Retention and Student Assessment

Mario Paz$^1$ and J. P. Mohsen$^2$

Abstract

The traditional method of performance evaluation and grading of students is based on how a student performs during a limited number of examinations and quizzes. These examinations are given during the course of an academic term and there is normally no second chance given to a student who may have performed poorly. This standard approach does not promote a behavior on the part of the students of studying for the pure sake of knowledge, but only to Acram@ and pass the examination. The authors propose an alternative method of student assessments. The proposed method improves learning by recognizing, evaluating and rewarding students on the basis of demonstrated dedication to study throughout the entire duration of the course and not only at short, isolated periods of time devoted to passing examinations. Students in this program are Aexercising@ their brains, and in the process, improving long-term retention of the class materials through systematic adherence to the program criteria.

Introduction

A major breakthrough in the understanding of brain function, revealed by researchers at the University of Geneva, shows that Aexercising@ the brain can improve learning and memory. The discovery is the result of an international collaboration within the Human Frontier Science Program, an initiative of the G7 countries launched in 1989 to promote cooperation between the world=s greatest scientists (Siegel, J., 1999). The Students Dedicated to Learning program adopted by some instructors at the University of Louisville, Department of Civil Engineering uses an alternate approach for grading based on Student Dedication Assessment (SDA) rather than the traditional methods of student evaluation based solely on examinations. The SDA program improves learning by recognizing, evaluating and rewarding students on the basis of demonstrated dedication to study throughout the entire duration of the course and not only at short, isolated periods of time devoted to passing examinations. Students in this program are continuously Aexercising@ their brains, and in the process, improving long-term retention of the class materials through systematic adherence to the program criteria. The incentive for students to participate is that the final course grade is based on both academic performance and student dedication to learning. The objective of the program is to promote dedication to learning, which undoubtedly results in improving learning, retention of class materials and also of improved student performance during examinations.

1 Department of Civil and Environmental Engineering, University of Louisville; Louisville, KY 40292

2 Department of Civil and Environmental Engineering, University of Louisville; Louisville, KY 40292
Long Term Retention

The complexity of the world is increasing rapidly with the rise of technology. We have access to more and instantaneous information than the generations before us did; and the information changes with intimidating speed. The half-life of an engineering degree is currently estimated at only four years. That is, in four years, half of what an engineering graduate has learned becomes stale—a daunting statistic. In the face of such rapid and exponential change, no one can rely solely on experience and accumulated knowledge. Content mastery is not a static state but an evolving and lifelong process (Richetti, C., Sheerin, J., 1999). We need to help students develop the capability to acquire tough problem solving strategies, become effective thinkers and retain class materials on a long-term basis that as a result will form the knowledge base for their future careers as engineers. The challenge for the instructor is to ensure transfer of learning from short-term to long-term memory. Within one hour of learning, about 60% of the original material is forgotten nine hours later, and within a month, 80% is lost (Phoon, A., 1997). To remedy this, the material should be reviewed frequently such that with good use of review techniques, retention can almost be perfect. The Students Dedicated to Learning program coordinates with the instructor’s use of review techniques to achieve success in long-term retention of the course materials and fosters a life-long dedication to learning. Common sense and experience would conclude that the crammed new material is not retained and is easily forgotten. However, studying as the course progresses allows new knowledge to be better associated with material previously learned and to be retained for a much longer time period.

Student Assessments

The currently prevailing procedure that is in use for grading suffers from several deficiencies. One of the factors adversely contributing to the shortcomings of the present system may be listed as the problem of grade inflation. Another factor may be the competition on the part of the instructors to attract students to their classes. The faculty annual performance evaluation is greatly influenced by input from students. Also, assigning inflated grades would be one way of assuring positive feedback and favorable student ratings. The drop option in many cases is used by those students who choose to shop around to select those instructors who are perceived to be less demanding. In many cases, the competition for the limited number of students is rather fierce and most demanding instructors with a reputation for being difficult are avoided. The proposed SDA system would potentially eliminate the need for students to shop around for less demanding instructors and promote learning for the sake of learning and acquiring knowledge.

In order for the students to be assessed effectively and fairly, when implementing the SDA program, guidelines should be discussed with the students at the beginning of the term. Students should be provided with written criteria on which their dedication to learning will be assessed and considered in awarding the final grade for the course. The criteria adopted by the first author of this paper include the following:

1. Class Attendance
2. Homework assignments
3. Research assignments on short topics related to class materials
4. Meaningful class participation
5. Reading all assignment material before attending class
6. Familiarity with additional textbook material which might not have been discussed in detail during class, and
7. Other criteria that the instructor might deem pertinent to the course.

The role of the instructor in the classroom has been changing over the years. The instructor, instead of being looked upon as an expert who possesses knowledge being communicated to the student, is now being viewed as a coach or facilitator of learning. Class participation is an important item for student evaluation. It encourages students to be active participants in classroom activities and teaches them to listen to others and voice their positions. These skills can translate into good interpersonal and communication skills, which are of great value in any organization (Gopinath, C., 1999). Regular class attendance, timely submission of homework assignments and review of relevant materials prior to the class have as their main purpose long-term retention obtained from the frequent review of course materials.

**Student Comments on SDA**

The first author of this paper has adopted this new criteria of assigning final grades that are based on a dedication to study in addition to performance on examinations. This author firmly believes that through implementation of the concept of A Dedicated Student @ most students will gladly subscribe and greatly improve their study habits because their hard work and dedication will be rewarded. Furthermore, the students soon begin to realize that not only will they acquire extra grade points but that their examination performance also improves. Surveys conducted in several classes where the program has been implemented demonstrate an enthusiastic approval by the student participants as noted in the following student comments:

1. Anonymous @ The Dedicated Student concept has made me study more than I would have had the concept not been applied. I appreciate the opportunity to attend a class with concepts that extend beyond that one particular class @.
2. J. Dwyer @ I can=t tell you how helpful and refreshing it is to know that our professor is as dedicated as we are trying to be, and that we are working together, rather than separately to accomplish the same goal: to enhance our learning knowledge @.
3. Anonymous @ I find myself more dedicated, which is amazing! @.
4. A. McCollum @ In this class I have read all required reading materials and this is a first for me @.
5. M. Coomes (signed as Dedicated Student) @ Along with Dedicated Students there must be Dedicated Professors that create as comfortable learning environment @.
6. Anonymous @ One final comment is that very careful thought and consideration of what it would take to be considered a A Dedicated Student @ and what would be rewarded @.
7. M. Ballard @ There should be some type of Lab for the Dedicated Students @.

In addition, students were asked to provide their own definitions of a Dedicated Student:
1. A dedicated student would be interested in what he/she studies.
2. A dedicated student would do most of the text problems, including unassigned ones before coming to class.
3. A dedicated student would read the textbook thoroughly for more detail than the lecture presentation.
4. A dedicated student would pay very close attention to the real life experiences of the instructor.
5. A dedicated student would have a good and valid reason for missing classes. Regular attendance is very important since most of the learning takes place in the classroom.

**SDA Implementation**

The criteria indicated above have been used to formalize a set of guidelines for students to be dedicated. The specific guidelines can be left to each instructor as to which items actually apply to his/her course. The proposed approach for evaluation may be illustrated by the following cases:

**Case 1:** The student has obtained an 85% grade average for academic performance for which the instructor would have given a grade of A. However, this student has also received a 100% grade for dedication to learning. If it is assumed that the instructor has formulated that the final grade would be calculated as the average of the performance grade with a double weight and the dedication grade, the student would be given a final grade of 90%, which would then deserve an A.

**Case 2:** The student has received a grade of 72% in academic performance, which corresponds to a C grade. He must then earn at least a 96% for dedication to learning in order to be rewarded with a B as the final letter grade.

**Conclusion**

The final assessment of student performance using SDA is very fairly based on the academic performance enhanced by the dedicated student score. The student is being rewarded for hard work and dedication to learning with the added bonus of long term retention of course materials. It can also be anticipated that the student will adopt a pattern of learning behavior that will decisively contribute to his or her future personal and professional success.
References


Siegel, J.; November 26,1999; *The Jerusalem Post*, Memory Photographed for the First Time, p. 6A

West, M.; Sept. 30, 1999; *The Arizona Republic*; Healthy Living; Faded Genes, As our Brains Age, Midlife Memories Slip Away; p. HL1

**Professor Mario Paz**

Mario Paz is a professor at the University of Louisville. He is also actively involved in consulting and research. During his professional career, he has specialized in Structural Dynamics and Earthquake Engineering. He has published numerous technical papers and several textbooks; some of these have been translated and published in other languages. Dr. Paz holds a professional engineering degree in Civil Engineering from the University of Chile, an M.S. degree in Statistics and a Ph.D. degree in Engineering Mechanics, both from Iowa State University. Previously, he was head of the Department of Statistics in Chile and a professor of mathematics at the University of Chile.

**Professor J. P. Mohsen**

J. P. Mohsen is a professor of Civil Engineering at the University Of Louisville. He has taught courses in Pavement Design, Structural Dynamics, Structural Mechanics, and Materials Testing during his tenure at the University of Louisville. He is the current Campus Representative for the Southeastern Section of ASEE. Professor Mohsen=s current research interests are Non-Destructive Evaluation of Portland Cement Concrete Structures.