



## STUDENT LEARNING GOING THROUGH A METAMORPHOSIS

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### ABSTRACT

*In the classical mode of learning, the student is the center of attention and tutoring is the preferred mode of teaching. The onus of learning remains with the students. From the sixties onwards, in our technology-driven society, learning, and education were geared towards performance, demanding rewards. Administration commenced using students' ratings for faculty promotions, salary adjustment, and tenure etc. This generated the problem of Grade Inflation, which is easy to feel but is difficult to prove. It is equally difficult to decipher the learning curve since a Gaussian distribution imposed on the grades profile camouflages the real learning trends of the students. It is postulated that a complex interaction of the instructor's desire to get good ratings, of the student's desire to get a good grade and of the administration's intent to use the ratings, produces a formula-plugging approach to course learning. This needs to be broken. Teaching should be left to the teacher and the taught that could with mutual discussion upgrade the learning process. Non-intervention of the administration enables the instructor towards more innovative and analysis oriented course delivery and its comprehension. The students are once more responsible to learn. This is an interim arrangement. Ultimately computers and Internet shall strongly influence the classroom learning. Student surveys will then become outdated and redundant. Monitoring assessment will still be needed. Local strategies or Outcome assessment portfolios with feed back control can be used.*

**Keywords:** *Student learning, Students ratings, grades, Bell-shaped density curve, Instructor, outcome assessment*

## **1. INTRODUCTION**

The student learning process consists of two interactive subsystems, the Delivery System and the Receiving system. The format of the classical learning assumes the role of the Delivery system, comprising of the instructor, to just help or guide the receiving system, representing the students towards learning a topic, subject, or a field. The student is the center of attention and tutoring is the preferred mode of teaching. The onus of learning remains with the students and the instructor acts as a facilitator. The students in this way did not discuss the instructor's style, effectiveness, or shortcomings in teaching and the administration did not really care since there were no complaints from the parents or students. No students' ratings or surveys were taken. The students self-evaluated themselves for having learnt or having not learnt a topic when the teacher provided an opportunity.

This, shall we say, the ideal process of learning, continued up to late fifties when the attributes of modern technology started taking deeper and firmer roots in the society. Invention, discoveries, and opening of the broader horizons of knowledge reached a plateau. The emphasis was now on the industrial application of the knowledge. Research with an industrial bias and Service to develop infrastructure were added to the teaching. From 50s until 80s a silent revolution completely transformed the classical character of the learning process, which now became burdened with corporate characteristics drawn from Service and Research, both the sectors needed money not only to justify its existence but also to expand. Higher enrolment and funding from various agencies generated the money. The competition of the market economy also penetrated the walls of the universities. Faculty members who performed were hired, retained, and promoted, and the faculty members who failed to produce results were stagnated, excluded or fired. Research, by far, is the most important facet of faculty performance that the administration judged. It is understandable that the achievements in research of faculty members could be evaluated on the basis of publications in refereed journals, projects, patents, research proposals, consultancy and more importantly funding. These are physical parameters and can be, with due difficulty, quantified approximately in measurable terms. Ironically, strict, stringent and performance oriented scales of evaluations were transferred to the domain of Teaching also.

## **2. STUDENTS' RATINGS - USED OR MISUSED**

The administration started using the students' ratings for hiring, firing, tenure, promotion, and salary increase etc. Without any vision or foresight, the students' ratings became the prime input to measure the teacher's performance. [Martinson, 2000] refers this as a misunderstanding fueled by the "disproportionate emphasis that is placed on student evaluations as a mechanism to evaluate and reward good teaching." Administration through a questionnaire collects the opinions, observation, and comments of the students and converts these abstract parameters into numbers by techniques, which are open to question. The results

so obtained would remain suspect and redundant if the fidelity of the data is not established. It may be added that the levels of satisfaction is a very individual feeling and cannot be quantified. Any suspect or subjective data based on the levels of student satisfaction, when processed, would give erroneous results defeating the basic purpose, in this case, the learning enhancement of the students.

It has to be clearly understood that the students' rating is not a charge sheet to prosecute a failed instructor. Nor it is an exercise to find a rationale to grant faculty-incentives. Its primary use is to suggest remedial measures to upgrade the student learning. In this context, it is best to leave the learning-comprehension and enhancement to the teacher and the taught and the Administration should be excluded from the student rating process. [Haskell, 1997] also believes that "one of the reasons that SEF (Student Evaluation of Faculty) was instituted- and rightly so- was for informational feed back so that the faculty might be more aware of student needs. The instrument has not, however, been used just for informational feedback to professors. If this were the case, then SEF would presumably not be a problem." The author further notes that it is almost always used to make decisions for retention, promotion, tenure, and salary increases. A similar recommendation is made by [Edwards, 2000], who observes, "Finally, it is recommended that colleges eliminate students evaluations of faculty. Instead, groups of two or more instructors could devote time to help each other improve the performance. Such two or three person cohorts are far more likely to enhance teachers' abilities than students' assessments, and the plethora of problems associated with student evaluations could be avoided". Mutual discussions, observations, comments, opinions, suggestions etc are definitely needed between the instructor and the students. A record of these could be taken through any arrangement including the one, which is already in vogue. The point to be noted is that since the student and the teacher are directly involved in teaching cum learning process, therefore, they should be primarily responsible to take the corrective measures for its upgrading. [Cahn, 1987], [Heller, 1986], and [Stone, 1995] also concluded that student ratings of instruction can serve as valuable feedback to an instructor about student preferences, but there is good reason to suspect that using them as a basis for administrative decisions on promotion, tenure, and merit pay has been a major contributor to the academic decline and devaluation of the past twenty-five or so years. How the requests for promotion, tenure etc. are handled, in the absence of students' ratings, should be left to the administration.

The dilemma for the administration "to be or not to be" a part in the student reaction survey, raged, to quote an example from I.I.T., Kanpur, an institution of international cum Silicon valley fame, for over fifteen years in the academic senate. Finally, a decision was taken that each department had the option to conduct Student Reaction Survey. Head of the department shall administer the Surveys, check if there was anything abnormal and then hand over the student responses to the concerned instructor, who studied and noted the suggestions and took appropriate action. It was further decided that the surveys would not be used in any form for faculty promotions.

Let us probe a bit more into the rating process. A basic inquiry remains unanswered as to why students who are not getting good grades in the examinations shall give good grades to the instructor. The answer can be modeled with two options; one, the students admit that the poor performance is due to their own fault in not putting enough efforts to get a better grade. Further, it is acknowledged that the instructor's performance was excellent. This is an oblique way of saying that the students did not pursue the learning; good grades therefore, did not follow them. This is an honest admission, which corresponds to an ideal behavior, which by definition is unattainable. The second option is straightforward, practical, and more plausible. If the students were not performing well, then it is due to poor instructional delivery of the teacher. Therefore, if the students get bad grade, they would react to give a bad grade to the teacher. It would be interesting to quote [McSpirit et al., 2000] whom touch on this often ignored point thus; "Often, course evaluation forms are completed before the end of semester. Faculty feels that to get high evaluations they must convince the students that they will get good grades. Therefore, by the midterm, the teachers have not demanded high performance. By then, it is too late. High grades are given with insufficient learning." More data need to be collected on this score. A straight check could be to take one additional survey after the students have gotten their grades and compare with the one taken before the end of the semester. Expectancy for higher grades by then would be over, a more realistic response may come, and a comparison of the two would establish the student indulgence with the grades and the fidelity of the data currently taken on student ratings. The argument, however, remains that a failing student would, in general, fail the instructor.

### **3. INFLATED GRADES**

These discussions lead us to the problem of Inflated Grades. There is no doubt that students are entitled to quality teaching. This entitlement to quality teaching is too often confused with a perception in the eyes of many that the students are entitled to good grades and a degree- irrespective of any effort on a student's part. Grade-conscious students look out for an easy instructor to spoon-feed them through the course material. This is in contrast to pre-sixties scenario where the primary responsibility to learn remained with the students. The main reason for this change of attitude in the students may very well be the "Grade Inflation", which can be defined as increase in average grades without corresponding increase in performance i.e. assigning higher grades to students than what they actually deserve. It promotes the notion that average is excellent. Teachers due to academic pressures may feel more secure to be engaged in research pursuits. Faculty also realizes that giving poor grades is not in their economic best interest. They believe that low grades lead to low faculty ratings by students, which, when used by the administration, jeopardizes the chances of promotion, salary adjustment etc. There could be many reasons for the grade inflation and the domain could be the students, faculty, administration, industry or society. It is difficult to pinpoint the source and the cause. Grade inflation is easy to feel but difficult to prove. "Is it possible" as [Wilson, 1999] puts it "that students are just plain smarter today than they were ten, twenty,

or thirty years ago, and therefore deserve higher grades?" The argument he continues "falters in the face of the brute fact that over the same period the grades were inflating most rapidly (1965-1980), average SATs, ACTs, and yes, GREs were in decline". [Brown, 2001] observes similarly, "Studies also show that during the period when grades were rising most rapidly, the mid1960s to 1980s, average scores on SATs, ACTs and GREs declined." Under the circumstances, a remedial measure, which could totally or partially insulate the Delivery-Receiving system to let it blossom naturally to intellectual maturity, should be seriously discussed. In the new format, it is conjectured that the faculty without any bias, prejudice or fear, shall be able to motivate and stimulate students to independently solve problems, develop critical-thinking abilities together with skills of analysis and synthesis, transform mathematical abstractions to physical concepts, and develop better communication skills.

#### **4. LIMITS OF PERFECTION OF THE DELIVERY SYSTEM**

Most of the suggestions quoted in literature pertain to increase the efficiency of the Delivery system, which by virtue of being physical has a limit for maximum efficiency operation. Much has been written about "Teaching Teachers to Teach". It is postulated that teaching is a craft and the skill to practice this has to be learnt. Good teaching, for example, can be achieved by paying attention to the following points: the instructor should show concern for the students as persons, and call them by the first name, show concerns for the students' success, should have on organized and clear lecture delivery, give prompt feed back, motivate the students, do not show off, bluff or intimidate, know what, why, and how the teaching is to be done, put together lectures that are both rigorous and stimulating, give home work assignments and examinations that are comprehensive, challenging, instructive, examine the answer scripts in a fair and unbiased manner, return the results regularly and quickly explaining the basis of the award of marks for each question etc. This is an endless wish list, advising the instructor how he can be more effective. Each instructor is what he is; he shall not be what he is not. He is not a unit of an assembly line to conform to a desired quality control. In fact, the variance in their attributes and attitudes keeps the flavor of learning process always fresh. Ironically, all the suggested remedial measures seem to be directed toward improving the efficiency of the Delivery system i.e. upgrading the instructor's performance. It is as if the Delivery system when perfected would become an ideal communicator and would drag or influence the Receiving system to become an ideal Receiver. Student learning shall touch a high peak due to hard work of the instructor. The entire process becomes as simple as that. It has to be realized that the diagnostic probes to monitor the health of an academic system, ailing or not, are positioned at the wrong place. It is not the Delivery system, which needs remedial attention. Attention has to be focused on the Receiver-the students community in the classroom. The instructor sincerely tries to incorporate most of the recommendations and suggestions quoted above. The teaching methods become labor intensive, appropriate to elementary and secondary school. For example, the instructor gives a well-structured and organized course where the outlines are

announced on Day one and faithfully covered. Assignments are regularly given, collected, corrected, and returned. Examination schedule announced and stuck to and the answer scripts promptly checked and returned. Solutions for the homework, quizzes, and examinations are discussed and promptly posted out or photocopies are given to the students. Day to day lecture schedule of the complete course is announced and followed. Grading policy is announced and strictly adhered to. These are many points from the endless wish list, which the teacher embeds in his program of teaching. This is a web weaved by the system in which the teacher and the taught are caught. The entire teaching process in this situation becomes spoon-fed. [Shine, 1993] as quoted by [Stone, 1995] notes that instead of students working hard and making maximum use of their educational opportunities, teachers typically find themselves doing all they can to teach while students make no more than a token effort to learn. He further argues that we cannot expect students to understand that they are the ones who must work hard to achieve if we hold the opinion that those who are teaching them have an exclusive responsibility for their success or failure. He finally proposes in line with the present submission that the educators need to emphasize that the primary responsibility of learning should be on the students' shoulders. There are known cases where students redefined their goals and improved their performance tremendously, not because teachers mandated change, but because students made a decision based on a belief that they will profit from sincerely pursuing set goal. Attempts for such transformations in attitude stem from realization that human beings are animated systems that can improve their performance if given the right incentive.

It can be postulated that the motivation to inflate the grades to get better students' rating for eventual use towards promotion, tenure, salary adjustment is too physical and almost criminal if practiced blatantly in a recognizable form. Faculty members do the teaching conscientiously and sincerely. It could be as [Gilmore and Greenwald, 1999] suggest, "many instructors shift toward increased leniency of grading as an unintended side effect of conscientious efforts to improve their teaching." In fact, a complex interaction of the need of the instructor to get good ratings, of the students demand to get good grades intermixed with the eagerness of the administration to use the ratings, reduces the learning process to a ritualized, mundane, heavy and boring job, because of the strands of sameness every day, in and out. No challenging thoughts, no brainteasers, no animated discussions, no transformations of the rigors of mathematics to easily comprehensible physical details, no motivation. The topic and themes are delivered in the closed- form format. Many of the examinations have open book policy. Students highlight the formulae and its applications only in the book. Analytical steps, physical approximations, and theoretical reasoning are skipped. Questions challenging the student's understanding of the subject are not usually asked. The course is given and understood through a formula-plugging approach. Fundamentals seem to be de-prioritized. Students do not take many steps without being propelled by the instructor.

Students prefer ease and convenience to difficult and time-consuming study. They feel satisfied and remain enrolled when they get high grades even if they do not deserve them. The learning exercise, though modified for easy and quick grasp for the students, is, nevertheless, conducted in a very sincere and professional manner. Workload is high. Every one is seemingly busy. Every one is apparently satisfied too at the end of the semester, good work and good performance both for faculty and students. Professor Emundson, as quoted by [Wilson, 1999], describes a post-1960s college scene where institutions reoriented to “creating more comfortable, less challenging environments, places where almost no one failed, everything was enjoyable, and every one was nice.” The learning process seems to be trapped in a non- radiating orbit like the electron that needs energy to move to higher levels; learning would need motivation from the students to move to higher levels.

An educational program needs to be periodically assessed for feed back so that it can be appropriately controlled for better outputs. Results of the students performance in the professional examinations after the degree, feed back from the employers, outcome assessment reports from external agencies or locally developed strategies are required. Students entering the professional arena have to prove their acquired skills.

## **5. ARE THE GRADES AND LEARNING CORRELATED?**

It is conjectured that the locally available grade–profile is not enough to establish the learning trends. Based on the previous discussions, there is every likelihood that the grades are inflated. The profile of itself, therefore, would not give a correct picture. Still, let us assume that the grades, irrespective of its over prediction, do bear some kind of proportionality to the academic potential of the student. With the higher learning, therefore, the average grade of the class should go up. In order to express the learning through a normative criterion, a Bell Shaped Density Curve is made to carry the grade–profile. Not everywhere, nor always, but at most of the universities most of the time. This seemingly was done, to quote [Roth, 2000], “to structure our grading system, to make, and to fit students to the modern day workplace hierarchy—a few at the top, most in the middle, a few at the bottom.” It is difficult to decipher the learning curve since a Gaussian distribution imposed on the grades profile camouflages the real learning trends of the students. In the process, we are trying to see what we want to. We are forcing the normal curve on population characteristics, which in this case is the grade. We are trying to remove a bound from the learning process yet we are imposing a bound. Teachers have to decide if their primary duty is to help develop the academic potential of the students to a possible maximum, or to make sure that the grades awarded fit the desired curve. Moreover, fitting the grades to the curve should be done for very large sample size e.g. students in a given discipline in all the universities across a nation. It should not be used to shape achievement of smaller units like one class, department or even a school. It is interesting in this regard to refer to Figure 1 which shows a plot of GPA (grade point average) versus the course number. Each point for a course represents an average GPA, taken over 6 years in the Chemical Engineering Department at KFUPM and each average has remained

constant over the years. An approximate Gaussian distribution of the grades was observed in each course. Lab and coop courses are not included in the following analysis. Series 1 contains the required core courses, which are based on theoretical principles, conceptual details, derivations and are arranged in ascending order of difficulty from sophomore to junior years. The GPA starts from 2.2 and asymptotically levels off at 2.5. Series 3 represents electives during the junior and senior years. The GPA for these elective courses remains more or less constant around a value of 3.0. Series 2 represents a single course- Chemical Engineering Economics and Plant Design, which bridges the applied nature of the elective courses and the rigor of the fundamental courses. It can be considered as the transition point between the theory and practice. Similar trends can be noted in Graduate courses. It can be observed from the figure that the GPA is rising steadily from initial to final years, which include the study in graduate program also. Does it mean that student learning is ripening through years? Have the students attained a level of intellectual maturity. A holistic knowledge of the whole program has been, as if, comprehended. It could very well be. It has to be checked. May be, and this probably could be nearer to truth, that the instructor is graciously acknowledging the seniority of the students and the rigor of the course. And the way to express it is to be lenient in the award of grades in the later years of the program and be lenient in grading with the elective courses. Discrete jump from one series to other seems to confirm the later view, because learning is not a quantized process; it is gradual and continuous. The point to make here is that it is very difficult to assess the trends of the students' learning, which seems to be hidden in the imposed Gaussian distribution. This exercise, it is suggested, should be conducted across to cover most of the courses in various disciplines. The results would certainly be revealing but not conclusive. In the final analysis

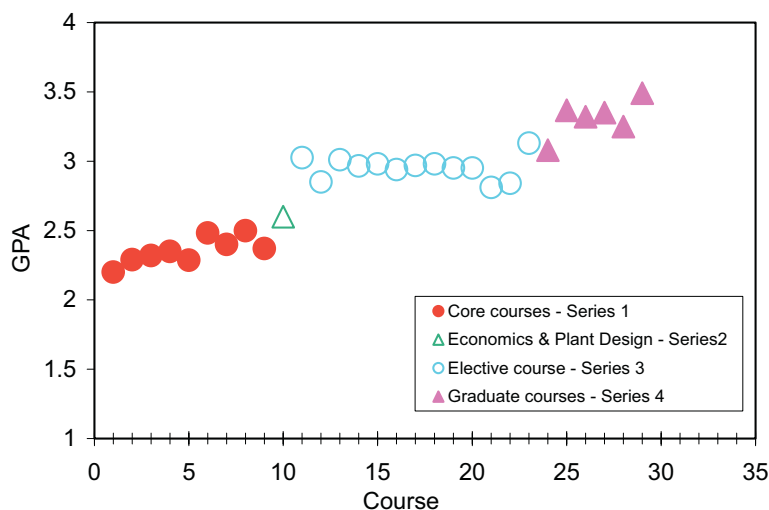


Figure 1. Average GPA versus courses in ChE program. Each point represents average taken over six years for a course and each number on x-axis represents a specified course.



an external assessment portfolio may have to be used which will ascertain the academic potential of the student at the end of the graduation. Local strategies can also be developed and applied to continuously assess the comprehension at the end of a course or a series of courses or at the end of a semester. The results of such an assessment program can be meaningfully studied in the backdrop of the relevant grades-profile of the student(s).

## **6. THE CHANGES TO COME**

In the mean time, the digital revolution currently driving societal changes has become as important as the invention of the printing press or the Industrial Revolution. Universities are now confronted with a growing realization that ignoring the effects of the Information technology is no more an option. Computers and Internet are on the verge of registering a permanent mark on classroom teaching and learning. Virtual universities are being set up and brought to your doorsteps. The tuition fees are less and the renowned experts in the field would lecture, from a long distance though. Market forces guide the economy, which compels the student of a virtual university to learn a topic by himself. Distance learning is becoming a distinct possibility. Canada's AlphaPlus center manages many adult literacy projects. Apex learning and the University of Washington have announced 10 new courses in humanities, science, and mathematics for Apex Learning's virtual school beginning from 2001-02 school year. Walden University in U.S. has introduced the first on line PhD in Public Policy and Administration from the December of 2001. In short, Computer and Internet are fast shaping higher education. Its clear cut effects are still being packaged and organized, that is why faculty are reluctant to integrate electronic technology into their class rooms. The challenge is to prepare for an uncertain future and to provide a technology-rich environment where students can obtain the continuously changing knowledge and skills needed to shape that future. How soon and how far this will take is a matter of 'wait and see'. [Edgar, 2000], however, notes that the traditional modes of teaching and research will still dominate ten years from now, but changes at the perimeter can and should occur. Technology-enhanced learning may have answers for many of the issues that are being raised, e.g. requests for post-baccalaureate professional education, access to asynchronous Internet-based learning, distance education and research, and competition with private organization entering the education market.

The electronic technology, not before long, shall significantly affect the classroom lecture delivery and its comprehension. It is interesting to note an example [Edgar, 2000] quoted for separation course in chemical engineering where the current topic is the impact of operating variables in a distillation column. The lecturer presents the concepts, equations and derived plots. The students immediately prepare examples on the laptops they bring to class or with shared workstations in the classroom. This cycle may be repeated several times in a given lecture. This is almost instant and comprehensive learning by each individual student. While the laboratory exercises are going on, the lecturer can move among students, looking over their shoulders and serving as an advisor and facilitator. The instructor is transformed from being a 'sage on a stage' to a "guide on the side." The relevance of Student reaction survey or ratings

in this scenario shall be lost or much diluted. It is, therefore, reiterated that the administrative grip on the students' ratings should be loosened so that its exclusion when the 'inevitable' catches is neither unexpected nor sudden.

It may be added that the need to assess and monitor shall remain in the future as it is now, with or without ratings. We have to periodically monitor and ascertain if the stated educational objectives are being followed faithfully or a feed back control is needed to put it on the right track. At the same time, we must have the feed back from the employers. Are they satisfied with the knowledge, skills, and applications of the students? Are the students satisfied with the education they received? Are the students well prepared to continue higher education at any university, national or foreign? Do the graduating students really possess the knowledge and skills faculty believe they possess? All these have to be checked and assessed by locally developed strategy and/or through available portfolios for outcome assessment. With outcome assessment, teaching is no longer just the act of showing up in the class and simply giving lectures, assignments, and exams. Teaching now includes setting goals for student learning in a course and/or curriculum, and motivating students to take responsibility to achieve those goals. Teaching now is based on assessed inputs and outputs in the learning process. Students need to demonstrate the acquired skills and knowledge.

## **7. CONCLUDING REMARKS**

Finally, it can be concluded that the student rating, a vanishing parameter, should not be used by the administration to grant promotions, tenures, salary raise, etc. The students should sit on the drivers seat now and take the responsibility of learning. This would avoid spoon-feeding to the students, and would also exclude learning the course-contents through formula-plugging approach. With the prospects of the electronic technology used in the teaching, center of gravity for learning, any way, would shift to the students' domain. Appropriate steps should be taken in advance so that the transition is not sudden. The instructor and the students should together constantly monitor the ways and means by which the learning process is most efficient. Students' learning should not be assessed 'on the curve' but should be assessed as they perform which may or may not follow a bell shaped density curve. Assessment strategies with feed back control should be used to monitor if the learning process is following the stated objectives.

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