Factors That Effect Student Retention

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ABSTRACT

The graduation rate of students can evaluate the success of a degree-granting institution. High school graduation rate continues to decline despite efforts taken by private and public sectors. (Colbert, 2013). The Low rate is even significant when compared with various racial and ethnic groups. Of those who graduate from high school and enter college degree programs, many of them do not finish their degree on time, and some become college dropouts. Many colleges and universities have taken the position that admissions selectivity is the best pathway to improved graduation rates (Schreiner, 2015); as a result, students from overseas have become their primary source of revenue. In a worst-case scenario, if this trend continues, in the next 20/30 years, US universities will primarily educate students from overseas. An educated workforce is the backbone of an economy. Government guaranteed student loans are made widely available to US students to support their college education. However, this has created a massive debt issue for many students (Elliott & Nam, 2013). Many students who do not complete their degrees or over-borrow and are unable to pay back their debt.

The object of the current article is to review the factors that affect student retention at the college level and thereby increase graduation rates. Much emphasis was given on curriculum refinements and faculty training to improve student retention. Although these initiatives created some positive results, the drop rate among US college students remained very high (Goral, 2016). This means that the curriculum and faculty teaching skill is only a part of the solution. Other factors that affect student retention are 1. Psychological, 2. Technological, 3. Expectation gap, 4. College preparation, 5. Available support, and 6. Student mindset and motivation.

The world of education has changed in many ways; the students and teachers are trying to adapt to that change; none the less, most institutions have yet to find an efficient point. This article assumes that such an efficient point exists and is achievable only through collaboration among the students, teachers, and administrative personals.

This article postulated that student's ***motivation and appropriate level of nurtured learning environment*** *has a synergistic effect on student's academic success. This synergistic effect is almost an interaction effect proposed in statistical analysis. That is, in the absence of one, the impact of other reduces significantly; however, when both are present, the chances of student success improve significantly. Narrative analysis of students' responses during informal discussions was used to clarify the notion of the interaction, mentioned above, effect on student's success. However, the article also analyzed students' behavioral aspect that significantly influences their academic success in a nurturing environment. The article identified various character traits as the most potent resistance to many students' academic success. The students' interaction revealed that many students could identify these character traits easily by doing a self-analysis on the pathways through those manifests in their school work; these pathways are reasons, justifications, and complaints. When a student spends a disproportional amount of time to find reasons why they do not complete their school work on time, use their circumstances to justify their low performance, or complain relentlessly about the difficulties of the subject, these are indications that those students are reluctant to assume much responsibilities for academic success. The article suggests that the school is a training ground for real life, and the character traits of most of the students would significantly influence their professional lives. Therefore, it is in the students' self-interest in doing their best in difficult situations to produce optimum results.*

Keywords: Institutional Responsibility; Academic Success; Motivation; Nurtured Environment; Synergistic Effect

INTRODUCTION

The decline in graduation rate has challenged many degree-granting institutions in the US. Although many institutions continued to revise strategies with hope for improving student retention, a satisfactory solution seems to remain elusive. Positive attitude toward the self is often identified as a determining factor (Dweck, 2016) for success at the college level. However, social scientists have yet to find a clear answer to why some students, despite many difficulties, persist and complete their college degrees and some others do not. Although individual perceptions of their circumstances play a part in the process of deciding on continuing with school, some students become performance drifter. Consistently poor performance is the sign of vulnerability that the student may eventually drift away from school. It is also claimed that students' mindsets influence their performance in school (Dweck, 2016); however, many students enter a college program with a very positive mindset; thereafter, their perceived difficulties with school work and their consistently poor performance in college create dents or even alters their mindset. Their decision to drop out of school some time can be explained by utility theory. Information asymmetry can also, in part, explain why one student persists in college and another drops out. The argument assumes that a student who persists may have some information advantage over a student who does not. Even if both have the same information available, individual assessment of the available information for those two individuals could be significantly different. Each of their assessments can also be tainted by their beliefs, desires, and their perceptions of circumstances. Many other factors influence their evaluation of individual realities.

INFLUENCING FACTORS

When studying the factors of student retention, one needs to examine the factors that lead to student dropout since the retention equation can be written as $R\ (Retention) = E\ (Enrolled) - D\ (Dropped\ out)$. From this equation, one can easily conclude that high retention rate over time (dR/dt) not necessarily always means the low drop rate (dd/dt); This is because the retention generally reported as a relative change in enrolment numbers with the dropout numbers. For that reason, if the enrolment rate (dE/dt) drops, this may inflate the reported retention figures. The factors that influence the drop rate includes the following:

Psychological Factor

When a problem is assigned in a classroom, students approach the assigned problem in different ways. Some of them try to relate it with the materials covered in the class, some others try to solve it with the knowledge they already mastered long before they registered for the class, yet some others try to guess the answer. Among a large class of students, it is likely to have some students who would have an initial assessment of the given problem; and shortly thereafter, they will wait for the answer from other students or from the teacher. This shows that different students, depending on their problem-solving skills, usually take different approaches when trying to solve the same problem. Life is filled with problems. "Even when we go on vacations to escape our problems, we quickly discover that vacations merely bring problems that differ in kind or magnitude from the ones of daily living" (Davidson & Sternberg, 2003, p. ix). When the solution to a problem has specific numerical value, the students can be taught the methodical steps necessary to find the solution. There are cases when the answers, even if numeric, simply represents a chance of an event. For example, if a student is asked to compute the probability of the number 11 as a sum of the numbers showed in two unbiased rolled dice. S/he can use the probability theory, in this case the ratio of favorable cases divided by the total number of cases, to calculate the probability of that event. In this case, s/he can determine that there are only two favorable cases that the sum can be 11; by calculating the total number of possible outcomes, which is 36, s/he has the answer 1/18. For many questions in life, there is no correct formula. The answers to those depend on the mental map or the paradigm (Covey, 2013) of the person who is trying to find the answer. Some questions are of specific category of probability; such as the one described by Tversky & Kahneman, (1982), "What is the probability that the process B will generate even A" (p. 4).

To many students, the process B mentioned above includes, at present, all the activities s/he must engage in life, and the event A is the completion of his or her degree; and as a result, improve his or her life situation. To many students, this probability is not a concrete number; it is a feeling of possibility—either positive or negative and are often associated to their performance in school. Positive feelings propel them to engage in school work along with life's other responsibilities; negative feelings often become a drag—it pushes the student in the opposite direction he or she

is trying to move. This drag is self-generated since its origin is in his or her subjective analysis of reality that leads him or her to inferential bias. The psychological processes that lead to judgement are often weakened by the fact that the students may have blind spots and often fail to see how s/he is contributing to the causes and conditions that are resulting to negative outcomes related to school work. Some students find school work getting increasingly difficult. David (assumed name) is a 35-year-old manager. He is hardworking and well-liked by his peers. He has come to school because of his desire to climb the corporate ladder, and for that reason, he would like to complete his degree, but after spending one year in college, he finds the courses are becoming increasingly difficult. He has a family to take care off and a demanding job; now he is not even sure if he would be able to finish his degree. He is so stressed out that he feels like he has reached his limit. In response to the question, if he knew that school will demand work and it will take good chunk of his time to deliver those, he said, "Yes, I was aware that school is not going to be joyride; it will test my stamina. I knew that I would have to stay up late at night to do the homework for school, and I was ready for it, but now my gut feeling is that I may not make it." Although in this case there are two mutually exclusive possible outcomes—either the student will make it, or he will not; a Binomial, success failure, model cannot be used to estimate those event probabilities.

One can use empirical data to estimate what proportion of students drops out of college programs; yet, that estimate may not apply for David since he can deliberately influence the outcome if he chooses to do so. But then again, his course of actions will be influenced by his intuitive judgment for assessing the uncertainty of the outcome. According to Tversky & Kahneman, (2009), in absence of a formal model for computing probabilities, in many cases, intuitive judgment may be the only practical method of assessing uncertainty of an event.

Faith Factor

If two students are asked to assign probability value of the same event by using their intuitive judgements, it is highly likely that they will assign two different values. Intuitive judgments are influenced by their beliefs. However, as Loeb (2003) claimed, "beliefs are assessed epistemically with reference to the underlying intellectual character or disposition that produces them" (p. 13). All beliefs are justified, meaning that those are formed through education, personal experience, or by blind faith—it is often rational to have blind faith since all knowledge in life cannot be verified through personal experience, detail understanding of rigorous proof, or experimentation. For an individual, all facts and information cannot be acquired through experience or education, nor can s/he acquire those through theoretical or practical understanding of a subject. Thus, s/he must depend on the findings of others and accept those as true—believe by faith. According to Bishop (2007), "believing by faith as, rather, a matter of *taking a proposition to be true in one's practical reasoning* while recognizing its lack of adequate evidential support" (p. 11). In this contest, two relevant questions need to be addressed; first, is to what extent an individual should depend on faith to chart the course of his or her life. The second question is to what extent faith plays a role in shaping actions for short- and long-term goals.

For example, when encountering a reasonably difficult math problem, if a student, assume her name is Carrie, has a very strong belief that she is bad in math, she always was, and it is something inherent, her course of action will be different than a student, assume named Jammie, who has the exact opposite belief. Pessimistic beliefs magnify learning difficulties, and that leads to unnecessary stress, whereas optimistic beliefs help a student to take reasonable steps to overcome difficulties. Social scientists claimed that optimism can be taught, learned, and improved. It is a matter of developing appropriate belief or changing the belief on holds regarding a specific situation and taking appropriate actions to produce some results. Individual's preexisting belief has definite influence on action s/he chooses in response to a specific situation. However, Rochelle (2012) stated, "Some people believe that every human action has a cause beyond the control of the individual" (p. 153). Holding such a belief is a serious obstacle to personal and professional growth of an individual; in such a case, the individual is better served by helping to change the belief directly instead of subjecting him or her to regimentation and expecting a change through habituation.

A very powerful tool for changing belief is a "thought experiment." Asking Carrie to think for impossible possible is the beginning of the experiment. Telling her to imagine that all math concepts in the book are based on two basic propositions: one is x + x = 2x, and the other is x*x = x2. The first proposition tells you that if one 'x" is added with another "x," it will give you "2x." In this proposition, we do not know what x is; however, what we know is that both x's used in the proposition are identical in all respect; therefore.it will hold true if x is replaced with any real object.

To Carrie, the question remains: if x represents a pen, then how do you add one pen with another, or how can you multiply one pen with another? It should be clarified to her that in mathematics, numbers do not represent the characteristics of the object of operation (Courant & Robbins, 1996). In this case, 2 represents either coefficient or exponent to indicate if the operation was addition or multiplication. Carrie needs to understand that "x" means "one x;" for that reason, one x + one x = (one + one) x = 2x. The operation, in this case, serves as the count for identical objects. Once this is understood, Carrie can generalize this concept to 3x + 5x = 8x. Mathematical operations are performed on the natural numbers; and not on the objects. Thus, mathematical statements should be reduced to the statement about natural numbers. Once a student feels comfortable with one topic, his or her self-confidence improves. Understanding and memorizing are two basic learning prerequisites, after that, it is matter of practice and application. One of reasons many students find mathematics a dry subject is because they cannot associate their thought in much of its contents. To some of them, it is all about rules and formulas that makes very little sense to them. However, many students' emphasis is usually more on memorizing and less on understanding. Trying to memorize mostly irrelevant and unrelated facts may create undue pressure on brain cells involved in learning.

Repeatedly learning and forgetting frustrates many students; to them the more they study, the more they forget. The brain is created to learn continuously (Sprenger, 1999). If that is the case, then why there is such a challenge for some students to remember what is learned last month or even last week? The answer to the age-old question is not very easy to find since there are many different causes that lead to forgetting what is learned. For most of the school work, the effective learning depends on the cognitive process used when the knowledge is acquired, and the same cognitive process is used during practice to make the acquired knowledge to record in long-term memory. Use of the cognitive process in learning increases students' self-confidence, especially for technical subjects, since this process does not require them to repeat steps shown in examples and ask them to follow these steps to answer questions without a proper understanding of the logic behind those steps. Faith in oneself for one's ability to perform in any area improves when the individual can demonstrate a successful performance. However, gaining proficiency in most areas requires the individual to be versatile—especially in appropriate technology.

Technology Factor

Access to technology and one's ability to use it effectively is also an influential factor for a superior performance in school. For higher performance in school, assuming everything else fixed, the student those who are proficient in technology have an advantage over those who are not. This assumes that all students have access to technology; this is not an unreasonable assumption since most colleges spend a fortune to make technology available to the students. Besides, the price of personal computers has significantly dropped relative what those were even five years ago. Best use of technology depends on what the students would like to do with it; for example, if they want to be a producer or consumer. The student who would like to be a consumer may spend most of his or her time on internet surfing only to find news and articles that interests him or her but of little relevance to the learning objective of the class for which the technology is available in the first place. Some students use technology to get engaged in social media to voice his or her opinion on various subjects that have little or no relevance to their school homework. Producers, on the other hand, use technology to their advantage to improve their performance in coursework.

Jacob (assumed name) a 27-year-old account manager comes to the class with his cell phone. He does not carry any book notepad or even a pen. He believes that in the age of technology, he does not need to carry these extra materials when he can get access to the learning materials through his cell. During the group discussion, when there is need to get access to the book, he tries to read it from his cell; since it is impractical to read and comprehend a several pages of the textbook on the cell because of the fragmented view and small prints, he hardly participates in the class discussions. When the teacher writes on the board to explain a concept, he takes the picture of the board although other students use pencil and paper to write the steps to confirm their understanding of the materials for later review. During the time of a practice session, he usually asks a classmate to lend him a page and a pen; during the practice session, he scribbles on the page and is often frustrated as he cannot relate to what he is expected to do and what he read on the cell. For him, it seems, technology has become a barrier not because he does not have access but because of his perceived view on why it was made available to him. Although technology was made available to him as a tool to make learning easier, his class performance shows gradual deterioration.

Many universities and colleges are using technology to easily track student progress through assessment; the institutions also made technology available to students so that they can take advantage of it to learn their course materials easily. However, for technology to work effectively and enhance learning outcomes, there are issues yet to be solved (Bauer & Kenton, 2005). Most universities and colleges spend a significant amount of their resources to address first-order barriers to technology; such as, teacher training, administrative support, maintenance, and upkeep of the technology. There is a second-order barrier yet to be addressed by many institutions. This is a perception barrier for students, faculty, and decision-makers in the administration. The student perception barrier is that many students thinks that in the age of technology, all knowledge can be on the server and they do not need to carry information in their heads; they need to have access to the server to extract information when needed. Such thought is at best partially correct only when one considers that human brain is not designed to be used as a database; the brain has tremendous creative power; but then again, it can only create something out of preexisting knowledge. Factual and conceptual knowledge are needed to support learning with understanding (Donovan & Bransford, 2005). Therefore, learning with understanding requires that some of the facts reside in learners' brain—not on the server. Technology is not there to replace the thinking of the learner but to support the thinking process by providing raw data when necessary, but critical thinking must be done by the learner, which always requires readily accessible information imbedded in experience. Many theories are developed through years of research, and the understanding of those cannot be achieved through personal experience; those must be acquired through careful study and correct acquisition verified through demonstration such as homework and exams. Even the best technology can only be successful when the students know how to use it and then use it to their advantage. Metacognition includes the knowledge about the self about what s/he needs to do to learn and remember what is learned. "Burden of learning does not fall on the teacher alone" (Donovan & Bransford, 2005, p. 10).

One of the second-order barriers for teachers includes the failure to see that technology can be used to increase teaching efficiency to reach out to students and help them organize the knowledge they are gaining around the basic ideas of the discipline. When a student fails to organize the gained knowledge around that basic ideas, the knowledge becomes disconnected, a disconnected knowledge unit is difficult to recall and at time impossible to apply in situations when needed. Technology gives a teacher the advantage of accumulating, in digital form, the responses needed to help the student clarify and organize the subject related knowledge and use those quickly to help the students. Those responses are not the handouts but response to the students' specific questions. Those response are to include explanations on what a student needs to know to understand the steps leading to the answer to his or her question. Teachers can decide what technology can be used under what situation. Hard work without a good strategy is less effective than moderate work with an effective strategy. The second-order barrier for administration is their emphasis on using specific technology in the classroom even if that technology is not completely integrated with individual subject (Thompson & Bieger, 2006). From students to teacher to college administrators, the expectation is that the technology will make life easy, but often technology simply brings additional frustration because the gap between what is expected before a technology is adapted and what is observed after its adaption.

Expectation Gap

It is not unlikely to have a discrepancy between what a student wants from a university and what s/he gets; also, what teachers want from students and what they get. This difference is defined here as an expectation gap. Nothing frustrates a teacher more than observing a general lack of interest shown by the students in learning. To a teacher, the major burden of blame for this expectation gap is usually on the students. Students, on the other hand, have an expectation of what they would like to consider a desirable class experience. When there is an expectation gap, to a student the major burden of blame is usually on the teacher. Sometimes some students expect a better grade with a minimum effort but dwelling far too much on poor performers increase teacher's frustration. There are many students in each class interested in more than just the grades. Maintaining the synergy of the class with those motivated students increases the chance to engage the less motivated students.

Some students expect that the subject would be interesting and should have contents that can draw their attention. The slightest amount of difficulties draws their attention out of the class; even during the discussion, they often engage in side conversations or even internet surfing with the cell or lap top. Disengaged students usually fall behind the class; as a result, their grades suffer. Persistent low performance makes them vulnerable to become college drop outs. Lowering the class expectation is a way to keep the unmotivated student motivated; but then again, this creates a grade

inflation issue. For some Universities or Colleges, there is a tendency to reward the students by giving them an easy grade and a sense of achievement (Rojstaczer, 1999). Higher tuition may also be a reason for the expectation gap for students. The students are collecting a massive amount of debt for going to college. For some student, the expectation is that the journey should be easy. The journey can be relatively easy only when they have the proper preparation and appropriate skill set for college level courses.

College Preparation

One of the most important determinants of college success is the skill set and college preparation. For many college going students, there is a life outside the college: They have a job and family with all its responsibilities. Daily activities they must do come first; as a result, some time school work may get second priority. According to Hofstadter & Hardy (1952) "The higher learning is not synonymous with life, it is not the whole of man's activity" (p. vii). Most students realize that their future financial well-being is some how tied to higher education, but also realize that s/he must do everything necessary for the present. Finding the balance between the need of today and the need of the future requires careful planning and execution. One of the basic principles of economics is that the real price of getting anything in life is what one must give up. The student who is not fully prepared for college level courses needs to give up, even more, to make up for the preparation gap. Failing to do so will invariably make their journey treacherous and make them vulnerable to becoming a college dropout.

College preparation is not limited to the skill of reading, writing, and arithmetic; a significant part of it is the comprehension skill, discipline, and ability to cope with stress. An individual's ability to process what s/he read or what is being presented and integrate it with something s/he already knows is essential for keeping or entrenching the new information for future use. Some students complain that they forget what they read, some others complain that what they read makes no sense to them. There are two issues at work here; first is the need for, the mindful reading and undivided attention to what is being presented, and the second is the cognitive dissonance. The student who fails to pay attention always ends up producing academically less-desirable results than they are capable of. This is because attention is the prerequisite to cognition—the process of knowing. Cognitive dissonance is also a serious impediment to that process because it interferes with both cognitive input and output.

To clarify the effect of cognitive dissonance, consider the student who name was identified by a pseudo name Carrie. She has a strong belief that she is very bad in math; she always was. The subject was never easy for her, and she accepted that she will never grasp many of the math concepts; but she at the same time believes that to graduate, she must pass the current math class she is in now. To pass the math class, she must complete the homework assignments and pass the midterm and the final exam. This requires her to have a fair amount of understanding of the subject. Carrie is holding two contradictory beliefs; those beliefs are interfering with her cognitive input and output. She was studying the chapter on scientific notations and got confused about how the decimals are converted into scientific notations. Following one of the exercises, she was frustrated with:

Express: $\frac{1}{125} \times 10^{12}$ in scientific notation.

The steps shown in the book were as follows:

$$\frac{1}{125} \times 10^{12}$$

$$= 0.008 \times 10^{12}$$

$$= 8 \times 10^{9}$$

She was having difficulties understanding how .008 is converted to 8 and why 10^{12} in changed to 10^{9}. The class teacher explained to her that $0.008 \times 1000 = 8$ and $10^{12} = 1000 \times 10^{9}$; therefore, $0.008 \times 10^{12} = 8 \times 10^{9}$. She then interpreted this as a formula: when you move the decimal to the right, you reduce the exponents by the number of digits to which the decimal is moved to the right. In her opinion, it is more difficult to understand and apply

$0.008 \times 1000 = 8$, then to memorize the pattern: $0.008 \times 10^{12} = 8 \times 10^{9}$. When the teacher confronted her that she will have difficulties in recalling this formula, her response was that she knows that she is bad in math and will have difficulties understanding the reason behind the step that $0.008 \times 1000 = 8$; therefore, memorizing is the best alternative. She was able to apply the formula she memorized and apply it to the next three or four exercises, but got stuck again with the following exercise:

Express: 325×10^{7} in scientific notation.

The steps shown in the book were as follows:

325×10^{7}

$= 3.25 \times 10^{2} \times 10^{7}$

$= 3.25 \times 10^{9}$

She was having difficulties understanding how 325 is converted to 3.25×10^{2}. The class teacher explained to her that according to the definition of scientific notation, you are only allowed to have a single digit before the two decimals in the stand alone factor; therefore 325 must be changed to 3.25, and that $325 = 3.25 \times 100$; therefore, it is written as $325 = 3.25 \times 10^{2}$. Once again, she then interpreted this as a formula: when you move the decimal to the two-digit left, you increase the exponents by the number of digits to which the decimal is moved to the left.

In the following class session, the instructor wanted to see how many students can apply what they learned in the last session and assigned them an in-class practice session which included an exercise that asked for the conversion to scientific notation. Many students answered all the questions some were having difficulties with the scientific notation, but Carrie was totally lost. She was looking at her notes repeatedly and could not recall the formula she proposed last week. Carrie was having difficulties with both cognitive input and output. Her issue with cognitive input was due to her belief that she is bad a math; therefore, she avoided any logical steps and explanations necessary to grasp the underlying properties of decimal to integer conversion and vice versa.

Schunk (1996) proposed the information processing theory that can explain how people learn. The process has four basic stages: first, attend to input, second, store or encode information to be learned in temporary memory, third, store the new knowledge into long-term memory, and fourth. retrieve when necessary. It is very important to pay attention to what is being encoded; during encoding, new knowledge is linked with a relevant existing knowledge in the memory. If there is a bug (like) computer program, retrieval will slow down, or knowledge will not be encoded properly. What Carrie needed to know in this case is understand that .3 is same as 3/10 or .04 is same as 4/100. This would have helped her to understand $0.3 = 3 \times 10^{-1}$; sometime students memorize the basic logical steps without understanding those. Such memorization is a mistake, and such errors when repeated on a regular basis, cause the learning to become progressively and significantly difficult.

Math difficulties, for most students, exists because the basic information related to the subject is not coded properly. Students are often asked to memorize instead of thinking and relating one concept with another; they are asked to solve one problem after another by following the steps shows in workout examples in the book or by following the steps a teacher shows them. If they would be asked to think and relate the concepts with one another and understand the logic of how one concept lead to another, they would be much better off. To clarify this claim, consider the following. When the concept of exponential numbers is introduced, the students are familiarized with one of the properties of exponential numbers shown in the following identity:

$x^{a} \times x^{b} = x^{a+b}$

After that, they are asked to use this property to answer varieties of similar questions where they are supposed to simplify or evaluate expressions such as:

1. $3^4 \times 3^5$
2. $4^7 \times 4^9$
3. $10^5 \times 10^9$

After they become familiar and comfortable with the steps, the next property of the exponential number is introduced, and the steps of practice continue. The emphasis is on the method of applying the properties of exponential numbers to answer various questions; it is up to the students to figure out why these properties work in the first place. Most students try to memorize these formulas; in this example, some students even try to make it easy for them by remembering that when you multiply two exponential numbers with the same base, you add the exponents. It is beyond the scope of the practice to analyze why this property works in the first place and how this property may lead to other properties of exponential numbers. In this scenario, it is difficult for a student to remember and recall all the properties of exponential numbers when those are encoded as knowledge units totally disconnected with each other except that these are all properties of exponential numbers.

It would be beneficial to students if they were told the 3^4 is a symbol which represents an operation, and the operation is the multiplication of 3 with itself four times; that is $3^4 = 3 \times 3 \times 3 \times 3$; in this identity 3^4 is a symbol, and the right side is the operation. In this identity "=" represents "means." The student would be better off reading this identity as 3^4 means $3 \times 3 \times 3 \times 3$ which is equal to 81. Once they understood and code this information, they will be able to extend it to interpret the meaning of 5^6. Also, they will not only be able to evaluate $3^4 \times 3^5$ but also will be able to evaluate $3^4 \times 5^6$. Notice, that in this case, the evaluation or simplification cannot be completed by using the property of exponential number shown above. The argument, in this case, is that effective encoding of new information regarding the meaning of $3^4 \times 5^6$ relies on the preexisting information about the meaning of $3^4 \times 3^5$, which intern encoded on the preexisting information vis-à-vis the meaning of 3^4.

College preparation is not all about how much a student already knows; it is mostly on how much time the student can devote to effectively encode, organize, and recall the information s/he is presented with during his or her coursework. An effective strategy is necessary for encoding, organizing, and ease of recalling. Many students just do not have time to develop such a strategy since it requires them to learn about learning strategy which is not a part of the curriculum, and they are busy reading the course materials, doing the homework, and preparing for the exams. In spite of doing their best, many students find that their performance is far below their expectation. Appropriate levels of support can mitigate the frustration due to the gap between their performance expectation and performance outcome.

Available Support

Many colleges and universities made available various resources to support students in improving their academic performance. Those are in the form of an online library, writing or math lab, free tutoring on a specific subject such as math or writing, or even counseling for specific issues. Help on developing effective learning strategies could be very effective for many students. One of the well-known facts is that mastering new knowledge requires repetition. Contextual interference improves the acquisition of motor skill (Shea & Morgan, 1979); Battig (1972) suggested that this is because the learner needs to overcome this interference by using a deeper cognitive processing; although this interference will slow down the initial learning if applied properly, retention of learned item will improve. Although their argument is applied for motor skill, it is equally applicable when a student is studying a technical subject such as math; for example, about the discussion presented in the previous section, suppose a student is learning the properties of exponential number. Following steps shows how it may work:

Step 1: learn that 3^4 means $3 \times 3 \times 3 \times 3$
Step 2: we will represent this as $3^4 = 3 \times 3 \times 3 \times 3$; at this stage, the student must understand that 3^4 is a symbol; it is not a math operation; $3 \times 3 \times 3 \times 3$ is the operation; in other words, whenever we use the symbol 3^4, we can replace that symbol with the corresponding operation.
Step 3: express the following symbols into corresponding operations: 3^5, 5^7, 8^4, 10^3
Step 4: express the following symbol into corresponding operation: $(1/2)^2$, $(2/3)^4$, $(3/5)^6$

When a student understands step 1 and step 2, s/he will be able to complete step 3 and step 4 just by using the definition used in step 1 and 2. In last two steps; that is, in step 3 and 4, s/he is just repeating the definition, and the exercises will be less challenging as s/he proceeds. Now look at step 5 to 9 below:

Step 5: express the following symbols into corresponding operations: $3^4 \times 3^2,\ 3^7 \times 3^3,\ 5^4 \times 3^2 \times 2^3$

In step 5, the student realizes that the symbols are put together with mathematical operation although no mathematical operation can be performed on symbol; therefore, for this compound symbol, s/he must expand each of the factors to its respective mathematical operation. Expressing $3^4 \times 3^2\ as\ \ 3 \times 3\ \times 3 \times\ 3 \times\ 3 \times\ 3$ is straightforward; however, she learns that when mathematical operations are shown on symbols, each symbol must be written in their respective mathematical operation. Now the interfering steps:

Step 6: express each of the following symbol with a single factor equivalent $3^4 \times 3^2,\ 3^7 \times 3^3$

To answer step 6, s/he must reflect on the definition of the symbols first, but s/he must do it at a much deeper level of understanding; s/he will note that by definition, $3 \times 3\ \times 3 \times\ 3 \times\ 3 \times\ 3$ can be written as 3^7; therefore, the single factor representation of $3^4 \times 3^2$must be 3^6. Through a deeper level of thinking, s/he realizes that math operation on symbols can be accomplished through the related numbers the symbols represent.

Step 7: Is it possible to express the following factors by a single factor expression? Why or why not? $5^4 \times 3^2 \times 2^3$

The step 7 is vastly different from the previous 6 output steps. The mental process relating to input, output and how the input information is stored and retrieved to guide output is the core learning at school. For that reason, practice is very important; in that sense, practice is not just repetition. It is perceiving, understanding, and storing information, and then retrieving and using the stored information to respond to a situation appropriately.

The appropriate level of support can make a difference in student learning experience. Support is not limited to giving them access to an electronic library or making various labs and tutoring available to them. It is mainly helping them become a self-guided learner. Koenig, (2010) asserted: "Teaching the learner how to learn as well as what is to be learned takes time" (p. xi). Most students have time constraints; as a result, they are more focused on test and exams. Effective learning and efficient information processing require the best use of human intelligence, memorizing events, formulas, and methods frustrates that intelligence; that could be the reason why many students forgets most of the contents learned during last semester. A very important support for the student is helping them to know how they can use very little information to solve vast amount of problems; but then, such support calls for teaching them critical thinking and creative thinking through which the students can solve problems or pose questions that leads to solution. Reuven Feuerstein (1980) showed that instructional strategy could significantly improve students' intelligence. This finding can be generalized to conclude that the appropriate level of support can also do the same—that change students' intelligence. However, the support can only produce results if the students are willing to use learning strategy, change their way of thinking, and take action that are consistent with desired outcomes. This depends largely on the students' mindset and motivation.

Mindset and Motivation

Attention and memory have a direct effect on students' academic performance. Those two factors can be the result of the way one thinks but are an immediate precursor for academic achievement. Belief has an influence on what a person thinks about himself or herself; not only that, it also influences how s/he interprets the events of life. It also determines a persons' accomplishment since it influences how a person leads his or her life (Dweck, 2016). According to Dweck, the mindset is the cornerstone of success in school and in real life, and the mindset is the view one carries for oneself. The discussion on faith in an earlier section of this article presented a discussion on the importance of faith. Faith is believing in a proposition prior to seeing it as true. Mind creates reality; according to Steven Covey, everything man has created, was created in his mind first. The main point is that one can work hard, but hard work is not enough for success if it is not created in mind first.

People pay attention to what matters to them and act according to their belief, and action produce results; this is true not only for school work but also in real world. An important question is can a person change his or her belief. If the answer is yes, then the question is how. First step is to identify if there is a belief that is hindering one's growth in some areas. This can be identified by monitoring self-talk. Monitoring one's attitude may be difficult, but monitoring self-talk is easy; one just need to listen what he or she is telling themselves during most of his/her awaking hours. Sometime thoughts (especially negative thoughts) just appears out of nowhere and persists until interrupted intentionally.

No one can deny the power of repetition; it leads to habituation, and this is the hope for a change. Attention to self-talk is the first step. Evaluation of those talks is the second step. This evaluation is not for right or wrong, good or bad, but for the alignment with the expected result. Harry (assumed name) is a 28-year-old school literature teacher. He is pursuing higher education to further his career. At the beginning of a required math class, he had a chat with his teacher. He started the discussion saying, "I am in this class because this is a required course, and I must pass this class. I am an English teacher, and I was never good at math as long as I can remember. Math is simply not my subject; I know I will struggle in this class; however, I am willing to keeping an open mind and doing my due diligence with a hope that I can pass this class. I know that I will never need this kind of math in my career."

Several points to note in Harry's discussion. First, his motive: he is taking this class simply because it is a required course. This means that his focus is passing the class and not learning from it. Second, his belief: He was always bad in math, and math is not his subject. This means that he has a mindset that is contradictory to his goal because to pass this class, he is expected to learn from the class and demonstrate that he has done so through homework and exams. Third, he has a belief that he will struggle, and the belief is so strong that he already knows that he will struggle in this class. The fourth point is that he already knows that the information he will learn in this class will never be useful to him in his career. He can find a reason to justify each of these beliefs he is holding, but none of these will help him pass the class. Even when he is willing to keep an open mind and work hard, his belief system will work against his goal of passing this class, and it is highly likely that his performance in this class will be less than what could produce.

Attention is guided by the thoughts one holds firmly. Cowan (1995) stated clearly, "Everyone knows what attention is. It is the taking possession of the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought" (p. 4). Attention is something one can control; but then again, attention mostly governed by inner belief since one can pay attention to one point at a time.

To increase student retention, college and universities need to pay attention to the factors beyond teacher training and curriculum updates. They need to focus on learners, help them to identify the weaknesses in their blind spots and provide appropriate support so that they can overcome that weakness.

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