INDICATORS FOR DEVELOPING EFFECTIVE PEDAGOGIC PRACTICE BASED ON BEHAVIOURAL SCIENCE TO FACILITATE MENTEE'S ACHIEVE HIGHER-ORDER COGNITIVE SKILLS

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Abstract :

For years, we have been fascinated by using the appropriate tools to make learning more efficient. Better mentors are the ones who keep themselves abreast of the methods of disseminating the knowledge, which is not only a matter of expertise in knowledge transfer but also the application of behavioral science for better end results. When we discuss knowledge accumulation, we must discuss the cognitive aspects of processing, understanding, and reasoning. Theoretically, cognitions are divided into lower-order and higher-order cognitions; lower-order cognitions help one memorize, whereas higher-order cognitions help the person understand, relate, and apply the knowledge. High-order cognitions are also known as high-order thinking skills; some of the skills involved are analysis, evaluation, conceptualization, synthesis, brainstorming, and decision-making based on a systemic thought process. The research paper deals with a review of various theories and research articles to seamlessly aggregate the knowledge and create a comprehensive understanding of facilitating cognitive growth in the mentees. In order to generalize the findings to all roles of imparting and receiving knowledge, the terms mentor and mentee have been used to allow inclusivity of different situations and stages of learning.

Keywords : *Pedagogy, Cognition, Knowledge, Psychology*

Introduction :

Many theories originally linked to the pedagogic process are based on the antecedent-consequence relationship between different learning behaviors. Talking about behavioral science does not limit the topic only to the behaviors but also includes the allied cognitive and social processes that impact learning and change. Many of the theories discussed here are core pedagogic topics, whereas some theories contribute to other sciences like philosophy, sociology, and psychology but find relevance when we discuss the higher-order cognitive skills in the mentees. This writing evolves from the intent of perceiving a topic for people in the role of 'mentor' and who are involved in effectively transferring knowledge and understanding the tenets of behavioral science that closely relate to higher-order cognitions, enabling better end results in the learning process.

Literature Review:

Mentees who develop sophisticated thinking skills and have high-order cognitive skills are able to imbibe the learning faster and apply the learning in practical settings (Levine & Melvin, 2009). Though developing higher-order cognitions is a persistent process that will have to be done over a period of time, its efficacy cannot be doubted in creating attributes like analytical thinking, conceptualizing, brainstorming, problem solving, and decision-making and critical thinking (Barak, Ben-Chaim, & Zoller, 2007). Some concepts designed by 'Maier" and "Kahneman" are quite similar to the lower-order cognitions and high-order cognitions, namely 'learned behavior/reproductive thinking' and 'reasoning/productive behaviors" (Maier, 1933) and "system 1" and "system 2' (Kahneman, Thinking Fast and Slow, 2011). The gap-filling concept of Bartlett gives three processes, i.e., interpolation, extrapolation, and reinterpretation, to seamlessly integrate past knowledge to facilitate higher-order cognitions (Bartlett, 1958). Though we might have varying explanations of high-order cognitions, most experts agree on the utility of harnessing higher-order cognitions within learning methodologies. If the transfer purely depends on learning and replicating, mentees will not be able to work effectively, which requires improvisation, analysis, and critical thinking. For empowering the mentees to work in a variety of challenging situations, it is necessary that imparting learning be based on methods of stimulating higher-order cognitions.

Research Methodology :

This research intends to observe and analyze different theories that relate to effective knowledge transfers and maximize the learning benefits through the application of these theories related to psychological and behavioral aspects of pedagogy. The attempt is not to enumerate all theories exhaustively but to observe the interplay between these theories and what some of the proponents of these theories have to say about achieving higher-order cognitions in a privileged relationship between mentor and mentee. The chosen methodology for this research paper is mainly descriptive and only wishes to answer how, when, and where questions pertaining to the topic. The paper does not mean to answer any 'why' questions.

General Discussion :

One of the important perspectives in a mentor-mentee relationship is the use of knowledge of cognitive and educational psychology towards creating meaningful engagement and increasing the efficiency of imparting knowledge. Persons in privileged positions like a mentor should necessarily be behavioral scientists, understanding the recipients' peculiarities and improvising the methods of transferring knowledge. The mentor's own belief that he can affect the knowledge transfer outcomes and eventually the mentee's performance is also based on self-efficacy beliefs like mastery experiences, vicarious experiences, verbal persuasion, and physiological and emotional states (Bandura, 1997).

"Some effective techniques are underutilized many teachers do not learn about them, and

hence many students do not use them, despite evidence suggesting that the techniques could benefit student achievement with little added effort" (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013).

"One potential reason for the disconnect between research on the efficacy of learning techniques and their use in educational practice is that, because so many techniques are available, it would be challenging for educators to sift through the relevant research to decide which ones show promise of efficacy and could feasibly be implemented by students" (Pressley, 1989).

Theories governing learning outcomes are many and difficult to discuss all at once, but loosely speaking, intelligence could be cognitive, emotional, or social, and there are theories of engagement based on what aspect of engagement we discuss. Most methods that promote collaboration, inquiry, imagery, argument, and working strategically towards decision-making through critical thinking are in all likelihood based on higher-order cognitions.

Knowledge of metacognition is important for both mentors and mentees. Metacognitions are based on the premise that a person is either aware of what he knows or has knowledge of what he does not know. Most importantly, one must know what thoughts and actions are needed in order to gain knowledge of what he does not already know. The ability to have a "bird's eye view' of both your own knowledge and ignorance and then set yourself to acquire knowledge in essential areas you find yourself ignorant in is the metacognitive training that a mentee can rightfully bestow upon his mentees. A metacognitive approach to learning allows the mentor to draw the mentee's attention to self-thought about the subject of learning, making him understand the whys and hows of the learning. When it comes to imparting knowledge, mentors must be aware of the role of 'a priori' and 'posteriori' as the vital tools of knowledge building. Again, whether a mentor is able to provide stimulation for such stages of knowledge building will determine whether the knowledge parcel created for the mentee is long-lasting or ephemeral.

While we are discussing metacognitions, let us also discuss the work of Nobel Laureate Daniel Kahneman. He divides the mode of thinking into two categories, 'system 1' and 'system 2'.

He says,

System 1 operates automatically and quickly with little or no effort and no sense of voluntary control (Kahneman, Thinking Fast and Slow, 2011).

System 2 allocates attention to the effortful mental activities that demand it, including complex computations. The operations of system 2 are often associated with the subjective experiences of agency, choice, and concentration (Kahneman, Thinking Fast and Slow, 2011).

Kahneman also goes on to classify these systems as fast thinking and slow thinking; according to him, slow thinking is more deliberate, needs more effort, and is orderly. This also requires using old cognitive programs and relating the new parcel of knowl-

edge with the already-acquired knowledge. The mentor needs to be encouraged to put in sustained attention, use previous cognitive programs, and put in efforts to resolve the intellectual challenge.

The kaleidoscopic challenge of mentoring people depends upon how one handles heterogeneous crowds that have had unique developmental paths until that time. Imagine the challenges that adults might have faced during the early developmental years through **Piaget's stages of cognitive development** or how they flared through **Eric Erikson's developmental stages.** For mentors dealing with young adults, knowing if they have reached distinct identities, social roles they have achieved, a positive self-image they hold, and a level of engagement will be critical. If one has to look at learning from **Vygotsky's** perspective, the mentor, being 'the more knowledgeable other', is able to stimulate the mentee far beyond proximal development. The possibilities for effective learning can only be accrued through a mentor's knowledge of developing higher-grade cognitions in their pupils. Being aware of different theories of psychosocial development will go a long way in harnessing and liberating the young talents.

Similarly, the heuristic method of teaching imparts the role of facilitator to the mentor, who helps his student make guided discoveries through trial and error. **Heuristic methods** of teaching allow for an exploratory method, or inquiry method, and, moreover, a self-learning way of finding solutions with minimal help through inquiry. While we are discussing promoting independent thought in the mentees, another important concept that could be a vital tool is the **"Socratic questioning method'**. Socratic questioning lets the mentees take ownership of their own learning by stimulating thought, arguments, analysis, evaluation, and perceptions. Conventionally, learning flows from mentor to mentee, with the mentor having distinct and unreasonable authority and the mentee being a passive receiver. Some of the important questions to ask here are: who plans the pace, content, and time for learning? What are the levels of engagement? Who has ownership and control over the learning? What kind of learning will result in applied knowledge that is accessible to the mentee while solving problems in the future?

The verbal exchanges between a mentor and mentee also need to be seen in the light of theories of verbal behavior.

"If men needed speech in order to learn to think, they had an even greater need of knowing how to think in order to discover the art of speech... So that one can hardly form tenable conjectures about this art of communicating thoughts and establishing intercourse between minds; a sublime art which is now very far from its origin...." (Chomsky, 2008)

Language must be intelligible; the way ideas are communicated very much depends on the internal monologue of the person, the artistic use of ideas, and the cognitive conceptualization of the topic to be discussed. The question that is worth pondering upon is how higher-order cognitions are related to expressions, or more precisely, to language, and more so to non-verbal communications.

Let us imagine the application of various laws stated by **Thorndike.** It would be impossible to attain the benefits of Thorndike's theories if the mentor is unable to translate his wisdom through intelligible interpersonal skills, mostly associative communication. Let us also go beyond the communicability between two people and think of the interpersonal dynamics between mentor and mentee as stated in "modeling theory' or in **Bandura's** Learning Theory. Does this mean mentors actually affect the mentee's behaviors beyond the actual intended learning that they impart? Keeping in view the **Pygmalion effect described** by **Rosenthal,** the belief of the mentor and reinforcement given by him will lead to high expectations, which eventually lead to better performance from the mentee.

There are also areas like social intelligence, interpersonal intelligence, or social cognition that have been discussed over the years to study the effectiveness of collaboration, teamwork, and reciprocity in different interpersonal relationships. It would be interesting to study the effects of social intelligence on the success of the mentor-mentee relationship and the learning outcomes. M. Afzalur Rahim has also linked social intelligence to creative performance in leaders (Rahim, 2014).

It is also relevant to discuss long-term memory, working memory, and fluid memory here with relation to the attention required from the mentee. While fluid intelligence is independent of previously acquired knowledge, working memory is the arithmetic memory that can be used for fulfilling a certain cognitive task. So then, is there an overlap between the concept of working memory and higher-order cognitions? A person needs to engage and disengage his attention depending on the task at hand (Shipstead, 2016).

Alexander Burgoyne and Randall Engle, in their study 'Attention Control: A Cornerstone of Higher-Order Cognition," also link the significance of attention for developing higher-order cognition.

Attention control provides a common thread among broad cognitive abilities, including fluid intelligence, working memory capacity, and sensory discrimination (Burgoyne & Engle, 2020).

Psychological manuals have developmental disorders like "attention deficit disorder," and a variant of the disorder seen in adults is also called "adult attention deficiency disorder" (Young & Goodman, 2016). Attention plays a significant role in cognitive development, and such traits in adults might also affect learning outcomes. Some of the learning difficulties have also been directly related to the inability to develop higher-order cognitions (Resnick, 1987). Hence, supporting the pupil with learning challenges is of utmost importance for the mentor. And, unless the mentor is well versed in the skills necessary to develop higher-order cognitions, learning could become very challenging for mentees with some learning difficulties.

Learning to be effective in higher-order thinking is important for everyone; it is not a frill, nor is it a skill that only "gifted children" can or need to develop. Any time an individ-

ual is faced with a perplexing situation or a situation where it is necessary to decide what to believe or do, higher-order thinking is necessary (Lewis & Smith, 2009).

It is not easy to learn, practice, and implement the skills related to the development of higher-order cognitions (Tobin, Kahle, and Fraser, 1990), and it will take understanding of the concepts and constant pursuit of refining skills to facilitate such high-order cognitions.

Conclusion

1. People in a mentoring role are in privileged positions to affect the performance of the mentee.
2. Mentors must be "behavioral scientists' equipped with the know-how of different theories and principles.
3. Interpersonal exchanges between mentor and mentee are mutual learning experiences.
4. Different theoretical perspectives on developing higher-order cognitions, whether aligned or opposing, should be learned to facilitate higher-order cognitions.
5. There are different terminologies used for the higher-order cognitions by different experts based on the field of study, i.e., sociology, psychology, philosophy, etc. How do they compare to each other, and can a comprehensive text be created by drawing similarities? This is an endeavor for future studies.

Limitations :

1. The study is limited by analyzing only a handful of contributors.
2. The descriptive nature only helps draw attention to some but not all areas that significantly affect the development of higher-order cognitions.
3. A deeper study is needed to establish comparisons, meaningful connections, and decisive research outcomes.
4. To have consensus amongst experts that define higher-order cognitions is rather difficult-the area is a conceptual swamp (Cuban, 1984).

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