Average (D)	Wide variety of spelling and grammar errors, often repeated throughout the write up; organizatio n unclear.	Student(s) gathered information that lacked relevance, quality, depth and balance. Student(s) conclusions simply involved restating information. Conclusions were not supported by	Miscalculates many of the ratios and presents them in confusing way s without adequate charts or tables.	Describes the ratios minimally and ignores the inter-relationships among them and ignores benchmarks.	No clear, definitive summary or nor reasoned conclusion to the question assigned.

		evidence.			
Failing (F)					<14
Total Points					

Exhibit 2

BACKGROUND

1. Gender
   Male or Female (please circle one)
2. Have you had coursework in accounting previous to this course?
3. What was your GPA in high school?
4. What is your GPA at St. Norbert College?
5. Are you an accounting major? Yes or No (please circle one)
6. Please circle your current class standing.
   Freshman Sophomore Junior Senior
7. Please circle your expected grade in this course?
   A AB B BC C CD D F
8. For the following questions please use the following scale:
   1 – Very unclear
   2 – Unclear
   3 – Neither clear nor unclear
   4 – Clear
   5– Very Clear
   a. How clear was the learning objective of each assignment?
      1 2 3 4 5 (please circle one)
   b. How clear were the writing organization (including spelling and grammar) requirements of each project part communicated by the professor?
      1 2 3 4 5 (please circle one)
   c. How clearly did the professor communicate the requirements related to gathering information from a variety of relevant resources (non-financial data)?
      Part 1: 1 2 3 4 5 (please circle one)
      Part 2: 1 2 3 4 5 (please circle one)
      Part 3: 1 2 3 4 5 (please circle one)
   d. How clearly did the professor communicate the requirements related to the accuracy and logical presentation of financial data and ratios?
      Part 1: 1 2 3 4 5 (please circle one)
      Part 2: 1 2 3 4 5 (please circle one)
      Part 3: 1 2 3 4 5 (please circle one)
   e. How clearly did the professor communicate the requirements related to the analysis of financial data to their respective bench marks?

Part 1: 1 2 3 4 5 (please circle one)
Part 2: 1 2 3 4 5 (please circle one)
Part 3: 1 2 3 4 5 (please circle one)

f. How clearly did the instructor communicate the requirements relating to synthesizing the financial and non financial data into a logically supported conclusion?
1 2 3 4 5 (please circle one)

9. How many times did you seek assistance from a TA in the accounting TA office?
1 2 3 4 5 6 >7 (please circle one)
10. How many times did you seek assistance from your professor?
1 2 3 4 5 6 >7 (please circle one)
11. Rate your experience on this project with respect to the following
For the following questions use the following scale:
1 –Dissatisfied
2 – Somewhat Dissatisfied
3 – Neither Satisfied nor Dissatisfied
4 – Somewhat Satisfied
5– Satisfied

a. Working with team members:
1 2 3 4 5 (please circle one)

b. Grade you have received:
Part 1: 1 2 3 4 5 (please circle one)
Part 2: 1 2 3 4 5 (please circle one)
Part 3: 1 2 3 4 5 (please circle one)

Self- Assessment

12. Rate your effort on each part of the project.
Part 1: 1 (low) 2 3 4 5(high)
Part 2: 1 (low) 2 3 4 5(high)
Part 3: 1 (low) 2 3 4 5(high)
(Please circle one)

13. How strongly did the project enhance you understanding of the material presented throughout the semester? (please circle one)
1 (very weak) 2 (weak) 3(neither strong/weak) 4 (strong) 5(very strong)
14. Please provide any suggestions on how this project should be modified next semester