

Innovative Teaching Strategies That Ensure Effective Learning

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Abstract:

Teaching-Learning process has been evolving since the evolution of man with the underlying aim of bringing about a desired change through targeted interventions. Over the years various studies and philosophies have contributed towards making this a more formalized and focused process. However, excess strategizing and structuring has had its own counter impact on the effectiveness of teaching-learning, causing goal achievement to become a challenge. This challenge grows with the growing age of the learner. Senior school adolescent students, who have their own set of priorities allowing studies to take a backseat, pose a dilemma for their educators. Their lack of engagement and low motivation levels relegate classroom teaching to an undesirable routine activity. To prevent teaching-learning from becoming a mere transactional activity, it becomes imperative to blend new innovative strategies in Teacher Education.

The aim of this paper is to emphasize creating an outcome based learning for adolescent students and establishing a strong teacher- learner bond. In this regard, it suggests incorporating the findings of medical researches based on human brain into Teacher Education. It further explores how by using these brain function pathways and processes, teaching strategies can be developed in order to ensure effective learning, long term retention and easy retrieval of learned concepts.

Keywords: Teaching-Learning, Adolescent students, Human brain research, innovative teaching, effective learning, retention.

I. INTRODUCTION

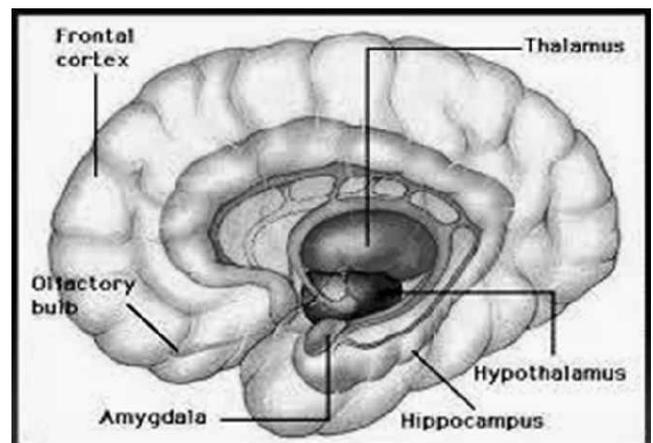
Adolescence is a period of remarkable mental, physical, psychological, emotional and social growth. However, it brings along its own challenges for the adolescents, leaving them predisposed to precarious situations. All this not only impacts their learning experiences but also has the potential to impede their development that can otherwise contribute greatly to them and to the society at large. During adolescence, academics and the educational goals associated with it take the peripheral position and what remains at the core is nowhere in sync with what is expected of them.

Adolescent students can be helped to reach their full potential and the above-mentioned challenges can be taken care of by avoiding their negative stereotyping and providing meaningful learning experiences to them. Their being more engaged in learning also presents higher chances for us educators to achieve the intended educational outcomes.

This paper attempts to put the findings of researches in the field of human brain and teaching-learning styles on the same page thereby suggesting strategies to convert teaching-learning activity into a more meaningful and relevant process. In the process, it also aims to move towards UNESCO's vision of 'Education for sustainable development'¹.

II. ANATOMY OF HUMAN BRAIN

It is essential to first understand briefly what human brain looks like and how it works.



In order to know how human brain works and how these findings can be applied in the field of education, it is essential to understand the key insights regarding some of the parts of the brain. These are:

Cerebral cortex- The cerebral cortex is the outermost layer of the brain, also referred to as gray matter. The cerebral cortex plays a role in just about every neural process, from memory, perception, attention, awareness, consciousness, thought, language, problem-solving, advanced motor functions and social abilities.

Prefrontal Cerebral cortex- It is the part of cerebral cortex which covers the front part of its frontal lobe. It is highly developed in humans and plays a role in the regulation of complex cognitive, emotional, and behavioral functioning.

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¹ <http://en.unesco.org/themes/education-sustainable-development>

Limbic system-The limbic system, located just beneath the cerebrum, is not only responsible for our emotional lives but also many higher mental functions, such as learning and formation of memories. The primary structures within the limbic system include the amygdala, hippocampus, thalamus, hypothalamus, basal ganglia, and cingulate gyrus.

Thalamus-The thalamus is a small structure within the brain located just above the brain stem between the cerebral cortex and the midbrain. The main function of the thalamus is to relay motor and sensory signals to the cerebral cortex.

Hippocampus-Hippocampus is a part of the limbic system that is vital for the formation of long term memory.

Amygdala- Amygdala is an almond-shaped mass of grey matter inside each cerebral hemisphere, involved with experiencing the emotions.

III. LEARNING PATHWAY OF HUMAN BRAIN

The learning pathway that the human brain takes has the following steps:

- First of all, the information is perceived through sense organs
- Sense organs then pass this information on to thalamus for first level processing
- Thalamus further passes on the information to Cerebral cortex for processing it further
- Cerebral cortex receives the stimulus information and sends it to Hippocampus
- Hippocampus evaluates the information and responds in either of the two ways:
 - if the information is not loaded with emotions but has high bias of what already exists in brain (aka Previous knowledge), it is sent back to Cerebral cortex for long term storage. However, any information consolidated via this pathway has to be maintained through extensive practice
 - if the information is loaded with strong emotions, Amygdala takes over from Hippocampus
- Amygdala, after receiving emotion loaded information, responds by activating other brain areas for memory consolidation and stores the information in synapses to be reactivated at a later stage. This is contrary to previous pathway since here extensive practice is not required.

IV. ADOLESCENT BRAIN

It is now imperative to understand how an Adolescent's brain is different from an Adult human brain:

- During adolescence the cerebral cortex, especially its prefrontal lobes, responsible for judgment, insight, reasoning, setting goals, consequential behavior, are still developing and are not fully developed before early twenties.
- The Limbic system is fully developed and takes precedence over other pathways for processing of information.

Due to this reason, in an adolescent's brain decision-making is greatly influenced by emotions as the brain relies more on the limbic system than on prefrontal cortex.

It is for this reason that adolescents remember school incidents from their distant memory very clearly and get vocal about the tiniest of details associated with the incident. Their description sex plicitly highlight their feelings. In other words, we can easily see them relive that incident in their memory. However, if told to recollect contents of a lecture of a not so favourite subject that took place a fortnight ago, they are unable to recollect anything about it. The reason behind this photographic memory is the emotional connect that they have with that distant incident. As explained above any information that has a high emotional load bears great significance for them and thus is learnt, retained and retrieved effortlessly by their brain.

V. HOW CAN THIS BE UTILIZED IN CLASSROOM TRANSACTIONS

The manner in which human brain learns can provide great insights for Teaching-Learning process.

Teaching-learning strategies like lecture, demonstration, hands on activities, mind mapping etc. have been used extensively in educational transactions all across. In certain cases, their effectiveness is phenomenal. However, when dealing with senior school students, all this can be made more impactful by using emotional pathway for learning. As we have seen, so far as senior school students are concerned, any information or experience which causes a rush of emotions in them is received by amygdala in their brains. Amygdala then activates numerous cortical areas for a better long-term memory and effective retrieval. Hence, while teaching them, it is prudent to use their Limbic system as much as possible. We need to understand, what amazes them is learnt better and learnt longer by them. It also ensures better attention for effective learning. In line with this we can conclude that for them the best way to learn is through true emotional involvement. This kind of learning not only helps in long term retention but also leads to meaningful learning which is easily retrievable when needed.

The teaching strategies which can lead to this kind of emotional involvement while learning are:

- Theatre
- Role play
- Music
- Acting
- Community involvement
- Predictive learning(<http://www.educationaldatamining.org/EDM2015/proceedings/short436-439.pdf>)
- Interdisciplinary approach
- Anecdotal references
- Games
- Simulation
- Films
- Use of colours as have high emotional connect

Anything that helps students relate to their own experiences and suggests victory over their personal struggles has a

positive impact on their learning. Any concept that is taught with emotional involvement and made to look personally meaningful is remembered by brain through varied routes and neural networking.

Hence, senior school education system needs to have curriculum delivery that is based on active involvement rather than passive listening. At the same time, teacher education needs to train new and existing teachers into using such transactions in classroom situations.

The delivery of the course content should involve:

Making new information relevant to the needs of the students

- Helping the students become aware of their struggles in a particular area and then introducing the related concept to help them connect with the need for knowing that concept
- Generating possibilities for students rather than merely representing facts to them
- Creating happy, emotionally satisfying atmosphere in class
- Making each interaction a memorable one through the use of anecdotes and wit
- Making the students feel invested
- Wherever possible, making the students experience, in a safe environment, what is being taught
- Ensuring that students apply their new knowledge and generate positive outcomes so that they are driven to know more about what is taught (Example-formation of school cabinet through the simulation of voting process used in India)
- Reinforcing effort by students followed by acknowledgement and recognition for it

Apart from this, the same strategy of emotional involvement can be creatively applied in various other learning areas by the teacher. It can cause a breakthrough for students in tough rote learning situations too.

VI. EXAMPLE

We all know how much havoc learning formulae creates for students. It is rote learning and as no previous knowledge of it is present in their brains, it becomes a challenge for their brain to index and perform long term storage of these formulae. As a result, students often forget them and cannot recall them when needed. If we attach stories to these formulae we can make the task of learning and retrieving formulae easier and enjoyable for them. The idea behind attaching stories to what is being taught is increasing its emotional load.

The Karl Pearson’s formula for coefficient of correlation given below is highly complex and tough to recall:

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}}$$

This can easily be remembered through a story, as described hereunder.

You (x) and your close friend (y) are always seen together (Σxy) in school. Another person (n) is jealous of your friendship and tries to separate you.

Finally, he is successful and as a result you (x) are not seen with your friend (y) now. You (x) are seen (Σ) alone (Σx) and so is (y) i.e. (Σy)

This can be represented as:

$$n(\Sigma xy) - (\Sigma x)(\Sigma y)$$

Ultimately it so happens, deep inside you develop hatred for (y) and you (x) replace your friend (y) completely from your life and wherever (y) was there in your memories now it is only you (x). Same happens with your friend (y). All this while (n) is there to monitor both of you and therefore sticks around you two.

$$\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}$$

The entire story now looks like this:

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}}$$

VII. CONCLUSION

Through the above insights it is clear that as educators it is our responsibility to make teaching a pleasurable activity for our students and link it with emotions so that it has a lasting impact on their minds and they can effectively assimilate, sustain and retrieve the learned concepts. All this will also ensure that they are able to transfer their retrieved knowledge to newer situations when needed.

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