

REVIEW

Enjoyment in academic pursuit and performance improvement

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Academic pursuit is a long-term commitment, which can lead to negative consequences, such as lack of motivation, dissatisfaction, and disappointment if performance in an examination is low. Enjoyment in academic pursuits can sustain the interest and focus necessary to learn and perform. The flow theory, optimal level of arousal, positive academic self-perception, and positive emotional environment provide the necessary intrinsic motivation and important directions to develop strategies to enjoy academic pursuit. A framework has been developed to indicate that simultaneous activation of positive academic self-perception and positive emotional environment routes leads to effective learning with consequent improvement in performance. Students can use these devices through continuous academic self-assessment. Research directions and applications are indicated.

Keywords: academic self-perception, emotional environment, flow, intrinsic motivation, self-assessment, strategy

Introduction

The thrust of this article is to highlight the factors that positively influence academic pursuit. The article conceptualizes academic pursuit as an investment in knowledge. It implies that enjoyment in academic pursuits can improve learning effectiveness and exam performance. The article uses Csikszentmihalyi (1) flow theory, the relationship between arousal and performance, the concept of intrinsic motivation, academic self-perception, and positive emotions to indicate how to enjoy academic pursuit. It uses appropriate anecdotes, examples, and stories along with research findings to support and explicate the emerging suggestions. These suggestions are integrated into a framework to indicate that simultaneous activation of academic self-perception and a positive emotional environment lead to enjoyment, which can have a more positive effect on learning and performance.

The article includes five major sections, including this section on introduction, which comprises two subsections: conceptual definitions and stage setting. The second section presents a review of literature and theoretical background relevant to the major objective of the article. The various

subsections are concerned with academic pursuit and performance, and they are linked to flow theory, arousal, and academic self-concept. In the section titled, “Two General Examples of Skill” we present two general examples to explicate the conceptualization of skill. The third section integrates the concepts and ideas presented in the “Introduction” and “Review of Literature” sections. A framework is developed to indicate two routes to effective learning and performance and suggests that the simultaneity of the routes can be more effective than only one route. The fourth section presents research directions and practical applications. The last section of this article is the “concluding” section.

Some conceptual definitions

Education is a womb to tomb, cradle to grave process. Academic pursuit is a long-term, unending engagement that requires giving time and energy to knowledge acquisition and its use. For students, it entails learning a discipline or a course for professional use. In this limited sense, academic pursuit involves acquiring knowledge, generally in the formal

setting of a school, to a certain level of proficiency or mastery. Schools test the proficiency level through various kinds of tests. Therefore, performance is required. Schools provide a certificate or degree as evidence of academic achievement.

For a teacher, academic pursuit is a life-long engagement. To be more comprehensive, meaningful, and inclusive, academic pursuit can be considered as an investment in knowledge that sustains interest in the world around us and contributes to the development of different worldviews. The “investment” perspective extends the conceptualization of academic pursuit from the classroom to “beyond the classroom.” Self-learning, learning through projects and research, participation in seminars and conferences, and experiential learning in the form of role-playing and other group activities make the learning process enjoyable. In an extended sense, academic pursuit as an investment applies to non-teaching professionals, housewives, businesspersons, politicians, and others. At the doctoral and post-doctoral levels, and in independent and collaborative research, researchers invest knowledge in addition to effort, time, and energy. The reward of investment in knowledge is in the form of more, deeper, and extensive knowledge, which contributes to personal growth and the growth of the organization in which the knowledge-investor works. The main thrust behind the above conceptualization is the need to update oneself, particularly in the teaching profession and in other professional engagements in general.

On the basis of interest and ability-driven motivation, students choose their primary discipline and courses of study. Student’s worldviews guide students in making those choices pragmatically. Worldviews also equip individuals to take decisions and act pragmatically in professional and social domains. Pragmatism is the source of prodding to view knowledge, language, concepts, meaning, belief, and science in terms of their practical uses and successes. Pragmatism is based on the principle that the usefulness, workability, and practicality of ideas, policies, and proposals are the criteria of their merit. It stresses the priority of action over doctrine, of experience over fixed principles, and it holds that ideas borrow their meanings from their consequences and their truths from their verification. Thus, ideas are essentially instruments and plans of action (2).

Enjoyment is the consequence of positive impressions and feelings of satisfaction created by positive stimuli. It is “a positive affective state that occurs when a person engages in an experience or activity that satisfies a desire, goal, or need, including but not limited to the need for pleasure, meaning, security, safety, sustenance, esteem, belongingness, or love” (3). Enjoyment is much more than, and different from, hedonism and pleasure, which are largely sensory and perceptual in nature and ephemeral.

A skill involves an organized sequence of goal-directed activities that use feedback as a corrective input. It is the ability or proficiency acquired through training and practice. Cognitive skills are important for academic

pursuits. Performance is a skilled behavior that achieves a preset goal. This conceptualization, along with the training required to acquire skills, implies that effective learning is essential to performance. Existing competence or skills define ability. Perceived ability or academic self-concept is crucial to performance.

Performance depends on focus on and awareness of the elements relevant to the problem at hand and the ability to disregard irrelevant cues in a given situation. Endsley formally combined these elements to define the cognitive construct “situation awareness” as “the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future” Endsley (4). Situation awareness is an important ability for operators in a dynamic situation, for example, for the pilots, vehicle drivers, and surgeons during a surgical process. During a test, situation awareness can be useful for properly distributing time to various questions, picking up the relevant cues and ignoring irrelevant ones from the question statements, and organizing answers.

Performers generally enjoy it when they perform if they are in flow. Flow is “a state in which people are so involved in an activity that nothing else seems to matter; the experience is so enjoyable that people will continue to do it, even at great cost, for the sheer sake of doing it” [(1), p. 4]. Flow is the optimal experience that people get when engaged in doing things that they want to do. It is this optimal experience that brings enjoyment to people. Writers, music composers, chess players, rock climbers, to name a few, all get the feeling of the optimal experience during performance. Csikszentmihalyi considered Yoga as a “thoroughly planned activity” and saw an extremely strong similarity between Yoga and flow. “Both try to achieve a joyous, self-forgetful involvement through concentration, which in turn is made possible by a discipline of the body” (p. 105).

An academic self-concept is a multidimensional construct that comprises self-beliefs in one’s own abilities to learn different school subjects and perform well on tests. As with the development of self-concept in general, academic self-concept also develops through perception of, and interaction with, the environment and feedback based on the consequences of actions. Parents can shape children’s interests, self-concept of ability, and relative achievement behaviors (5) by giving direct positive feedback when children do well and work hard in school (6).

Performance can be understood along with behavior in general. Psychologists define human behavior at two levels: observable actions (overt behavior) and non-observable (mental; cognitive) activities (covert behavior). Overt behavior can be a response to some change in environmental energy (the stimulus) or to some mental activity (for example, expressing an idea in words). Covert behavior can be a response to a stimulus or to a covert activity (for example, adding numbers or making mental images).

Is performance the same as behavior or are they different concepts? There are two contrasting operational views. Meister (7), cited by (8) posited that performance and behavior are different. Human performance is systematic, organized, and measurable behavior, which is appropriate in a technological context. Human behavior is comprehensive (includes less rational, emotional, and attitudinal states), which is appropriate in a non-technical context. The alternative view is, "Performance is synonymous with behavior Performance is *not* the consequence or result of action; it is the action itself" [(9), p. 261]. In this view, performance (behavior) is what people do, and it can be observed. Cognitive behavior cannot be observed, but the results of cognitive actions can be seen. In general, it can be suggested that performance is a goal-directed behavior. Mathematically, performance (P) can be described as a function of behavior (B), given some goal (G): $P = f(B|G)$.

Setting the stage

Arjuna's story in Indian mythology provides an important anecdote to understand the concept of academic pursuit as an investment and its relationship to performance and other important features of learning. As the story runs, in a lesson on archery, Draunacharya asked his students to shoot a bird by aiming its eye. Draunacharya called the students one-by-one and asked if they saw the tree, the branch, or the bird. Every student said he saw trees, branches, and birds. Arjuna, who practiced archery day in and day out, gave answers to all the questions in the negative. The conversation between Draunacharya and Arjuna seemingly went as hereunder.

Drona: "What do you see?" Arjuna: "I see the eye of the bird." Drona: "Do you see the tree?" Arjuna: "No." Drona: "Do you see the branch?" Arjuna: "No." Drona: "Do you see the bird?" Arjuna: "No. Drona: "Then what else do you see, Arjuna?" Arjuna: "Nothing." Drona: "Shoot, Arjuna." Arjuna released the arrow and it just hit the target.

The story has several important inklings to take home. The task involved a high challenge: shooting the bird's eye, spatially a tiny target. Arjuna had a high skill level: investment through continuous day-in-day-out practice to achieve the level of mastery, leading to performance with great acumen and precision. Arjuna had a clearly defined goal: the "bullseye." Arjuna was focused with selective attention to the bird's eye and a strong situation awareness to ignore objects and information irrelevant to the task at hand. He had no distraction, as indicated by the answer "No" to the questions related to the presence of "irrelevant" objects.

To conclude, Arjuna was *focused*, had one-pointed *unwavering attention*, and was *in control* of his mind. Some would say, "Arjuna was *in the zone*." What does it mean to be "in the zone?" Does being in the zone improve performance? If so, then "How?" What does it mean to be in control? The concepts of situation awareness and flow discussed in

the section titled, "Some Conceptual Definitions" provide answers to the above questions.

Literature review: some determinants of performance

A rich literature exists on human performance in various domains. The following review is only indicative of theories and constructs that contribute to an understanding of what determines performance.

The flow theory and academic pursuit

The flow theory identifies nine elements that make an experience enjoyable (10). The elements are (i) *Clear goals*: In the flow state, the individual has specific goals at each step that indicate what needs to be done next. This helps in the error-free, smooth conduct of the entire activity. (ii) *Immediate feedback*: Each goal can be thought of as a collection of intermediate goals. Achievement of an intermediate goal indicates a movement in the right direction. The individual knows at the conclusion of each intermediate goal whether the progression is in the right direction or otherwise. (iii) *Balance between challenges and skills*: As the level of challenge increases, an increase in the skill level is also required. An incompatibility between the levels of challenge and skill generally leads to emotional states that are disappointing and dissatisfying. (iv) *Merged action and awareness*: The individual focuses and concentrates on the task. There is a one-pointed mind to match challenges and skills. (v) *Exclusion of distractions from awareness*: nothing irrelevant draws the individual's attention. The focus is on the here and now. (vi) *No worry of failure*: In flow, failure is not an issue. There are clear goals and skills that are potentially adequate to meet the challenges. (vii) *Disappearance of self-consciousness*: During the episode, individuals ignore how they look and even step out of the boundaries of their ego to temporarily become a part of the larger entity. At the conclusion of the event, there is generally a stronger self-concept. (viii) *A distorted sense of time*: the subjective time is shorter or longer than the clock time, depending on the situation and the task. (ix) *Autotelic nature of activities*: The activity becomes an end in itself and a source of intrinsic motivation. The individual does not necessarily look for external rewards.

The elements of an enjoyable experience indicate some paradoxes. Time is perceived to be still, yet flowing. Due to the high skill level, the performance is effortless, yet highly challenging. High proficiency achieved through continuous practice makes performance relaxed, yet there is high intensity involvement as the performance requires high skill levels. There is a feeling of full presence yet a lost sense of

		Skill Level Required		
		LOW	MODERATE	HIGH
Challenge Level	HIGH	ANXIETY Fear of the unknown, uncertainty	AROUSAL A state of excitement or energy expenditure	FLOW A state of optimal experience
	MODERATE	WORRY A state of mental distress or agitation		CONTROL Authority, power, influence
	LOW	APATHY Indifference; Lack of motivation	BOREDOM A state of weariness	RELAXATION Abatement of tension to achieve calmness

FIGURE 1 | The eight channel model of flow [Based on (11), p. 31, this figure].

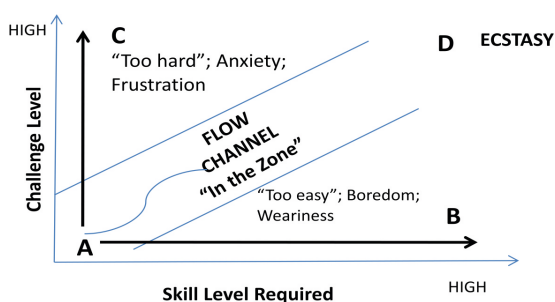


FIGURE 2 | The flow channel and challenge-based learning.

self. These paradoxes probably also teach the individual to be calm and patient.

Combinations of different levels of challenge and skill lead individuals to experience different emotional states. The model that describes these states can be represented as an eight-spoke wheel [(11), p. 31, **Figure 1**], which is schematically represented in a matrix form in **Figure 1**. As **Figure 1** indicates, when the skill level required is low, the individual moves from apathy (indifference and lack of motivation; low challenge) to worry (a state of mental distress and agitation; moderate challenge) through anxiety (fear of the unknown or uncertainty; high challenge). At moderate skill level requirements, the emotional state changes from boredom (a state of weariness; low challenge) to arousal (a state of excitement or energy expenditure; high challenge). Finally, at high skill levels, the shift in emotional experience is from relaxation (abatement of tension to achieve calmness; low challenge) to control (authority, power, and influence; moderate challenge) through flow (a state of optimal experience; high challenge).

A flow state is characterized by an optimal experience that provides enjoyment. Both flow and apathy provide pleasure, but with some differences. For example, in flow, pleasure is related to active engagement, while in apathy, the source of pleasure is passivity (for example, using Facebook or watching television). In the latter state, pleasure lasts only so long as passivity lasts. The feeling of pleasure during apathy comes from meeting preset biological expectations

that provide homeostatic experience and maintain order (for example, the taste of food, seeking what looks good to the eye, etc.). The feeling of happiness in apathy is therefore “not genuine.” On the contrary, enjoyment is related to meeting biological expectations *plus* “achieving something unexpected” (as in creative work) and helps forward movement through optimal experience or enjoyment. This movement provides a feeling of pleasure and genuine happiness, which lasts much longer, even after the active engagement in the episode is over.

Two things make the experience of academic pursuit enjoyable and intrinsically motivating (**Figure 2**): (i) An incremental development of skills beyond the average (moving from A to B); and (ii) Achievable challenging goals (moving from A to C). Low levels of skill and or challenge, and their combinations when one is high and the other is low, are not conducive to enjoyment.

A dynamic match between skill development and the level of challenge associated with goal achievement assures performance in the flow channel or “in the zone.” If only the level of required skill increased without an increase in the challenge, the task would become too easy with the consequential experience of boredom and weariness. Similarly, anxiety and frustration result if the challenge is high (task is too hard) and the existing skill level is not commensurate with the challenge. A dynamic match between skill level and challenge to meet moderate and high challenges provides the most appropriate conditions for enjoying a task. Activities, such as role play, problem solving, simulation, and games can make learning interesting and facilitate movement from A to D, a state of ecstasy (extreme happiness). Archimedes was in a state of ecstasy when he discovered the method to find the purity of the king’s crown: Highly excited, Archimedes forgot that he was not dressed, and he took to the streets naked, crying “Eureka!”

Arousal and performance

Psychologists have an interesting way of classifying individuals into “larks” and “owls.” Lark is an early morning bird. Individuals who rise early in the morning and like to do most of their tasks during the day are “lark.” Those who prefer to be awake and do their tasks during the night are “owl.” These preferences have to do with individuals’ levels of arousal.

Larks typically feel more energetic and are able to commit to memory what they learn during the day. This happens because they feel more aroused during the daytime. As **Figure 1** indicates, arousal helps in doing tasks that involve high challenge appropriately, even with moderate levels of skill. Does the level of arousal change during the day? Research shows that arousal level is related to body temperature (12, 13), which shows circadian variation. Performance in a variety of physical and mental tasks

depends on the level of arousal. Arousal, energy, memory, and body temperature show interesting relationships derived from the *Yerkes–Dodson law* (14). The Yerkes–Dodson law suggests an inverted-U relationship between arousal and performance. Performance increases as the arousal level increases up to a certain point where it reaches a maximum level, beyond which, if the arousal level increases further, performance continuously declines. Thus, an optimal level of arousal is required to achieve optimal performance. Performance impairment when arousal increases beyond the optimal level results from physical and emotional changes, such as fatigue, anxiety, burnout, and panic, in the given order.

Circadian changes in body temperature show a variation up to about 2° on the Fahrenheit scale. Kurian and Sharma (13) demonstrated a relationship between space perception and body temperature that varies as indicated by the Yerkes–Dodson law. Johnson et al. (15) found a falling and rising relationship between relative clock hour (the time of rising fixed to 8.00 a.m. irrespective of the clock time when the participants in the experiment actually woke up) and core body temperature over 36°h of uninterrupted participation in the experiment. They showed that subjective alertness (test of sleepiness), short-term memory (recall of simple information), cognitive performance (number of calculations completed in a given time), and core body temperature had similar relationships with the relative clock hour.

How can the circadian rhythm be useful in academic pursuits, particularly to rapidly get into the flow state? Most often, individuals can experience a “flow-block,” similar to the writer’s block that most writers face. Primarily, this happens because of the general habit of procrastinating the particular activity for whatever reason. This can be avoided by introducing effective scheduling of activities, thereby introducing self-administered intrinsic rewards. Assume that reading and writing are the two primary activities in which a learner is involved. With some experience over a few days, the learner can identify the time of the day (24°h according to the biological clock) that is most efficient and enjoyable for a particular activity. Reading involves understanding and committing to memory whatever is read. Writing requires creativity and expression. Once the individual discovers the most effective slots for these activities, time blocks can be carved out to develop an appropriate schedule to be ritually followed each day. There is a greater likelihood of getting into the flow state faster. Other strategies can be developed to meet individual requirements.

Two general examples of skill

These examples indicate the need to change skills with a change in the challenge. General examples are used to avoid any domain-specific knowledge in understanding the argument.

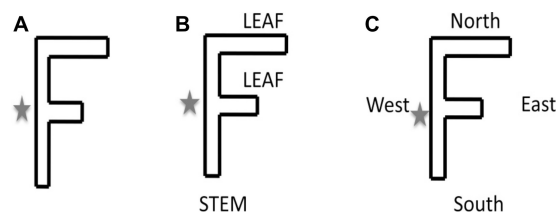


FIGURE 3 | Number of turns (A,B) and map direction of movement (C) in traveling across the periphery of the shape starting from the star.

Example 1: Do not seek any clarification right now. Look at the shape in **Figure 3A**.

Question 1: If you walk across the periphery of the shape, starting from the place marked with a star (*) and completing the periphery, how many left turns will you take?

The question is incomplete as the number of left turns depends on the direction of movement, whether clockwise or counter-clockwise. As you can *count*, there are *seven* left turns in the counter-clockwise direction of movement and *three* if the movement is in the clockwise direction. The total number of turns (left turns plus right turns) is 10. As can be checked, the number of left turns and right turns are complementary to each other for a given direction of movement.

The answer to Question 1 requires the simple skill of counting the number of turns when the concrete object is visible. Is the presence of a concrete object required for counting? In several talks, the present author exposes the slide with the shape in **Figure 3A** for a brief duration (about 100°ms) and then asks Question 1. In this situation, the concrete object is not available to the participants, yet almost all participants give correct answers. How are the participants able to do that? One possibility is that the participants form a mental model (a concrete image in the present case) of the shape, mentally traverse across the image, and count the number of turns. In either case, whether the shape is physically available or is available in the participants’ minds, the required skill remains the same: “count.”

Question 2: One way to describe an F-shaped object is to consider the shape comprising a stem and two leaves (**Figure 3B**). Assume that there is an 80-leaf F-shape. How many left turns will you take in moving across the periphery of the 80-leaf F-shape?

Question 2 presents a more challenging situation. Drawing an 80-leaf F-shape on paper or forming a mental model and then counting the number of left turns, though possible, will be cumbersome. You need to shift to an abstract level, perhaps to the algebraic level, and develop a formula to *compute* the number of turns. Let there be an N-leaf F-shape. You can develop the following formulae to compute the number of left (L_C)- and right (R_C) turns in the clockwise direction (C) as well as the total number of turns (T): $L_C = 2N - 1$; $R_C = 2N + 3$; $T = 4N + 2$. You can verify these formulae for **Figure 4A** and compute the required values for the present 80-leaf F-shape ($T = 322$; $L_C = 159$; $R_C = 163$).

The above questions illustrate that when the situation became more challenging, there was a shift in the required skill from simple *counting* to *abstracting* and *computing*. Abstraction indicates that the image, whether physical or mental, is not required. This implies that skills may change quantitatively or qualitatively. Physics provides some interesting examples in support of this conceptualization: advancing from geometrical optics (light as particles), to physical optics (light as waves), to quantum optics (wave-particle duality). The shift from one level to the other provides more sophisticated skills and methods to understand optical phenomena (for example, wave optics to explain diffraction of light) that are difficult to understand and explain at a lower level (at the level of geometrical optics).

Question 3: Now refer to the F-shape in **Figure 3C**. How many times will you be moving eastward in traveling across the periphery of the F-shape?

Again, the number of eastward moves can be counted: Two (clockwise direction) and Three (counter-clockwise direction). It appears that the argument will be the same as in Questions 1 and 2 above if the challenge increases to an 80-leaf F-shape. Yes, but there is a basic difference in the required skills. Left turn and right turn are appropriate for navigation in a city (for example, driving an automobile), where knowledge of landmarks (where to take a turn?) and routes (what is the path from one landmark to the other?) is critical. Moving in a particular map-wise direction requires a mental map or “survey knowledge” of the area. This information is generally useful to rally-car drivers and off-route or lost travelers.

The order in which the three forms of knowledge develop is quite universal: landmark knowledge, route knowledge, and map knowledge. Yet, there are important differences in the way route knowledge and map knowledge develop. How does route knowledge differ from survey knowledge?

‘Research suggests that the paths to the two forms of knowledge are different. The most direct path to route knowledge is through *navigational practice*. The most direct route to survey knowledge is through map study. However, there is some asymmetry between the two kinds of training in that extensive navigation will also eventually develop fluent survey knowledge, but extensive map study is less proficient in developing route knowledge’ [(16), p. 132].

Example 2: How much time do you typically spend in reading a novel? A novel typically contains 100,000 words. With a normal reading speed of about 250 words per minute, it may take about 7 h to complete the reading. Reading speed can deteriorate if comprehension is required (for example, while reading technical reports and textbooks) or improve if the material being read is of personal interest (for example, while reading a letter from a friend).

Reading involves two types of eye movements: eye fixations and saccades. Fixation helps in visually focusing on a specific part of the text to get the image in the region of the fovea. For a text written in English, the average duration

of fixation is 250°ms. Saccades are quick eye movements between two fixations spanning around 10 letter spaces for normal text in English. Each saccade takes around 20°ms to complete. Saccades are generally in the forward direction but may be regressive. For technical material, fixations are longer and saccades cover a shorter span with a greater likelihood and frequency of regression [(17), cited by (18)]. Is the speed of reading 250 words per minute a good reading speed for competitive examinations requiring performance on multiple-choice objective-type questions under time pressure? This question is discussed under the section titled, “Routes to Academic Performance.”

Academic self-concept and performance

How important is academic self-concept to performance? Lower academic self-concept leads to test anxiety, among other negative consequences (19). This is similar to the anxiety that is experienced when an individual with a low skill level is faced with a highly challenging task (**Figure 1**). Test anxiety can adversely affect performance. The control-value theory (20, 21) provides a cognition-based explanation for the relationship between academic self-control and performance in educational settings. The control-value theory posits two types of cognitions that determine action control: control cognitions (for example, academic self-concept) and value cognitions that create an interest in expressing emotions in educational settings. Higher academic self-concept determines adaptive action-control behaviors and positive learning emotions involving enjoyment, *inter alia*. Lower academic self-control triggers maladaptive action-control behaviors, such as anxiety.

To adopt and execute action-control behaviors, individuals need to be consciously aware of, and accurately assess, their academic self-concept. How accurate are individuals in their assessment of their own abilities? In a study, Sharma (22) asked students a single question, “How many marks do you expect to get in today’s quiz?” under varying amounts of information (four conditions). The conditions were—B1: students knew the topics on which the questions in the quiz were based; B2: students read the question paper; B3: students completed the quiz; and B4: the instructor gave the correct answers to the class. Students faced decreasing uncertainty (alternatively, an increase in the amount of information) as the condition moved from B1 to B4. In general, (a) students’ expected marks deviated by 10% or less of their actual marks, (b) the amount of deviation declined from condition B1 to B4, and (c) high and low performers differed in the direction of expectation. The high-achieving students, identified on two different criteria, underestimated themselves (negative deviation of expected marks from the actual marks), whereas the low-achieving students showed over-expectations. The results were generally similar to the competence (B1 + B2) and performance (B3 + B4) analyses. An implication of

these findings is that students are fairly accurate in their self-assessment and the assessment of their academic self-perception (competence).

In subsequent research, the high and low groups showed positive and negative expectations, respectively, for conditions B1 and B3, but both groups had negative expectations under condition B4 (23). Surprisingly, both the groups revealed a high degree of confidence in their self-assessment (about 75% in conditions B1 and B3, which increased to more than 90% in condition 4). The findings on self-assessment of performance and confidence in assessment, particularly getting closer to the actual marks with increasing information (22, 23), support the notion of the development of an academic self-concept through interaction with the environment.

Do the high- and low-performing students have different perceptions of their (the same, as in an examination situation) environment and develop different learning and performance styles? A learning style is “a predisposition on the part of the students to adopt a particular strategy regardless of the specific demands of the learning task simply a strategy that is used with some cross-situational consistency” [(24), p. 233]. In a class test in the introductory psychology course that included two types of questions, basic and applied, high performers not only scored more marks than the low performers but also did significantly better on basic questions as compared to applied questions (25). The low performers did not show any difference in performance on basic and applied questions. Basic and applied questions involve two different types of cognitive processing: information transmission and abstraction/elaboration of information (26). Basic questions sought simple reproduction of material acquired during the course, whereas applied questions required formulation of a problem on the basis of a given scenario/situation (abstraction) *and* use of concepts/examples to answer the related question (elaboration). Though each student is likely to develop a learning style, it appears that the high performers can use specific strategies to appropriately handle the differential in time pressure created by the basic and applied questions. It is possible that high performers “employ a high degree of variability in cognitive strategies at the beginning of task development and have greater learning and eventual success in task performance” [(27), p. 34]. They are more behaviorally adaptive as compared to low performers, and thus are able to handle the variability in task performance (Smith et al.). Abstraction and elaboration are time-consuming cognitive processes, whereas information transmission is quick (of course, assuming the memory does not fail). Thus, keener situation awareness and effective deployment of selective attention in the examination (performance in general) provide an edge to the high performers.

Relating the above ideas to academic performance

A summary of the ideas presented earlier will provide a useful guide to academic performance improvement.

In the context of academic pursuit, performance means “effective learning and performance in an examination.” Low academic self-concept sequentially leads to poor learning, weak performance in examinations, depression, and finally a lack of motivation. If a student’s academic self-concept and self-assessment of performance are high (more accurate), high perceived ability is intrinsically motivating, leads to strong performance, and culminates in happiness and a higher quality of life. An intrinsically motivated individual does not seek external rewards; action is its own reward. As the self-determination theory of motivation (28) suggests, intrinsic motivation serves three “innate, essential, and universal” needs: the desire to feel competence, autonomy, and relatedness. To meet the desire for competence, an individual seeks to control the outcome and experience mastery. Any activity that attempts to meet extrinsic motivation (such as money, social status, praise, and food) fails to meet the earlier discussed basic needs. Increasing skill levels and exposure to, and experience with, highly challenging situations improves performance and accuracy in self-assessment.

Academic performance improvement requires a high academic self-concept, an emotionally positive environment, working on challenging problems, continuous practice, an optimal level of arousal, focus on the task (living in the present), time management, a well-defined order of learning, and a high reading speed. The effect of continuous practice on learning is incremental (29, 30) and can be expressed as a power law that reflects the negatively accelerated learning curve.

Routes to academic performance

Figure 4 graphically shows that enjoyment, learning, and memory mediate the relationship between (a) academic self-concept and performance and (b) emotionally positive environment and performance.

As **Figure 4** indicates, there are two routes to improving performance: a central route that emerges from academic self-concept and a peripheral route sourced from an emotionally positive environment. The central route thus uses core competence based on abilities and practice. The peripheral route provides the necessary background that facilitates the learning process. This distinction is similar to the distinction between cerebral activation that enhances thinking and memory processes and the activity in the reticular activating system that provides the necessary general background activation to register the incoming information.

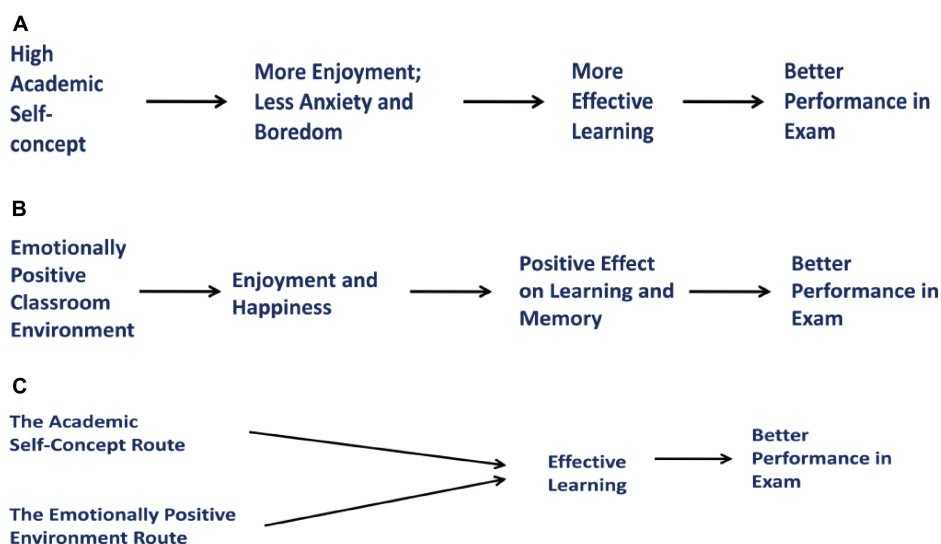


FIGURE 4 | The routes through which academic self-concept (A) and emotionally positive environment (B) influence academic performance. Simultaneous activation of the two routes (C) can be more effective.

COWS Analysis		Strength		Opportunity	
		S1	S2	O1	O2
Weakness	W1	S1W1:	①	O1W1:	③
	W2	S1W2:		O1W2:	
		S2W1:		O2W1:	
		S2W2:		O2W2:	
Challenge	C1	S1C1:	②	O1C1:	④
	C2	S1C2:		O1C2:	
		S2C1:		O2C1:	
		S2C2:		O2C2:	

FIGURE 5 | Using strengths and opportunities to develop strategies to handle weaknesses and threats.

What creates an emotionally positive environment? The teacher’s role is crucial in creating the classroom atmosphere. Creating curiosity among the students through stories and questions, admiration and appreciation of students, raising students’ hope to generate positive expectation, focusing on strength, and using humor through examples and anecdotes are some effective and useful approaches to creating an emotionally positive environment.

The following quote suggests that to sustain interest and continuity in work and be productive, it is important to take breaks.

“All work and no play doesn’t just make Jill and Jack dull, it kills the potential of discovery, mastery, and openness to change and flexibility and it hinders innovation and invention” (31).

Therefore, a work-life balance should be maintained. Since there is a limited time budget (24^oh in a day), individuals can effectively manage their time by appropriately interspersing work with leisure. The available 24^oh can be divided into three broad areas: paid time (activities related to work;

studies in the case of students); obligated time (non-discretionary activities, such as meeting biological needs and social responsibilities and commitments); and leisure (discretionary time). An individual has only two blocks under control (obligated time can be minimized, but not eliminated): paid time and leisure. An effective allocation of time for these blocks of activities can be useful in performance enhancement.

What could be a well-defined order of learning? A quick answer is: “Know the alphas, betas, and thetas well before they enter an equation; know the equation well before it enters a theory; know the theory well before it is pitched against other theories and models.” This answer is based on the author’s recollection of conversations that happened among fellow students during his post-graduate studies in physics. Example 1 discussed earlier provides support for this understanding: Learn the concepts well (landmark knowledge), use the concepts in theories and models to understand how the concepts relate to each other (route

knowledge), and compare the theory to other theories (map knowledge).

We now go back to the question asked toward the end of Exercise 2 (section titled, “Two General Examples of Skill”): Is the speed of reading 250 words per minute a good reading speed for competitive examinations requiring performance on multiple-choice objective-type questions under time pressure? Can the reading speed be increased? Expert readers develop skills to sample longer word-strings in sentences and control eye movement (saccade, quick eye movement) to focus on keywords (fixations). That can increase the reading speed to as high as 500 wpm (or even more) with comprehension. Practice can improve the reading speed.

Research directions and practical implications

In this section, we indicate research directions and describes some implications for different stakeholders, in particular, students, teachers, and parents. A practical implication is indicated for students by suggesting an exercise that they should regularly do to develop and assess their academic self-construct.

Directions for research

The framework that provides the routes to academic performance (Figure 4) provides the basis for the following research hypotheses for the central route (Figure 4A) to performance (H). H1: Academic self-concept is related to performance. H2: The relationship between academic self-concept and performance is mediated by enjoyment and learning. H2 thus suggests a double mediation effect. Similar hypotheses can be developed for the relationship between emotional state and performance. The simultaneous activation of academic self-concept and environmental routes can be extended to include the interaction effect to test the statement “Simultaneous activation of the two routes (c) can be more effective” (Figure 4). H3: Academic self-construct and emotions have an interactive effect on performance. The mediation effects can be added to the hypothesis stating the interactive effect. The framework can be further extended by including some moderating effects of socio-demographic and personality constructs. These hypotheses can be tested through simultaneous equation modeling.

Empirical research on enjoyment and performance can be more effective with mixed research methods that involve the use of qualitative and quantitative methods. The qualitative component can provide important inklings about the formation of academic self-construct, the elements of an emotionally positive environment, and the role of different stakeholders that include peers, teachers, and parents.

Developing strategies to improve performance

Learning how to do self-assessment can contribute to academic self-perception and self-concept formation. Teachers and parents have an important role in this context. Above all, the students themselves play a larger role in the development and assessment of their academic self-construct.

The exercise described here is based on what managers generally do to develop business strategies for new businesses and when they want to diversify. It comprises two steps: (i) Step 1 entails identifying (a) their company’s strengths (S) and weaknesses (W) of their business as well as (b) opportunities (O) and challenges (C) in the environment. Step 1 is an SWOC analysis. (ii) Step 2 involves the development of strategies based on strengths and opportunities to combat weaknesses and challenges. The second step can be represented by the acronym COWS, a pictorial view of which appears in Figure 5. Individuals can use COWS to improve their personal, social, and professional lives.

How to use COWS in an academic context? Strengths and weaknesses are internal to an individual. They include individuals’ abilities, competencies, and all those elements that contribute to their academic self-concept. Strengths are what an individual does best. Weaknesses are what the individuals struggle with, do poorly, or lack. Opportunities are conditions in the environment that facilitate activities and can be used to enhance academic performance. Challenges are any environmental forces or conditions that may not allow individuals to achieve their goals.

Cells 1–4 in Figure 5 can be used to summarize strategies. For example, Cell 1 indicates the strategies based on strengths to handle weaknesses. Similarly, other cells can be completed. Prioritization of strategies can then help with the order in which those strategies can be implemented. Since strengths, weaknesses, opportunities, and challenges change when new learning happens and environmental changes take place, this exercise will be effective if used with a manageable frequency. An evaluation of the effectiveness of strategies before developing a new set of strategies can be used as a guide.

Conclusion

Human performance is relevant to all domains of life. It requires the development and continuous improvement of appropriate skills, a positive self-concept, an emotionally positive environment, and feedback mechanisms. Individuals have to invest time, energy, and effort to raise their skills to the level of mastery and proficiency required to handle challenges and enjoy the processes and activities involved in achieving the required goals. Skill learning is a continuous process that can be facilitated by continuous self-evaluation.

In particular, academic pursuit can be made more enjoyable and rewarding in terms of improved pursuit through frequent assessment of academic self-construct.

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