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Regular Lecture Quizzes Scores as Predictors of Final Examination Performance: A Test of Hypothesis Using Logistic Regression Analysis

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Abstract
Student academic success in school demands acquisition of specific skill sets that emphasize self-assessment, monitoring, adjustment, self-control, and motivation; the courage and ability to adopt efficient learning strategies; and resiliency in case of academic difficulties. As hypothesized, data from the present study demonstrates that student performance in routine lecture quizzes can predict performance in the final examination and successfully completing a course. Course data accumulated from several courses taught by the same instructor in the last five years (n=1294) were used in this analysis. The results generally indicate that: 1) performance in the quizzes is positively correlated with performance in the final examination; 2) students who attain a score of 70% or more in the quizzes are nine times as likely to pass the final examination with the same or higher score compared to those who do not. However, achieving better grades of a high "B" and above requires lecture quiz scores 80% and above; and 3) students attaining passing grades of 90% and over in the quizzes are three times as likely to pass the final examination with a similar or higher score; while students who attain a failing grade of 59% or less in the quizzes are twenty five times as likely to fail the final examination compared to those who passed. These results emphasize the critical role played by educators in the adoption of frequent course assessments as an integral part of instruction; the importance of educator engagement in providing routine formative feedback to students; the importance of students' self-evaluation and staying on track with course material as the course progresses; and the need for students to be proactive in seeking help early in the semester to understand course content and improve their test taking skills.

Keywords
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Abstract
Student academic success in school demands acquisition of specific skill sets that emphasize self-assessment, monitoring, adjustment, self-control, and motivation; the courage and ability to adopt efficient learning strategies; and resiliency in case of academic difficulties. As hypothesized, data from the present study demonstrates that student performance in routine lecture quizzes can predict performance in the final examination and successfully completing a course. Course data accumulated from several courses taught by the same instructor in the last five years (n=1294) were used in this analysis. The results generally indicate that: 1) performance in the quizzes is positively correlated with performance in the final examination; 2) students who attain a score of 70% or more in the quizzes are nine times as likely to pass the final examination with the same or higher score compared to those who do not. However, achieving better grades of a high "B" and above requires lecture quiz scores 80% and above; and 3) students attaining passing grades of 90% and over in the quizzes are three times as likely to pass the final examination with a similar or higher score; while students who attain a failing grade of 59% or less in the quizzes are twenty five times as likely to fail the final examination compared to those who passed. These results emphasize the critical role played by educators in the adoption of frequent course assessments as an integral part of instruction; the importance of educator engagement in providing routine formative feedback to students; the importance of students' self-evaluation and staying on track with course material as the course progresses; and the need for students to be proactive in seeking help early in the semester to understand course content and improve their test taking skills.

Keywords: *Continuous assessment tests, self-regulated learning, probability, general model, quizzes, final examination, odds ratio, logistic regression*

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Several studies have demonstrated that student academic achievement is affected by student self-regulation including thoughts, feelings and actions that allow them to make decisions to achieve specific goals (Zimmerman, 2000; Kitsantas, 2002). Such self-regulation might include a variety of strategies that enable students to complete tasks in a timely manner; monitor and evaluate their performance and make adjustments as necessary; and exercise diligence in seeking help when needed. The ability to set realistic, specific and achievable goals varies from student to student and is affected by a variety of factors in a student's life. Such factors could be student paid work schedules, immediate family obligations, personal physical and psychological health, and collegiality. Studies indicate that students who are self-regulated, set goals and self-monitor their progress display higher skills acquisition than those who set goals and do not self-monitor (Zimmerman, 1998; Zimmerman & Kitsantas, 1997, 1999). Zimmerman (2000) argues that students who are self-regulated are also self-motivated and have the ability to replace their learning strategies with more efficient ones if the desired goals fall short of expectations. This can be done for example, by seeking assistance from others when necessary or restructuring their learning environments to be more conducive if performance remains poor. Self-motivation is closely associated with personal outcome expectations and student's self-efficacy beliefs of performing to expected standards. Such efficacy beliefs enable students to set high goals for themselves, self-monitor their performance accurately, self-evaluate their strategy outcomes, and persist in case of difficulties (Bandura, 1986; Kitsantas, 2002).

Although there is no uniform consensus on the topic of student's ability to adapt their learning strategies to task demands, the topic of strategy adaptation has received increased publicity and experimental research (Thomas & Rowher, 1987; Winne & Hadwin, 1998; Nist & Simpson, 2000; Braten & Samuelsten, 2004; Broekkamp & Van Hout-Wolters, 2007). Findings indicate that strategy adaptation often transfers to other beneficial strategies like better time management; re-evaluation of personal learning goals; and better differentiation of tasks at hand (Broekkamp & Van Hout-Wolters, 2007). For example, in goal setting, students might ask themselves: "Should I review for the test now, read the textbook, or do additional online research?" A study by Thomas and Rowler (1987) indicates that if course tests demand deeper comprehension skills, students are better able to adopt deep-processing techniques to improve their academic performance. Such deep processing could involve connecting new information with prior knowledge, mapping concepts, mental imaging, and formulating analogies, examples, questions or diagrams (Broekkamp & Van Hout-Wolters, 2007).

In a model formulated by Broekkamp and Van Hout-Wolters (2007), students also use a variety of instructor and personal cues "to construct their representation of task demands" (p.410). Such cues could be: 1) Explicit information given by instructor (like "please be very attentive to this concept"); 2) Information only implied (like when quiz questions give pointers to what instructors want students to remember in a particular topic); 3) Student collaboration with each other allowing them to reflect on task demands which may be augmented by parents, older siblings or other older students in the group who may suggest what and how best to study; 4) Reliance on learning materials to infer what is important in a particular topic including previous exams by the same instructor, bolded or underlined concepts, glossaries, words in italics and a summary of key concepts with definitions; and, 5) Students' memory of previous test strategies and concepts, especially if they are excelling in the course. According to Carvalho, a successful regimen for students includes: making decisions regarding the efficiency of their learning strategies, learning how to best

monitor their performance, making attributions to their failures and successes and adapting their behavior to benefit future similar situations (2009). Students progressively develop to be more independent and self-regulated after they attain a level of proficiency that allows them to monitor their own progress, effectively assess their attributions and manage their learning environment (Carvalho & Isobe, 2004; Carvalho, 2009). In many classroom situations, students are exposed to many different learning opportunities which are understood and perceived differently by different students. Test taking (including end-of-chapters tests, verbal instructor classroom questions, lecture quizzes, practice exams and mid-terms) is perhaps one of the most valuable opportunities for students to regulate their own learning in a certain domain (Carvalho, 2009).

Study Hypothesis and Analysis

There is an almost universally accepted notion among educators and others that students who perform well in continuous assessment tests are very likely to successfully complete a course with a reasonably good final grade. Such students are deemed to possess better organization skills, are more motivated, seek assistance when needed, utilize available resources optimally, and are able to adapt their study habits to suit their needs. While this may well be self-evident, educators cannot be complacent and take this for granted. Similar to the controversial "No Child Left Behind Law" introduced during President Bush's era, educators do not want to "leave any student behind" in the courses they teach! We revisit this issue following four observations: 1) Among students who routinely perform well in continuous assessment tests, there are a some who fail to get "expected" grades in a course at the end of semester; 2) Some good-performing students in the course can do even *better* in understanding the material taught and achieving excellent grades as a result; 3) There are some students who routinely perform sub-optimally in continuous assessment tests (even fail) but successfully complete a course and thus, cannot be counted out as yet; 4) Often, there are students who entirely fail to pass both continuous assessment tests and final examination perhaps due to lack of initiative, poor preparation, low self-motivation, and/or little perceived interest in successful performance.

Our main premise is to use data to encourage educators to become more engaged even for "better performing students" and to develop more focused interventions throughout the semester which target all students using focused-formative feedback. Using a relatively large dataset of student lecture quizzes scores in different courses taught by the same instructor; we seek to gauge general student performance, and to find out whether students are using strategies such as self-regulation, self-motivation, self-monitoring and analysis resulting in successful course performance. We hypothesize that students who successfully pass a course with grades in the "good (mid-to-high B)" and "excellent (A)" ranges in their final examination are most likely using all or some of the above strategies to modify their learning environment. We use student performance scores in lecture quizzes which are multiple choice tests averaging 10-15 questions given immediately after each day's lecture. We make the assumption that students who score grades of "C" (79%) and below in the final examination have not been able to modify their learning environments and if they have, it was marginal. We understand that using this final examination performance as an index to incorporation of better learning strategies is "a measure by implication", rather than a direct measure, and that there may be other reasons associated with improved student performance (addressed in the discussion section below). Considering the study's large sample size and variety of courses utilized, each with a different set of students, we believe that better student performance in their final examination is consistent with the discussion by Broekkamp and Van Hout-Wolters (2007). The authors state that student

routine self-reflection on course performance, continued self-motivation with adoption of better study habits, development of better time management skills, re-evaluation of personal learning goals, and better differentiation of tasks at hand greatly facilitate better performance. We conclude the study by generating regression equations that will help students and educators predict final examination performance based on the level of performance in continuous assessment tests.

Method

We used test data accumulated from several courses taught by the same instructor within the last five years with a sample size of 1294 students. Courses included both lower division courses such as, "Introduction to Biology" for non-majors, "Human Biology", "Environmental Factors in Health"; and upper division courses like "Environmental Health", "Human Nutrition" and "Genes and Human Health". In all lectures taught by this instructor, students attended roughly 2-hour lecture sections twice a week for a whole semester (with three sessions reserved for major examinations). Lectures were posted on the *Blackboard* learning environment as PowerPoint lectures accessible to students in advance of in-class meetings. Students were expected to review the lecture notes to be covered in each session beforehand, and could choose to print the lecture notes, save them on their laptops to be accessed in class, or at the very least, review the notes online before coming to class. Lecture quizzes were administered each day after lecture either during the last ten minutes of lecture or were timed tests completed online before the end of the day. Data for each student from each course was recorded in two columns in a *Microsoft Excel* spreadsheet: semester-long mean lecture quizzes score and the corresponding final examination score. Data used in this study were amalgamated from the individual courses in increase the sample size.

Statistical analysis

First, data from lecture quizzes and final examination scores is tested using Spearman's Rank correlation coefficient to assess the nature of the relationship between the quizzes and final examination scores; and its strength. Second, a logistic regression model is used to test: a) whether passing the lecture quizzes with at least 70% can predict passing the final examination with a similar or higher score *(the general model)*; b) whether attaining a particular score in lecture quizzes (59% or below, 60%, 70%, 80% and 90% or more) can predict the score in the final examination *(scenarios 1-5).* Third, as the logistic regression equation predicts the probability of the occurrence as a function of the independent variable (s), it can be used to predict the probability of a hypothetical student passing the final examination with a certain score. To do this, the y-value obtained from the general equation ($y = a + bX$) is then converted into a probability between zero and one in an S-shaped curve using the function: $p = e^{a+bX}/1 + e^{a+bX}$.

Results

Spearman's Rank correlation coefficient analysis of quizzes scores with those of the final examination is weak but positive ($r=0.34$, $p<.001$, $n=1294$). Logistic regression analysis data for *the general model* and *scenarios 1-5* discussed in the "Methods" section (Table 1) indicates that: 1) Students attaining combined quizzes scores of at least 70% are approximately 9 times (OR value of 8.78 in Table 2) as likely to pass the final examination with the same score or better compared to those who got scores below 70% ($X^2= 160.53$, $p<.001$). 2) Students attaining combined quizzes scores of at least 90% are 3 times (OR value of 2.74 in Table 2) more likely to pass the final examination with the same score or better compared to those who got scores below 90% ($X^2= 60.85$, $p<.001$). 3) Students

attaining combined quizzes scores of between 60-69%, 70-79% and 80-89% have no better odds of doing any different in the final examination and the results are not significant (X^2= 5.00, OR = 0.51, p=0.03; X^2= 1.42, OR = 1.24, p=0.23; X^2= 0.52, OR = 1.12, p=0.52 respectively). 4) Students attaining combined quizzes scores of 59% or less are 25 times (OR value of 24.93 in Table 2) more likely to fail the final examination compared to those who got scores above 59% (X^2= 134.09, p<.001).

Table 1. Results from logistic regression analysis of class data from pop-quizzes and final examination for several different scenarios (n=1294).

Data Scenario	*X^2*	*Odds Ratio(OR)*	*Coefficient*	*Probability*
General Model: If a student's total quizzes score is at least a 70%, what are the chances of the student passing the final exam with at least a 70%?	160.53	8.78	2.17	<0.001
Scenario 1: If a student's total score in the quizzes average at least 90%, what are the chances of getting 90% or more in the final exam?	60.85	2.74	1.01	<0.001
Scenario 2: If a student's total score in the quizzes is a score is between 80-89%, what are the chances of getting the same in the final exam?	0.40	1.12	0.12	0.52
Scenario 3: If a student's total quizzes score is between 70-79%, what are the chances of getting the same in the final exam?	1.42	1.24	0.21	0.23
Scenario 4: If a student's total quizzes score is between 60-69%, what are the chances of getting the same in the final exam?	5.00	0.51	-0.67	0.03
Scenario 5: If a student's total score in the quizzes is a failing score of 59% or less, what are the chances of getting the same in the final exam?	134.09	24.93	3.22	<0.001

To calculate the probabilities of a hypothetical student passing the final examination from the scores obtained from lecture quizzes using the probability function ($p = e^{a+bX}/1 + e^{a+Bx}$), the following results were obtained (Table 2). These results indicate that compared to everyone else's performance in the class, a student has a 95% chance of passing the final examination (with a 70% or higher) if he/she obtained a score of at least 70% in the quizzes (X=1); and a 70% chance if he/she obtained a score of less than 70% (X=0).

It should be noted here that while data on Table 1 predicts the odds of passing the final examination from total quizzes scores, those odds are compared *to students who did not attain the condition in question*; data on Table 2 compares the overall probability of a student passing the final examination with *all students*. For example, as shown on the last column of Table 2, the odds of getting a 70% in the final examination if a student obtained 70% in the quizzes is 78% (as reported in Table 1); while the overall probability of passing

final examination if a student passed the quizzes with a score of at least 70% is a high of 95% (general model, Table 2). Likewise, while the odds of failing the final examination if a student failed the quizzes with 59% or less is 93%; the overall probability of passing the final examination with at least a 59% compared to all students is a low of just 18%.

Table 2. Probabilistic equation and function results of logistic regression analysis data for the three statistically significant scenarios of class data (n=1294)[1].

Scenario	*Equation (y=a + bX)*	*Overall Probability*	*% Likelihood (from ORs in Table 1)*
General Model	y = 0.85 + 2.17X	0.95 (if X=1) 0.70 (if X=0)	78%
Scenario 1	y = -1.12 + 1.01X	0.57 (if X=1)	74%
Scenario 5	y = -4.71 + 3.22X	0.18 (if X=1)	93%

[1]Scenarios 2-4 in Table 1 were dropped from this analysis due to non-significant results obtained in Table 1

The final examination means for students for five different scenarios (Table 3) are fairly similar for those attaining lecture quizzes score above 60%. Testing for the difference between those means with different sample (n) sizes, significant results were obtained (Table 3) ($F = 256.55$, $p<.001$). This statistical significance appears to be largely influenced by the relatively lower means for those with average quiz scores of 79% or below ranging from 70.76% to 85.51% for 772 students (Table 3).

Table 3. Average means in the final examination scores for students who obtained different scores in the quizzes for five different scenarios (n=1294).

Scenario	*Mean*	*Standard Deviation*	*Number of students (n)*
Average FINAL grade of those who got at least a 90% in the quizzes	89.25	11.43	368
Average FINAL grade of those who got between 80-89% in the quizzes	89.11	10.35	154
Average FINAL grade of those who got 70-79% in the quizzes	85.51	10.19	190
Average FINAL grade of those who got 60-69% in the quizzes	85.22	11.22	188
Average FINAL grade of those who got 59% or below in the quizzes	70.76	16.58	394
	ANOVA (F) = 256.55, p<.001		

Discussion

One goal of this study is to analyze data to support the widely held view that student final examination performance (and successfully passing a course) can be predicted from their overall score in routine semester-long quizzes given periodically by the instructor. Studies have shown that students prior test exposure significantly improved their performance in later exams (Gurman 2011; Brookhart 1997). Although a positive correlation was found between overall quiz scores and the final examination score in *the general model* (Table 1) it was relatively weak (Spearman's Rank correlation coefficient, $r=0.34$, $p<.001$, $n=1294$). We believe that four factors greatly affected this outcome. One, as noted by Carvalho and Isobe (2004), most students may not be fully aware of how well they self-monitor their performance on tests so that they can make appropriate changes in a timely manner. Some students do not adequately prepare for the quizzes as they do for the final examination. This means that students may be aware that they are doing poorly in the quizzes, but hope to prepare better in the final examination. For example, Wambuguh's (2008) study on teaching large evening classes noted that students would routinely miss a lecture session only to show up during the last fifteen minutes of lecture to take the lecture quiz, resulting in a poor score due to inadequate preparation (Wambuguh, 2008). To ensure utilization of better learning strategies to enhance comprehension of course material, students must be encouraged to participate in instructor office hours, consult often with peers, take practice tests and use online support resources which most adopted textbooks offer. Unfortunately, as the course progresses, some students appear less motivated to adapt their study habits to the feedback they get from the quiz scores, but somehow hope to pass the course.

As noted by Zimmerman (2000), such careless behavior can be brought about by a scattered student learning environment filled with demanding job expectations, family obligations, poor personal health and poor collegiality. Two, students often neglect or miss opportunities to complete lecture quizzes especially if they are to be completed online on the same day as the lecture. This can result from the complexity of student work schedules, overscheduled family commitments, lack of self-discipline, sheer carelessness or "it is only a quiz" attitude, or just getting overwhelmed and not keeping up with the material in the course. Further, perhaps the low point-worth of the lecture quizzes is considered relatively safe by some students. Three, student cognitive receptivity – many students usually require the "threat" of a major catastrophe waiting to happen to prepare and galvanize their mental energies and attitudes which are required to successfully complete a task. In most colleges, final examinations are given a specific week on the course schedule which reinforces the notion that these are serious examinations that could mean failing a course and delaying academic progression. Four, the test type (in this case multiple choice) may not be effectively stimulating students' metacognitive skills as would short-answer type tests which, as noted by Pressley et al. (1990), require "deeper levels of processing and effortful retrieval of information" (p. 105). This last issue requires further research.

On a more positive note, despite the weak positive correlation found between the two variables (lecture quizzes and final examination scores); more robust statistics (logistic regression analysis) was more data sensitive and produced better results that can be used to make predictions. These results support our hypothesis that for those who do well in the quizzes achieving at least a 70% score on average, their chances of achieving the same score or higher in the final exam is better (*nine* times greater) than those who do not (Table 1). Indeed, as shown in Table 3, students who scored between 70-79% in the lecture quizzes averaged scores of 85.51% in their final examination with a probability of passing that examination at 95% (*the general model*, Table 2).

The results of this study have also enabled the development of three equations, one for *the general model* and the other for two specific scenarios (Table 2). We found this somehow complex analysis (especially for those who are not very conversant with logistic regression analysis) necessary as a performance predictor as described next. Thus, a hypothetical student can use his/her continuous assessment score to predict likely performance in the final examination. For example, using the general model equation ($y= 0.85 + 2.17X$, Table 2) a student whose average quiz score is say, 77%, can calculate the probability of passing his/her final examination with a score of 70% or higher by substituting the values in this equation using the general probabilistic function ($p = e^{a+bX}/1 + e^{a+Bx}$). Substituting X with 1 (not zero as the student is above 70%, and X=1), the student would get a probability of 95% of passing the final with a score of at least 70%. If the student were to get an average quiz score of below 70 (then, X=0) the resulting probability would be lowered to 70%, which is not as bad and an optimistic assurance that the student can still do well in the final examination even after dismal performance in the quizzes. This lower probability, which is still pretty good for those scoring less than 70% on the quizzes, may appear puzzling, even contradictory to the premise of this study. However, for the five reasons cited at the beginning of this section (poor self-monitoring, poor quiz preparation, carelessness, poor cognitive receptivity, and type of test) there are multiple intrinsic and extrinsic factors that can affect student overall performance in a course.

On the other hand, these results indicate that there appears to be a *minimum* threshold average quiz score (80-90% in this study, Table 3) that greatly improves the odds of doing well in the final examination (high "B" score). This is where the modification of the student's learning environment with lecture quizzes feedback comes into play following the five strategies for successful intervention (page 2) noted by Broekkamp and Van Hout-Wolters (2007).

Careful self-monitoring, continuous evaluation, timely adjustments to study habits are integral components of self-directed learning. We had hypothesized that only those attaining quiz scores in the "A" and "B" range would show significant performance in the final examinations and thus were showing clear signs of self-motivated and self-regulated learning. We also assumed that students scoring 70% and below in the lecture quizzes were less self-motivated and less engaged in utilizing strategies of self-evaluation, self-monitoring and thus improved study habits. This was not supported by the results obtained. As seen in Table 1, the probability of students who attained lecture scores between 60-89% doing better in the final examination remained the same. This means that a student who attained 70% had the same odds of passing the course as a student who attained 89%. This clearly shows that although it cannot be predicted from lecture scores, students attaining scores as low as 60% were very much aware of their dire situation and were covertly improving their study and test preparation habits in a self-regulated manner. Perhaps they were also getting pertinent feedback in their study habits from colleagues, siblings or from other school sources that target special student groups. This might explain the weak correlation found in the analysis because at least 378 (of 1294) students perceived as *underperforming* in the lecture quizzes (scores between 60-79%) were not neglecting or ignorant in their study habits managing to get a mean score of 85% in the final examination (Table 3). It is important to note that for students who attain an average quiz score 90%, their odds of achieving the same or higher score in their final examination increases *three* times with a probability of 57% (Table 2). Students in this group achieved about 89% on average in their final examination. As noted in the literature in general, students' test

performance is associated with the development of good test taking strategies which are often correlated with lower levels of anxiety associated with familiarity with tests from the same instructor; and better test attitudes for those who have routinely been engaged taking prior tests (Dooden, 2008; Dolly & Williams, 1986; Culler & Holahan, 1980).

However, the study shows that at least about a quarter of the students achieving scores of 59% or below (n=394), managed to get an average score of at least 70.76% in the final examination (Table 3). This percentage appears to be the *critical* value in this study which very well may signify that students in this category had poor self-regulated learning lacking in continuous self-evaluation, self-motivation, timely self-monitoring and learning adaptation with course progression. As reported by Broekkamp and Van Hout-Wolters, (2007), students in this group would have a lot of difficulty adapting their learning strategies with the task demands at hand. This observation deserves careful reflection for a student who utilizes these results to make predictions. It certainly tells prospective students that not being able keep up with course material or performing sub-optimally in continuous assessment tests *may not* necessarily spell doom in the course but they remain on the lower edge of the "traditionally acceptable" performance scale in successfully passing a course. Poor course performance further affects student academic progression especially for those planning to apply for graduate school. To be successful citizens with essential skills, students must therefore remain motivated enough to self-assess, prepare and adapt their learning and test taking skills and strategies as they progress in a course. There are multiple factors that could come into play in determining a student's final examination score. These might include students' time management and test taking skills in timed examinations; students' procrastination and a complacent attitude after doing so well in the quizzes, hence inadequate final examination preparation; students' environmental settings as they review course material and prepare for final examinations; students' test taking anxiety especially apparent in longer examinations; and the volume of course materials tested which demands holistic and deeper understanding of course material presented over a long period of time.

West and Sadoski's (2011) study on medical school academic performance noted that two study skills - good time management and frequent self-testing - were generally stronger predictors of first-semester academic performance in medical school than aptitude. Thus, educators can assist students with organizational assistance, prioritization, support and teaching them how to monitor their comprehension by implementing self-testing techniques will make their study time more efficient and effective; and in turn, improve their academic performance. At a time when school class enrollment remains high, individual attention to each student may not be realistic. However, group sessions can be targeted either in educator's office hours, at school learning/career centers, or in special education programs targeting special groups like minorities. To self-motivate their students, educators could also routinely spend at least five minutes at the beginning of their in-class meetings reviewing effective learning strategies for the benefit of all students. We suggest that educators also freely share the regression equations developed in this study (Table 2) with students who can then use them to predict performance in a course at any stage in the semester. Based on the study results that lecture quizzes can fairly predict course performance, our overarching suggestion is that students must be encouraged to maintain sustained engagement in all the courses they undertake. This can be done by encouraging students to: constantly review relevant course material, preparing and taking all routine tests offered in the course, revaluating and reassessing performance periodically and seeking help without delay when the need arises. Educators can facilitate this process by offering

students opportunities for self-evaluation, self-assessment and reflection, timely assistance, and recommending resources that can help in other aspects of academic performance including time management, prioritization, school-work balance, and better test-taking skills.

Conclusion

How should the results of this study be utilized by educators and students? First, to benefit all students, educators cannot maintain a "hands-off" approach with their students. A sustained and more engaging approach where educators and/or learning specialists provide systematic formative feedback to students is called for. Second, for students, it is important to review course material systematically as the semester progresses, and preparing adequately for routine tests is a good strategy that assures good course performance. For example, attaining an average score of at least 70% in routine tests improves the odds of achieving the same or higher score nine times and raises the probability up to 95% of attaining the same score in the final examination. However, passing a course with an average grade is not all students should hope for; and a better than average grade (high "B" and above) is of advantage to any student nursing future graduate school aspirations. This translates to scoring at a level of 80% or higher in continuous assessment tests. Third, results indicate that for students attaining a 90% or higher in average quiz scores, their final examination performance odds are three times better compared to those whose average quiz scores remain below 90%. Fourth, attaining a threshold score of 59% or below increases a student's odds of failing the final exam twenty five times (93% probability) compared to students who score above this threshold. Finally, using standard regression equations developed in this study and the student's average quizzes score (or other score from routine tests), students can fairly predict the probabilities of passing a course. It is hoped that this revelation will motivate them to be more proactive in seeking additional resources earlier in the semester.

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