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# Student Perceptions of On-line Homework-grading Software

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## ABSTRACT

Accounting students used homework-grading software and were generally happy with it but its use did not improve their grades unless they had used similar software previously. These are the results of a longitudinal study regarding their perceptions of use of the software. Even though the homework counted for 20% of their grade and they had unlimited attempts to make 100% each week, very few of them took advantage of the opportunity. They would work until they were satisfied with their grade and stop or they would start working late and run out of time before they finished. They knew it was useful and they intended to use it, but 80% of them stopped before making 100% on each assignment. Student responses also reflected the instructor had significantly more “power” at the beginning of the term but by the end, their peer’s influence had increased while the teacher’s influence had waned.

## Keywords

Homework-grading software, intended use, continued use

## INTRODUCTION

The Department of Accounting at a large regional university reported that 25% of students received a “D”, “F” or withdrew from its introductory classes for non-majors. All faculty members teaching the courses required homework but they gave varying degrees of feedback and graded it differently. Some would give credit for attempting assignments while others required the answers to be correct. The department devised a new model that weighted homework grades at 20% of the course grade and required that all homework be completed using various software packages offered by publishers. The software allowed students unlimited attempts to get the answer right so the department thought this might improve the percentage of students successfully completing the courses.

Simon’s theory of Bounded Rationality suggests that people have so many choices and decisions to make that they use their limited memory and abilities in the best way that satisfies the majority of their needs. In other words, some students devote time to a subject only to realize that in order to make an “A” they’ll need to spend even more time than they already have. Do they take time away from another subject or lower their grade standards and accept the “B”? Or is there more to it? Are they influenced by others in their group? Do they allow themselves to fall to the level of the masses? Christakis and Fowler (2007) found that over a period of 30 years, a person whose friend became obese was 57% more likely to also become obese. They submit that this network phenomenon is very powerful, and works even if the friend is miles away. However, they also believe the power of this link could be harnessed and used the other way. Can this link be used in the classroom to encourage students to do their homework?

Studies by Andrews, Tildesley, Hops and Li (2002), and Granovetter (1973) submit that the influence of a peer group has a tremendous effect, even if there is only a weak tie to the group. Andrews et al. studied the use of cigarettes, alcohol and marijuana and found that peers can either lead others into risky behavior or steer their associates away from smoking and drinking. Granovetter looked at social networks, especially those with weak ties and found that they are “indispensable to individuals’ opportunities and to their integration into communities” (Granovetter, 1973). It is possible that weak ties are strong enough to influence students to do or not do their homework.

This paper reports the results of a longitudinal study that examined student perceptions of computer software for grading their accounting homework. Using computer software should be beneficial since it gives immediate feedback. This is particularly

valuable when students work on foreign concepts to encourage nascent skill sets. The purpose of this study is to examine whether the usefulness and ease of use of this kind of computer program affect their intent to use and continued use. Do students use the software to do their homework because they think it is useful or easy to use? Once they have some experience with it, will they persist with the same intensity? If they perceive the computer supported homework program is useful and easy to use, will these features encourage students to complete all the assignments? Will the instructor play a motivating role to urge them to complete all coursework? However, students are required to use the software to complete assignments and this grade becomes part of their university experience. Are they graded on their use of technology or their subject matter comprehension? These questions need answers if educators are to continue using the interactive tools in the best possible way.

## LITERATURE REVIEW

Davis (1989) presented a technology acceptance model (TAM) that attempts to explain how people approach new software. He suggested there were two major components, perceived usefulness defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” and ease of use, as in a measure of the effort required to learn to use the software. Brown et al (2002) examined TAM in a mandated situation where bank personnel were required to use computers to perform their jobs. They found that in order to maximize employee use, organizations should focus on promoting the benefits to positively influence their attitudes. They also found peer influence to be a factor in its use.

Venkatesh (1999, 2002) also examined technology acceptance focusing on user training as an influence on use. His training environment model (1999) showed that game based training increased a person’s intention to use, by-passing the ease of use construct. His motivational model uses extrinsic motivation and intrinsic motivation to predict intention to use. Building on his previous work, Venkatesh, Speier and Morris (2002) posit that intrinsic motivation, perceived ease of use and perceived usefulness are the three constructs that influence behavioral intention to use and continued use of software.

Cognitive absorption, a theoretical construct made up of personal innovativeness and playfulness was presented by Agarwal and Karahanna (2000) as the antecedent of perceived usefulness and perceived ease-of-use. They believed that the construct of attitude from the original theory of reasoned action (Ajzen and Fishbein, 1980) should also play a part in any research aimed at discovering why people do or do not use software. Does attitude play a role in determining the use of home-grading software?

Ravenscroft and Buckless (1992) reported that examination of accounting students’ scores in two different universities revealed that when the professor included homework grades, females earned better grades than males but when the grades were computed from exams alone, males earned higher grades, partly because they were more competitive. Does gender really play a part in student success?

Further research has been carried out by Bhattacharjee and Sanford (2006). They address these issues and examine three research questions involving the influence processes that shape user acceptance and the effects and persistence of the influence processes across a population, based on the temporal state called the elaboration likelihood model (ELM). They agree that external influences such as the credibility of the source urging them to use it play a large part in determining whether or not a person uses technology. Therefore, a teacher should have some power in motivating a student to use the software.

Bounded rationality (Simon, 1972) is the term coined by Simon to explain why people don’t always make the most rational decision. Humans are constricted by limits on time, mental capacity and lack of knowledge, all of which are needed to make rational selections. This results in satisficing, or making a selection that is not the optimal one but the best one under the circumstances, all things considered. For students, satisficing might be the combination of studying and partying that allows them to pass a course without passing up all pleasurable entertainments.

Boyce (1999) wrote, “The computer is not the ultimate teaching tool, but part of a range of educational technologies which are available (Boyce, 1999).” He examined the use of computer-assisted teaching and learning in accounting but he was also concerned with teachers who were unsure of how to use computers in an educational setting. At the time, there were no homework-grading software packages and no general agreement that computer-assisted learning was desirable. Today, students come to college armed with basic computing skills, the result of computer classes in public schools. Instructors have no fear of assigning homework to be completed online. Very few students need help even getting started.

Carnaghan and Webb (2007) investigated the effects of technology on satisfaction, learning and engagement but they used personal response devices (clickers or remote controls) in the classroom. They found that the technology increased student satisfaction, but not student engagement in the class. Lindquist and Olsen (2007) examined the role of feedback as in check

figures or completed solutions. They did not find a difference in overall test scores of the students who received homework solutions compared to those who did not have access to them but the level of satisfaction was again augmented. Halabi (2006) also tested the effect of feedback provided by computer software in an accounting class. He found that students who had no prior knowledge of accounting performed better with richer feedback, which included phrases such as “Incorrect. Please try again. Remember the account you are after is a current liability” compared to basic feedback such as “Incorrect. Please try again.”

Therefore, it seems likely that students, when told by their instructor that the software will help them learn and can help them pass the course, will use the software to do homework and will complete all homework since it is so important.

**METHOD**

The students were followed over two semesters in two different accounting courses. They were asked to complete a questionnaire at the beginning of the term, mid-way through the term and at the end of the term about their intention to use or continued use of software to grade their accounting homework. Questions about the same constructs were asked each time and the student answered questions about the importance of different aspects of the process using a Likert Scale (1-7). Some of the students were required to use Personal Trainer software and others were required to use the Cengage website that had been integrated through Blackboard. There were 267 responses which were examined using SPSS. The reliability analysis provided an alpha of .8239 which is adequate. Their answers led to some new insights on the use of technology.

The students were told they had to use the Cengage software. They could not get a better grade than “C” if they didn’t do their homework using the online grading system. On the first day of class, they saw a demonstration and were shown how to enter their answer to a homework problem and click “Enter Answer”.

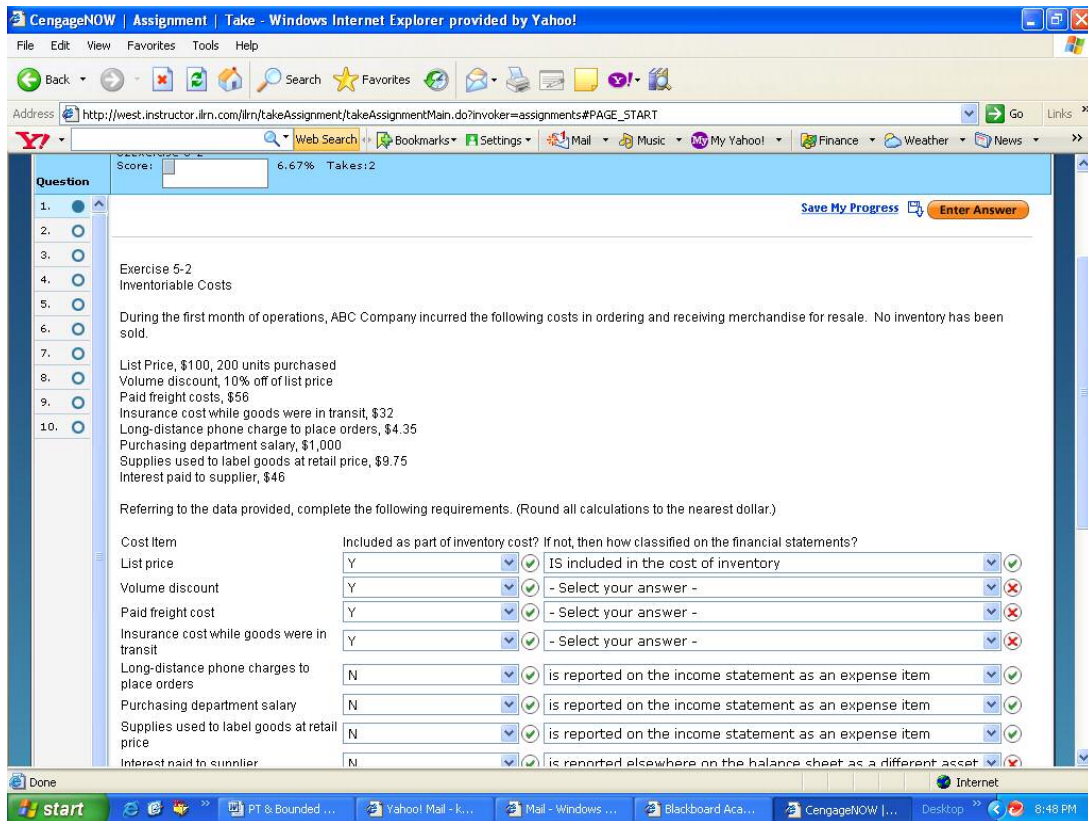


Figure 1: Screen shot from Cengage homework grading software

If their answer was correct, they would see a green check. If the answer was wrong, there would be a red X. After the first attempt, hints were available. They had an unlimited number of attempts but they had to have the assignment completed by the end of each week. There were tutors available about 30 hours a week in the accounting office and the professor was always available either during office hours or through email. The Accounting Department believes in the Generation Effect (Lindquist, 2007) or “learning by doing” and feels that students who are willing to put forth an effort should have as many chances as they wish to get the problem right. The department believes that students learn best by working problems, but since the class sizes have grown to 100+, the only way to effectively grade all the assignments is by using the software. An example of one of the Cengage problems is shown below in Figure 1. Some of the questions are simply drop down boxes similar to multiple choice questions but some actually ask for a number as an answer.

Since the use of the software was required, it does not seem to fit the technology acceptance model. They may think it is NOT useful and NOT easy to use, but they have to use it anyway. And, depending on the urgency of the task, the user may not care about trust or reliability issues in the same way as e-shoppers do. They are not required to give their credit information, but they do have to complete a task.

Based on the previous literature, there might have been differences based on gender, age, educational level or even differences due to a student’s motivational intensity. There might have been differences based on previous computer usage and experience. After seeing the demonstration, students should have believed it was useful and would help them learn. They should also have believed that if their peers were using the software, they would also use it.

The questionnaire was created to measure eleven constructs based on the student’s perception of various components. A factor loading found there were twelve components in the first survey that accounted for 84.73 % of the variance but after all three survey responses were entered, there were only nine constructs accounting for 79.414 % of the variance. The constructs can be seen in Table 1.

Construct	Item: The software...	Source
Usefulness	Will be useful	Davis (1989), Venkatesh (1999, 2002),
	Will enable me to perform better on my tests	
	Will increase my chances of getting a good grade	
	Will help me do my homework faster	
Fun	Will be fun to use	Agarwal and Karahanna (2000), Carnaghan and Webb (2007)
	Will be entertaining	
	Will be an enjoyable activity	
Ease of use	Will be simple to use	Davis (1989),
	Will be easy for me to become skillful at its use	
	Will be easy to operate	
Reliable	Will give the correct answer	Butler and Gray (2006), Orlikowski (1993)
	Will operate correctly	
	Will be reliable	
Time	Using the software will not take much time	Simon (1972)
	Will not need to invest a lot of time using it	
	Will not take much to learn to get started	
Physical	Will not be physically exhausting	Agosto (2002)
	Will not overload me with too much information or features	
	Will not give me physical discomfort	
	Will not make me tired	
Peers	Will be used by all my friends	Christakis and Fowler (2007), Andrews et al (2002)
	My friends told me to use it	
Importance	Using it to do the assignment is very important to me	Carnaghan and Webb (2007), Halabi (2006), Ravenscroft and Buckless (1992)
	Turning in homework on time is very important	
	Turning in homework perfectly is very important	
Teacher	There is no way out of using it if I want to pass	Bhattacharjee and Sanford (2006)
	My teacher told me that I have to use it for this class	
Intention	I do not intend to use it if I do not have to	Ajzen and Fishbein (1980), Davis (1989)
	I intend to use it to do my homework	
	I intend to use it to learn accounting	
	I am committed to getting the best grade possible	
	To perform excellently in this class is my top priority	
	Getting an A in this class is not the most important goal	
	I just need to get a passing grade for this class.	
Computers	I am comfortable using computers	Boyce (1999), Carnaghan and Webb (2007)
	I feel comfortable using computers to do homework	
	I have no problem fixing computer glitches or crashes	
	I have a certain apprehension about the use of computers	

Table 1: Constructs and survey questions

**RESULTS:**

The following table shows the results of each construct over the three questionnaires. Similar questions from the survey were grouped together and the responses, using a Likert scale, were averaged. The means of construct “useful tool” from the first questionnaire were compared to the means from the second and third questionnaires.

Construct	Sig. (2-tailed)			Likert Scale where 1 = not important and 7 = very important		
	Difference between 1 <sup>st</sup> & 2 <sup>nd</sup> survey	Difference between 2 <sup>nd</sup> & 3 <sup>rd</sup> survey	Difference between 1 <sup>st</sup> & 3 <sup>rd</sup> survey	Mean of construct in questionnaire 1	Mean of construct in questionnaire 2	Mean of construct in questionnaire 3
Useful tool	<b>0.022*</b>	<b>0.000***</b>	<b>0.007***</b>	5.719	5.4980	5.4480
Fun	0.346	0.91	0.686	4.280	4.1878	4.1389
Ease of use	0.518	0.061	0.723	5.627	5.7328	5.5767
Reliability	<b>0.044*</b>	0.993	0.075	5.977	5.770	5.7820
Time	<b>0.000***</b>	<b>0.000***</b>	<b>0.000***</b>	5.020	5.2347	4.4987
Physical	<b>0.000***</b>	<b>0.000***</b>	0.065	5.243	5.3730	5.3227
Friends	<b>0.022*</b>	<b>0.02*</b>	<b>0.000</b>	3.345	3.8647	4.1970
Important	0.916	0.742	0.09	5.922	5.9655	5.7970
Teacher	0.277	0.607	<b>0.013*</b>	5.991	5.9214	5.600
Intention to use	0.845	<b>0.000***</b>	<b>0.000***</b>	5.370	5.5970	4.8400
Computers	<b>0.000***</b>	<b>0.000***</b>	<b>0.014*</b>	4.746	3.2790	4.3858

**Table 2 Construct Means Table**

\* Significant at the .05 level

\*\* Significant at the .01 level

\*\*\* Significant at the .000 level

According to the responses to the first survey, they did not care if it was fun or if their friends were going to use it. They planned to use the software to learn accounting and getting a good grade was important. The students were confident that it would not take too much time to learn the software and they were sure they would use it to learn accounting.

There were some significant changes in the student’s responses half-way through the semester. Their response as to the usefulness of the software dropped significantly from the first to the second questionnaire and dropped even more by the end of the term. At first, it was very important to them that the software would be useful in helping them learn accounting and make a good grade but their attitudes changed by mid-terms. There is a difference in the means of the “useful” construct between the first and second surveys but no change between the second and third surveys. However, the difference between the first and third surveys is still significant.

Another significant drop occurred in their perception of the importance of the teacher. At the beginning of the term, using the software because the instructor said to was very important, but by the end of the term the mean dropped. Also at the beginning of the term, the student responses indicated that it was not important that their friends would be using the software but that quickly changed. Eight weeks into the term, there was a significant difference. The importance of the teacher dropped at the same time the importance of other students increased. The surveys were administered at a large (18,000 students) southeastern urban university and the classes can have over 100 students in them. Students start the semester not knowing each other but after eight weeks, they apparently become acquainted. Maybe it is the shared experience of listening to the lecture and doing the homework that creates a bond and increases the importance of their peer’s opinions.

The construct built on the homework being important and the importance of doing homework on time and perfectly showed an average of 5.9 as a response to the first two surveys but dropped to 5.7 by the end of the term. This may be another example of bounded rationality. They have too many courses, too many hours at work and too many outside activities. Their

response is to make the homework less important in their minds. Or, maybe a sixteen week semester is too long. Maybe students can only focus for eight to ten weeks.

Another interesting result involves the student's perceptions of reliability. This construct is created by the student responses to the question: "How important is each of the factors?" The three statements were: "The software will give the correct answer", "The software will operate correctly", and "The software will be reliable". The average on a 1-7 scale with 7 being the most important was 5.977, the highest of any response. Unfortunately, the software had several bugs. One time the correct answer was 0.00 but when students entered "0" their response was counted incorrect. There were two bad errors where the software counted the wrong answer as correct and one case where doing all the work correctly only resulted in a grade of 97%. So the mean dropped over the semester from 5.97 to 5.77 and then 5.78. The importance of the software's reliability decreased. It was not perfect, but it was good enough to get the job done which is another way to look at satisficing.

Students responded to the survey statement "Using the software will not take much time" on the first survey by saying it was moderately important. By the second survey, it apparently became more important but by the end of the semester, the amount of time was no longer a key issue. It appeared that some students had accepted that they were not going to get the "A" and time was no longer relevant.

Some additional comments were made by students and involved physical sensations such as eye strain from focusing on the computer screen or cramped muscles from sitting in one place too long. They may have realized by the second survey that there were physical issues which would account for the significant increase in the importance of physical issues, but by the third survey, they had adjusted.

The computer construct had several statements such as "I am comfortable using computers," "I feel comfortable using computers to do homework," and "I have no problem fixing computer glitches or sudden crashes." In the first survey, the average response was about a "4" meaning "neutral". By the second survey, that dropped in "3" range meaning "somewhat disagree". But note that by the third survey, the mean increased. The differences are significant each time. This could just reflect that computer use leads to computer self-efficacy. The data was tested to determine if the results differed by gender but there was no significant difference between the responses of men and women. A comparison of student grades based on previous use of similar software showed a significantly higher final average was held by students with previous experience, even if the previous use was a program used by the math department.

A t-test was performed to determine if gender was a factor in exam grades. There was no significant difference. The mean exam score for 139 men was 68.76 and the mean score for 125 women was 69.52. Another test examined the difference in homework scores. The average for the male students was 90.54 and the average for female students was 90.58 showing no significant difference. The final average using homework and exams was 77.69 for men and 77.33 for women. These results are in direct opposition to those found by Ravenscroft and Buckless in 1992. It would suggest that gender is no longer a determinant of success in accounting.

Students reported other factors that influenced their intention to continue using the software. Their remarks were generally favorable: "It gives you hints in order for you to get the right answer"; "I like being able to try again until I get it right"; and "No wasting paper and instant gratification of grades; the ability to review homework in class afterwards instead of turning it in and waiting." However, there were a few complaints: "When my computer was slow it was hard to get work done in a timely manner"; "the software had some 'rounding' issues that made completing homework complicated and time consuming"; and "It gave the wrong answer on a problem which made me question its reliability for the rest of the homework assignments."

SPSS was used to determine if students who initially recorded that it was very important to earn an "A" had higher averages at the end of the term. There were no significant results. Saying making an "A" was a top priority did not necessarily make it so. Intentions do not always lead to results.

## CONCLUSION

Even though the homework counted for 20% of their grade and they had unlimited attempts to make 100% each week, very few of them took advantage of the opportunity. They would work until they were satisfied with their grade and then stop or they would start working late and run out of time before they finished. They knew it was useful and they intended to use it, but 80% of them stopped before making 100% on each assignment, even though 80% of the students made 100% the first week. They started strong but lost a lot of steam. Even after promoting the use of the software, introductory accounting classes for non-accounting majors still had 25% of the students receive a grade of "Withdrawn," D or F.



“Ease of use” and “perceived usefulness” were important when technology was new but today’s college students do not consider computers “new”. They cared about getting their tasks accomplished. No students suggested giving up the software to return to pencil and paper. They appreciated the immediate feedback and the opportunity to submit answers until they got it right. One young lady submitted answers 205 times until she earned the green check! The results also show that gender is no longer an issue in accounting education.

It is very interesting that students did not care what their friends thought about the software at the beginning of the term, caring more about the teacher’s views, but totally flip-flopped as the semester progressed. Instructors should be aware that they seem to have more power early in the semester before the student’s peers become more important, even though some of those ties were very weak. Most of the student’s responses reflect their desire at the beginning of the semester to do well but by the end of the semester, the course became less important in most aspects. By then, they just wanted out!

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