

Effect of Divergent Thinking as Creative Intelligence in Learning

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Abstract: *Divergent and convergent thinking techniques are often recognized as valid approaches for the problem solving and design phases of the learning process. However, convergent thinking strategies have traditionally been seen as more indicative of “typical intelligence. On the other hand, divergent thinking has been equated with creativity and” the two have often been described as contrasting and opposing approaches to the problem-solving process. Divergent thinking was associated with creativity. While it is true that divergent thinking should be valued positively, the perception that its opposite is inherently wrong and harmful has been widely promoted in educational psychology and educational studies. It is important to note that in recent years there has been a marked shift towards acceptance of the idea that the true production of creative intelligence requires not only convergent thinking but also divergent thinking; this is a significant change that has taken place in recent years.*

Keywords - *Divergent and convergent thinking techniques.*

I. Introduction:

The term "divergent thinking" refers to a problem-solving method that is defined as offering a variety of possible solutions with the goal of finding the most viable option. In most cases, it takes place in an unplanned and unstructured way, during which a number of different creative ideas are generated and evaluated. A large number of possible solutions are explored in a relatively short period of time and unexpected connections can emerge. Inconvergent thinking is used to organize those organized the information and ideas generated during the divergent thinking stage one, once the stage is complete. Brainstorming and freewriting are examples of activities that require participants to think differently. In 1956, a psychologist named JP Guilford was the first person to work on the concepts of convergent and divergent thinking.

The ability to generate a large number of difficult or complex ideas from a single term or from simple triggers or ideas is often considered one of the most significant characteristics of divergence. It requires things like forming unexpected combinations, turning information into unexpected shapes, establishing relationships between distant collaborators and other such activities. Using divergent thinking, a single question can lead to multiple answers and while those answers may vary slightly from person to person, they are all considered equally important. They may never have existed in the past, so they are considered innovative, surprising or rare. There are cases where this is true only for the particular environment or experience of the individual whose actions are responsible for the variability in question.

The goal of divergent thinking is to generate new ideas by examining many different responses in different situations and possible solutions to a single stimulus. This type of thinking is used in the process of generating creative and innovative ideas. It is often used as part of the cognitive learning process known as convergent thinking, which consists of following a specific “set of logical” procedures to arrive at a solution, which in some cases is considered the good and optimal solution. Divergent thinking usually occurs in an unplanned situations, fluid and nonlinear way. As a result “many ideas are formed in an emergent cognitive style. In a very short time, a multitude of possible solutions are explored and useful and unexpected connections are made”. After completing the divergent thinking phase, the convergent thinking phase serves to organize and structure the thoughts and information generated. Researchers in the field of psychology have discovered that a high IQ is not a sufficient factor in determining creative ability; “instead, personality traits that encourage divergent thinking are more important” people whose personalities include nonconformity, curiosity, risk taking and perseverance are more likely to think differently.

The Objective of the Study

- Study on the effect of divergent thinking.
- Study the effect of creative intelligence on learning.

Divergent thinking in learning

1. **Complexity in learning:** the ability to conceive of difficult, multifaceted, multilayered or complex ideas;
2. **Curiosity in Learning** – The personality trait of exploring, seeking, “asking questions, learning, getting more knowledge and information about something, being able to dig deeper into ideas”;
3. **Editorial board Learning** - The ability to add to, develop or embellish “a product or idea”;
4. **“Flexibility in learning** - The ability to create different perceptions or categories that give rise to a series of different ideas about the same thing or problem”;
5. **Relief Learning** – “the ability to generate many ideas to increase the number of potential solutions or related products”;
6. **“Imagination in learning** - The ability to dream, inventor thinking, see, conceive new products or ideas, be original”;
7. **“Originality in Learning:** The ability to come up with fresh, unusual, unique, radically different or entirely new products or ideas”;
8. **Risks Taking Learning** - Willingness to be bold, daring and adventurous - to take risks or try new things to excel”.

People with personality traits like curiosity, nonconformity, stubbornness and risk taking are more likely to think differently. Thinking and making lists of questions are examples of things that can stimulate divergent thinking as a form of creative intelligence in the context of learning. The example of divergent thinking that will be presented in a moment should be taken seriously. Then the social media platform was the one that started it to find out how people use the app so that changes can be made to the app based on the results. This appears to be the case for Twitter, Facebook, Instagram, Meet and Zoom which has “developed an online service that did not have a concrete application tested and applicable at launch. Launching something and finding out what the market is only after launch doesn’t have to be a foolproof strategy in most cases it isn't, but it seems to have been the case with Twitter Facebook, Instagram, Meet and Zoom”.

Encourage divergent thinking while learning:Activities such as creative sets of feelings, thoughts, ideas, thought processes and creative questions, time to think and meditate brainstorming, topic mapping, bubble mapping, journaling, tabletop role-playing, art creation and writing free are examples of activities that financially encourage Divergent Thinking Support. During freewriting, the divergent thinker focuses on a particular topic and writes continuously for a very short period of time, in a style known as stream of consciousness. “Different ways of thinking can be attributed to mood, creative abilities, intellectual ability, brain activity, personality and lack of sleep. These are the factors that are compared”.

- **Mood:** Research shows that preparing for creative thinking can lead to mood swings”that depend on the type of thinking used in the activity According to research, divergent thinking affects mood in the opposite way. While the first activated a negative atmosphere, the second activated “the exact opposite: a positive atmosphere” for teaching learning process.
- **Creative Ability:** Creative ability was assessed in a study using two separate tasks. In the case of the divergent tasks, all the tasks, although considered as a group, showed an association, they were not significant when examining certain conditions. Divergent thinkers solved remotely more of the five related problems than their convergent counterparts.
- **Intellectual Abilities:**To determine the teens' ability to think differently, they were put through a series of traditional IQ tests. The test results showed that people assigned high levels of divergent thinking had significantly higher reading and verbal fluency scores than participants assigned low levels of divergent thinking. Additionally, people with very different thought patterns have been shown to have higher levels of anxiety and intuition.
- **Reflection periods:** the participants' brain activity was monitored for any changes that might have occurred. The researchers were able to accomplish this by analyzing the subjects' electroencephalography (EEG) patterns as they engaged in deviant thinking. The altered brain activity patterns seen on EEG for the two different thought patterns differed from each other. Unlike the control group, who simply rested, those who diverged or converged in thinking produced a significant amount of alpha 1,2 resynchronization. Convergent thinking has been shown to produce greater coherence in theta 1 band, which was straighter and more caudal. This is in contrast to divergent thinking, which has been shown to result in a reduction in amplitude in the caudal parts of the cortex in theta bands 1 and 2. Significant increases in coherence and amplitude indicate that a strong connection between the two. hemispheres of the brain.
- **Personality:** Personality correlates of “divergent thinking was examined. The results show that two personality traits, namely extroversion and openness, were found to be capable of divergent thinking. The opening discusses intellectual curiosity, artistic interest, originality, liberal attitudes and imagination”.

- **Sleep deprivation:** According to a 1988 study by JA Horne, even one night of insufficient sleep can significantly impair a person's ability to have divergent thoughts. The best results can be obtained by applying divergent thinking when applied to open challenges that encourage innovation and motivation. When there is only one solution that can be correct and the answer can be determined by examining information already stored, convergent reasoning is the most effective way of thinking. In addition, convergent thinking, although it may not seem like it, contributes to the production of new ideas. Due to the fact that divergent thinking focuses on ideas rather than processes, any solution found as a result of divergent thinking often requires convergent thinking to turn it into an achievable to-do list. This is because divergent thinking focuses on innovative and creative ideas.

Playful and divergent thinking during learning: Parallels have been found between kindergarten children's play and divergent thinking. The relationship between these two traits was examined in a study documented by Lieberman. Play has been conceptualized and operationally defined in terms of five characteristics: physical, social, and cognitive spontaneity; reveal joy; and sense of humor, the study authors said. During the study, Lieberman concluded that by observing children's behavior during play, they noted individual differences in spontaneity, nuances of playfulness, and sense of humor. These observations implicate a relationship between the above qualities and some of the factors found in the intellectual makeup of creative adults and youth. This study highlighted the association between aberrant thinking behavior, also known as creativity, in childhood play and subsequent viewing behavior in adolescents and adults. Creative, particularly about the link between these behaviors and play”.

“A longitudinal study of preschool children and the development and development of divergent thinking skills during adolescence and adulthood” could be included in the framework of this research, which will provide opportunities in this area. “The purpose of this study would be to substantiate the connection established between play and divergent thinking in the next life. This would be an interesting long-term study as it would help parents and teachers to recognize this behavior or lack thereof in children, particularly at an age where it can be strengthened if it is already displayed or encouraged if it is already shown. Is displayed and not yet displayed. . add This would be an interesting study as it would help parents and teachers identify this behavior or lack thereof in learners \children”.

Effects of positive and negative mood on deviant thinking in learning: This study also examines the effects of positive and negative mood on divergent thinking. Nearly 200 art and psychology students participated in the study. At the beginning of the experiment, students measured their mood using an adjective checklist before performing the required tasks”. The data showed that those who reported being in a good mood performed significantly better than those who reported being in a bad mood. According to the results, natural positive mood significantly facilitated task completion but negative mood significantly inhibited task completion. Based on the results, encouraged students are more likely to prefer successful approaches, which would lead to more proposed solutions. Students who are in a pessimistic frame of mind may opt for maximization tactics and become more concerned with the quality of their thoughts, making it more difficult for them to succeed in this type of work.

Many more related studies have found a link between a pleasant mood and increased cognitive flexibility. This hypothesis was further explored “in a 1990 study by Murray, Sujan, Hirt, and Sujan”. The researchers found that participants with positive moods were able to recognize relationships between concepts and demonstrate advanced abilities to distinguish “concepts. This group of researchers drew parallels between their findings and creative problem solving, arguing that positive participants” are better at distinguishing and integrating unusual information from disparate information. In other words, positive participants are better at creative problem solving. This shows that the researchers have a clear cognitive advantage in engaging in activities related to divergent thinking when they are in a more euphoric state of mind. “To generate more creative ideas and solutions, further research could take this topic a step further to examine effective strategies for improving divergent thinking in a negative mood. For example, how to move from optimization strategies to satisfaction strategies instead of focusing on the quality of ideas” would be an example of a strategy that could be explored in this research area”.

Effects “of Sleep Deprivation on Divergent thinking:A study by JA Horne found that sleep can affect a person ability to engage in divergent thinking, even when the motivation to behave well is maintained This is despite the fact that very little research has been done on the effects of sleep deprivation on divergent thinking”. In this particular study, twelve participants were not allowed to sleep for a period of thirty-two hours, while another group of twelve participants followed their typical sleep schedule. Subjects' performance on a verbal fluency task and a challenging nonverbal planning test were shown to be "significantly affected by sleep loss." “This was also the case when the personal performance incentive component was checked. This research showed that even one night of sleep deprivation can impair divergent reasoning, which contrasts the result of

convergent reasoning, which tolerates short-term sleep loss. Research on sleep deprivation and divergent thinking could be further explored at the biological or chemical level to determine why cognitive function related to divergent thinking is affected by the deficiency and to determine whether or not it exists a difference in the impact of sleep Deprivation in subjects depending on whether they are deprived of REM or non-REM sleep”.

II. Conclusion:

People have to be creative if they want to be successful in the 21st century, as it is widely recognized as an essential skill to do so. “Although creativity can be influenced by domain-specific factors eg, domain knowledge and competence and domain-general factors eg, creative potential and personality, training in cognitive skills, especially divergent thinking, proved to be the most useful to enhance creative output. However very little is known about how academic creativity can be fostered in students through good education and how individual differences can be combined with the benefits of education. The purpose of this research was to examine the benefits of a divergent thinking training program. The program helped high school students master a variety of cognitive techniques for divergent thinking and apply those methods to tasks related to scientific creativity. The tactic was to help students identify the essential components of divergent thinking namely association, decomposition and combination with adaptation. According to the results, the students who participated in the program showed greater capacity for scientific creativity than their peers who did not participate. Students with a high level of creative potential or a low level of creative potential obtained the same benefits from education; However, students with higher domain knowledge benefited more from the training than students with lower domain knowledge”.

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