

# A Systematic Review: The Relationship between Learning Styles and Creative Thinking Skills

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## Abstract

Creative thinking skills have become necessary and desirable competency for any professional. Learning styles are a reflection of the habitual behavior determining distinct preferences in a given learning situation. Evidence has suggested that there is a kind of relationship between these two variables. However, existing research on this has been rather minimal. It is worth noting that systematic review is used in this study for the exploration and determination of the relationship between learning styles and creative thinking skills. Five electronic databases were applied with a focus on studies that focused on the relationship between learning styles and creative thinking skills. Seven studies were finally included. Four key themes explain the results: Evolution of Creative Thinking in Academic Progress, Main Learning Styles, Learning Styles and Student Achievement, and Learning Styles and Creative Thinking Skills Correlation. The conclusion reached was comparative studies were able to illuminate on the existing relationship between learning styles and creative thinking skills. Nonetheless, more research needs to be carried out to determine the extent of this relationship or rather to enhance its significance.

**Keywords:** creative thinking, learning styles, systematic review, student achievement

## 1. Introduction

Creative thinking has gained considerable significance over the last few years. This has become even more essential given the role of new ideas in transforming the world. According to Friedel & Rudd (2006), the increase of knowledge and communication of this knowledge is essential in facilitating various forms of scientific breakthroughs that enhance life. As a consequence of this, having individuals with the capacity to think creatively has become even more critical. This is evidenced in the emphasis of creative thinking within the education system in many parts of the world. It is for this reason that student achievement has with time come to be measured on their creative thinking abilities. According to Riding & Rayner (2002), the process of nurturing these abilities has been pegged on learning styles that are applied within the classroom context. Thus, learning styles have a strong influence on creative thinking skills as elicited by the influence on the techniques of information acquisition. At the same time, Mayesky (2012) notes that learning styles are equally critical in influencing the mode of information sharing in the course of the learning process.

This study will be conducted with the purpose of gaining an understanding of the connection between learning styles and the ability of learners to be creative. In this case, the study will endeavor to identify the type of relationship that exists between these two concepts. In particular, the study will explore whether the learning style of a student correlates with the manner in which they think creatively. This line of inquiry is essential in order to assist educators to be able to teach with creativity in mind in light of the relationship of lack of with student learning style.

### 1.1 Importance of the Problem

For a long time and in many countries around the world, learning has entailed traditional teaching methods with an emphasis on examinations and therefore an exam-oriented system of education. This has meant that there has been very minimal consideration on the need to adopt problem-solving skills and utilize this approach towards learning. As per Garton, Cano, & Raven (1992), most educational curriculums entail teachers spending a substantial amount of their time on the maintenance of subject matter interests as opposed to problem solving. In

the view of Dilekli (2017), problem solving in this case requires a substantial amount of creativity among those who can master it. This is evidenced by the inadequate and narrow research existing on the correlation between learning styles and creative thinking. Adding to the body of research on this is therefore critical and even more so within a fast paced changing world. In essence, there is the expectation that the problem will set the pace for even more modern learn to tap the creative elements of students.

### *1.2 Purpose and Research Objectives*

The purpose of this study is to gain a better understanding of the type of relationship that exists between learning styles and the ability to think in a creative manner. In this regard, the research objectives to be pursued in this study are as follows:

- To determine the level of creative thinking in students as a consequence of the learning styles adopted.
- To determine the role of learning styles in the students' attained achievement.

### *1.3 Research Gap*

Over the last few years, there has been a substantial amount of research regarding learning styles and also creative thinking as it entails the education system, as postulated by Gardner (2009). While each of these concepts has been widely researched individually, there has been minimal research concerning how the former might affect the latter. This implies a great gap with regard to knowledge concerning the link that learning styles have on creative thinking. This further implies that there is very minimal research on creativity and the concept of learning despite the close relationship between problem solving and creativity. Accordingly, there is no existing differentiation existing between cognition needed for learning and that which is needed for creativity.

### *1.4 Research Questions*

The following research question highlighted below was developed as a way of guiding the study.

- Do learning styles adopted by educators influence the creative thinking skills of students?

### *1.5 Relevant Theoretical Insight*

The term *learning style* has been utilized widely by educational theorists over the last seven decades. While its terminology has varied from writer to writer, most of them have defined it in terms of a distinct and consistent method of encoding, storing, and performing, and a method that is independent of intelligence. It has also come to be defined as an individual's preferred method of gaining knowledge. Dunn, Beaudry, & Klavas (2002) on the other hand define learning styles as learners' dominant behaviors in the course of the process of learning. Felder & Brent (2005) provide a more distinct definition of learning style as being a person's preferred method of learning or the way in which a person acquires information. According to Kolb (1984), the theory of learning styles asserts that students attain academic success within the learning environment that matches their own style of learning. In this case, students tend to have a learning style preference. Nonetheless, most learners are still able to learn in settings that are not in line with their preferred style of learning. It is normal for learning styles to change according to the learners' experience as well as attitude. This to an extent explains the reason why some learners use certain learning styles at times and change and pick up new ones. Nonetheless, it is essential to point out that there is a group of learners who are highly rigid. Rigid learners are characterized by the inability to change the learning styles even when it becomes necessary. In most instances, they are the ones who experienced the most difficulty when a different learning style is applied to them.

Creative thinking entails the process of developing something that is new or original. Mohamad & Rajuddin (n.d.) explicate that this process of creative thinking has been noted to be closely linked to the perception of putting forth varying views. According to Facione (2013), these views are usually independently produced as opposed to being derived from each other. As a result, creative thinking is mainly associated with exploration in the same way that perception is linked to exploration as well. The concept of creativity remains complex with many researchers and psychologist still unable to completely provide an explanation of this concept. Creative thinking is essential in encouraging students to be more open to trying different perceptions, concepts, and points of entry. Tsai & Shirley (2013) assert that this, therefore, allows for students to apply different methods in solving problems. Various studies show that everyone possesses a sense of creative thinking and that this form of thinking can actually be taught as well as developed.

### *1.6 Theoretical Background*

The Kolb's experiential learning model has been widely used and modified to address a number of educational settings. The model proposes four stages of hypothetical learning cycle. According to Kolb (1984), learners will exhibit preference for some of the stages much better than others and the process of learning is thought to be

continuous and interactive in nature. The four particular stages of the learning cycle as per this theory are: concrete experience that is about experiential learning; abstract conceptualization in which there is a preference for conceptual and analytical thinking to bring about understanding; active experimentation that involves an active process of trial and error learning; and reflective observation where much consideration is given towards a task and potential solutions before any action is taken.

There has been a substantial amount of research into creative thinking which has given rise to various theories on this. Kirton (1994) adaptive-innovation theory is one of these. This theory posits that there is separation of creative thinking into two concepts of (a) cognitive style (b) cognitive level. These two concepts are perceived as being unrelated statistically. Further research brought about the ability to measure creative thinking capabilities through the work of Torrance (1998) who developed the Torrance Test of Creative Thinking (TTCT). Some of the creative thinking capabilities that can be measured through the TTCT include originality, fluency, flexibility, synthesis or combination, elaboration, and expressiveness. This is significant as this is also what comprises the skills of creativity.

## 2. Literature Review

This review of literature will assess other studies conducted on the subject of learning styles and creative thinking skills. The specific areas that will thus be assessed are learning styles, concept of creative thinking skills, and the extent to which a relationship is formed between these two variables.

### 2.1 Learning Styles

Keefe (1991) defines learning style as being the characteristic cognitive, effective, and psychosocial behavior that is used as a type of stable indicator of the way that learners perceive and respond to the learning environment. Allison & Hayes (1996) on the other hand define learning styles as a type of preferential mode through which a learner masters learning, solve problems, and thinks through.

From the above definitions, it is clear that learning styles are a description of the various ways that people learn. The term *preferential* has been used richly in these definitions of learning styles. This indicates that people have a unique way through which they absorb and processes information and knowledge in general. These personal preferences for learning styles are brought about by factors such as sensory modalities, personal types and cognitive styles.

Gregorc's (1982) Style Delineator divides learning styles into two categories. The first category is how people acquire information which is termed as perception and how this information is stored which is termed as ordering. According to Gregorc (1982), the purpose of developing the Style Delineator was to provide an explanation as to why people tend to have a preference to a given learning style. The Style Delineator division leads to the development of perceptual capabilities and ordering capabilities. The perceptual capabilities are then categorized as abstract or concrete while on the other hand ordering capabilities may be categorized as sequential or random. These categorization leads to the formation of four essential mediation channels which are: concrete sequential (CS), concrete random (CR), abstract sequential (AS), and abstract random (AR). The preference by most people of one or two of these channels with minimal sense of flexibility is what leads to preference towards a given learning style of styles. At the same time, Gregorc in his 1979 work also argued that individual behavior was also responsible towards the determination of a person's learning style (Gregorc, 1979).

In the view of Gregorc (1982), a person can only express dominance in one of the four mediation channels which will in turn determine their own distinct learning preferences. For instance, a person with a CS style of learning will form a learning approach that encompasses sequential learning that is a step by step linear kind of format. In this case, the thinking process of this kind of learners is one which is instinctive and deliberate. Further, their sense of creative skills are fixated on the refinement and duplication of ideas that already exist (Gregorc, 1982). For learners with CR style of learning, this type of learner tends to approach learning in random three dimensional patterns. The thinking process of these kinds of learners is intuitive and impulsive. The sense of creativity of these learners is original, visionary, and inventive in nature (Gregorc, 1982). Those people with an AS style of learning do so by ordering information in a sequential manner resulting in the creation of a number of branches of information. Therefore, these type of learners will exhibit creativity through synthesis of ideas that are based on theory (Gregorc, 1982). For the final group of learners who exhibit the AR learning style, this type of learner tends to order information in random as well as web-like structures. Thus, for this type of learner, their thinking process is mainly derived from imagination and fine arts. Their sense of creativity is therefore derived from their imagination.

Nonetheless, it is essential to mention that literature has expressed restriction on learning styles being a factor on

student learning. For instance, Jones, Reichard, & Mokhtari (2003) in their study established that the area of learning styles is quite sensitive in the academic world. This is evidenced by the fact that students who participated in their study tended to move from one learning style quadrant to another depending on the learning strategies that were in place at a particular situation. Price (2004) on the other hand found some inconsistencies between the learning styles reported by students and the style that was actually exhibited. The conclusion of this study was the extent of the value of learning style tests was incomplete.

## *2.2 Creative Thinking Skills*

Understanding the term creativity provides an opening into assessing creative thinking and associated skills. Mohamad & Rajuddin (n. d.) define creativity as bringing into existence that which was not there before. The work of Guilford (1950) proved to be highly essential in explaining creativity. Guilford was the first scholar who utilized scientifically based instruments towards the assessment of creativity. Anderson, Anderson, Krathwohl, & Bloom (2001), revised the Bloom Taxonomy in order to reflect the significance of creativity. The resultant impact of this was creativity jumped to the highest positions of educational objectives. This implied that creativity had thus become an essential component of learning.

Nonetheless, it must be understood that this term covers a wide range of different skills. Mohamad & Rajuddin (n.d.) identify some of these skills as compromising imagery, originality, fluency, associative thinking, modification, elaboration, metaphorical thinking, and forced relationship. These skills can to an extent be thought of as the basis for creative thinking. Therefore, this wide range of skills explains to an extent why creativity is a term that has been poorly understood and why there is much difficulty when it comes to teaching it. At the same time, it is equally essential to point out that determining a true definition of creativity has remained a challenge. This is evidenced by Plucker, Beghetto, & Dow (2004) who after reviewing 90 scholarly articles came to the conclusion that only 38% of the articles were able to explicitly define creativity. This might explain why creative thinking skills are barely well understood in research. Its definition has been mainly vague with most researchers being highly subjective in their definitions.

Despite this, there have been studies that have been dedicated towards defining creative thinking and therefore creative thinking skills. Ennis (1985, p. 45) defines creative thinking as “reasonable and reflective thinking focused on deciding what to believe or to do”. The scholar Sternberg (1986, p. 20) defines creative thinking through the description “the mental processes, strategies, and representations people use to solve problems, make decisions, and learn new concepts.” From these definitions, it is clear that there was very minimal consensus in regard to the definition of creative thinking. In addition, these earlier definitions also reveal that components of creative thinking had not yet been identified. The definitions give the meaning that there has been extensive research in terms of understanding the topic and its significance in the field. A definition that included the components of creative thinking was developed by the Dephi Panel in the 1990s. According to Facione (2013, p. 4) creative thinking came to be defined as “self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based.” This definition reveals that creative thinking consists of six key components.

Gaining a better understanding of creativity in literature has been done through the pursuit of the concept of divergent thinking. Guilford (1975) has posited that divergent thinking is closely related creativity. Runco (2004) has reiterated this in his assertion that divergent thinking is perceived as being one of the main elements of the cognitive process in creativity. In this case, divergent thinking relies heavily on the fluidity of the thinking process and free association which does not depend on intelligence. This concept of divergent thinking was extended further in the work of Mednick (1962) who then proposed the associative theory of creative thinking. This is a theory developed with the intent of explaining the general process of creative thinking. Therefore, according to Mednick (1962), creativity is exhibited by the formation of associative elements into new combinations that could be used by individuals for purposes of explaining different ideas. There is increased creative thinking when the combinations of ideas are more. Mednick goes on to indicate that there are three essential approaches that are used to bring together associative elements: serendipity, similarity, and mediation. Accordingly, serendipity is defined as the specific environmental appearance of stimuli that evokes associative elements. Similarly encompasses the second mode of creative solution which is assessed through observation of the homogeneity of the structure. With regard to the final approach, this takes place through mediation of common elements and applies symbols that will conjure remote ideas.

In addition, Mednick (1962) in his work finds that individuals that display high levels of creativity tend to have a rather flat hierarchy of association. In such a situation, responses to creative solutions are usually slow and

steady. Nonetheless, they produce many more ideas. However, those individuals that are deemed to be less creative usually display a steep hierarchy of association with a response to a much higher rate which generates fewer ideas. In tandem with this line of thinking, Michalko (2001) further recognizes the significance of associative ability on creativity by asserting that creative geniuses have the capacity of extending their associative horizon on a wide and unusual manner. The associations and imaginative connections of genuine are strong enough to boost their levels of creativity, which subsequently result into innovations. The innovative attitude set the pace for increased levels of development in the respective fields that these learners are interested in going into the future.

### *2.3 Relationship between Learning Styles and Creative Thinking Skills*

Over the last few years, researchers have come to the conclusion that there is significant interaction between learning styles and creativity. This is evidenced by Gardner (2009) who opines that the relationship between learning styles and creativity has become rich, though limited. Nonetheless, gaining a better understanding of this relationship is essential in order to provide insight that may be beneficial as well as applicable. In particular, parties within the education sector where learning styles are commonly used and creativity is perceived as important can benefit from understanding this relationship.

There have arisen a number of studies that have attempted to prove the link between creative thinking and learning styles. Kirton's (2003) adaption innovation encompasses both elements of creativity and learning styles as its basis. He applied both elements to determine the creativity style possessed by an individual. In essence, Kirton (2003) describes the adaption innovation theory as assuming that individuals have the capacity to solve problems in a creative manner. In regard to the theory, there is the appreciation of the view that individuals differ significantly in their abilities to create, solve problems, and decision-making.

Kirton therefore from his work came up with two categories of creativity styles that include adaptors and innovators. Adaptors were defined as individuals who use pre-existing concepts as a way of improving and have a high preference for working within defined structures. On the other hand, innovators tend to develop ideas in new ways and are most comfortable working within refined structures that they have developed for themselves. In developing these two categories of creativity, Kirton perceived cognitive style as being a relatively stable feature of the manner in which people solve problems.

The work of Amabile (2012) is further essential in illustrating the extent of relationship between learning styles and creative thinking. Therefore, Amabile (2012) goes on to define three components of creative performance that include domain-relevant skills, creativity-relevant skills, and task motivation. In the development of creativity skills, Amabile proposes that cognitive style is an essential factor towards the development of creative performance.

In recent times, Tsai & Shirley (2013) conducted a study whose purpose was to determine the relationship between learning styles and creativity in math students. Remote Associates Test (RAT) was used to measure creativity. The Index of Learning Styles was used to measure learning styles preference. The study concluded that there was no significant relationship between the two elements. This implies that there is need to place much more attention on the topic and thus more research to be carried out.

## **3. Methodology**

### *3.1 Research Design*

The research design that has been applied for this study is the systematic review. This has been used with the intent of setting up a reliable evidence base for education providers. Dixon-Woods (2011) defines systematic review as the scientific process that is guided by a number of explicit, as well as demanding rules structured towards showing immunity from bias and promoting accountability and transparency in relation to execution and technique. However, this research approach has been criticized for taking up a reductionist perspective in regard to research evidenced presented. This study will rectify this by including both qualitative and quantitative studies which will be useful in widening the scope of the research. As per the recommendation of Thomas & Harden (2008), the following essential steps as explained in the subtitles below were followed in order to ensure that the review of literature was systematic.

### *3.2 Sample*

The research sample consisted of a total of 8 studies. It is vital to mention that it was necessary to carry out an evaluation of the quality of the studies before their selection. All the studies that were selected were written in the English language. The articles had significant conceptual similarity of learning styles and creative thinking.

### *3.3 Sampling Strategy*

The search of the five databases was carried out with the help of an assistant. A total of 1210 articles were identified. This proved to be quite a considerable number of articles and as a consequence it was necessary to narrow them to a smaller and manageable number. This was done through removal of duplicates and comprehensively screening of abstracts and titles. From doing this, the remaining articles were 58 full texts. Additional studies were rejected and the number was reduced to 8 articles. This was done through analysis of whether the studies were relevant to the research topic. That is this entailed evaluating the appropriateness of the focus of the research for addressing the research question. All the 8 articles were thus included in the review.

### *3.4 Sample Validity*

The sample validity of this study was ensured through the development of an inclusion and exclusion criteria. In the first place, this study was not limited with regards to age, gender, and nationality. This means that the systematic review to be conducted for this study will evaluate the relationship between learning styles and creative thinking within a general context. Further, the forms of studies that have been included in the review are both quantitative and qualitative in nature. In addition, the studies are peer reviewed. Studies that were excluded included course descriptions and case studies. Transparency was determined by the methodology of potential articles being made explicit. This included the sample size and analysis being made clear.

### *3.5 Sample Setting*

This systematic review was conducted through the use of various search platforms. In particular, this involved the use of a search strategy that included a computer assisted search of literature in five key databases. In particular, the databases that were used included ERIC, EBSCOhost, PsycINFO, Google Scholar, and OECD. In order to locate studies that investigated creative thinking and learning styles, the search entailed entering the following combination of words into the databases: creative, creative thinking, learning, learning styles, qualitative or quantitative research, and education. The specific timeframe for studies that were included was five years.

### *3.6 Method of Data Collection*

The particular method of data collection that was applied for this study was the qualitative systematic review. It proved to be the best data collection method in providing an understanding of the relationship between learning styles and creative thinking. This method of data collection is thus invaluable in bringing together the necessary research evidence that will inform on the type of relationship between these two variables.

### *3.7 Method of Data Analysis*

The results of the study will be presented in a descriptive format. Data analysis will be done through thematic analysis. This will involve assessing the various key themes that can be derived from data collected in the articles. This entailed reading through the articles that were selected in order to determine the main points and themes. In particular, the synthesis was done under the following key subheadings of research aim, research design, data collection, sample, intervention, research findings and the related implications.

## **4. Results**

The results of this systematic review have been grouped into four main themes that include: evolution of creative thinking, main learning styles, learning styles and student achievement, and learning styles and creative thinking skills correlation. Accordingly, these themes and all that they reveal are highlighted as shown below.

### *4.1 Evolution of Creative Thinking in Academic Progress*

Interpretations were drawn from three studies. In the study by Lumsden & Findlay (1988) it was found that academic progress negatively correlated to creative thinking. The remaining two studies on the other hand found that there were considerable changes in regard to creative thinking skills and characters when it came to academic progress. In particular, the findings showed that creative thinking underwent improvement after the early years of learning. However, it experienced a decrease in the course of the middle years of learning, only to rise up once again in the senior years of learning. For a long time, the general presumption was the changes that were taking place in creative thinking as it applies to learning were as a consequence of changes in the education system and the general learning environment.

### *4.2 Main Learning Styles*

There was diversity of learning styles across the studies. Nonetheless, there were some learning styles which appeared frequently in the studies that were assessed. Accordingly, the main learning styles were in form of

divergers, accommodators, and assimilators (Suliman, 2006; Andreou, Papastavrou, & Merkouris, 2013). The second most preferred style of learning was found to be in the form of convergers and divergers, as per the studies by Andreou, Papastavrou, & Merkouris (2013) and Suliman (2006). The remaining studies were able to illustrate that the process of learning is not static. In reality, this process is actually highly influenced by various combined learning models. The study by Gyeong & Myung (2008) for instance showed that learning through concrete experience and reflective observation was preferred by 80.2% of the students. This to an extent was in contrast to the results of Suliman (2006) who found that most learning styles that were used mainly placed emphasis on the concept of abstract conceptualization as opposed to concrete experience. At the same time, these types of learning styles also favored the process of active experimentation in the place of reflective observation.

Some of the studies also focused on Felder & Solomon's learning style inventory that is about increased preference on visual and verbal learning. The work of Zhang & Lambert (2008) found this style of learning to be the second most preferred among students. Equally, a preference for sensing learning was found to be predominant in the work by Mahmoud (2012). However, sequential and active processes of learning were rather ranked quite low. At the same time, intuitive as well as global styles of learning were found to be more favored by quite a small number of learners (Zhang & Lambert, 2008). The studies by Zhang & Lambert (2008) and Mahmoud (2012) revealed that there were substantial tendencies towards the concept of passive learning which was facilitated through strict orientation regarding procedures and facts.

#### *4.3 Learning Styles and Student Achievement*

The findings across the studies support the contention that learning styles have a significant impact on student achievement. Abidin et al. (2011) reveal this in their assertion that learning styles determine students' strengths for academic achievement. Students who have multiple learning styles or a combination of a number of learning styles tend to learn more effectively and therefore experience much better overall achievement. This further shows that students who are taught by learning styles that are compatible to their preference are more likely to perform better than those who are mismatched. The relationship between learning styles and extent of achievement is further revealed by the study undertaken by Ishak & Awang (2017) who posits, a student's learning style if accommodated has the potential to result in improved learning attitude and as a consequence enhance their thinking process.

Jilardi Damavandi et al. (2011) on the other hand presents conflicting results in which they conclude that there is no significant difference in the academic achievement of students with converging, diverging, accommodating, and assimilating styles of learning. This was predicted in their null hypothesis: that there is no significant difference in academic achievement of students with converging, diverging, accommodating and assimilating learning styles.

The study by Warn (2009) reiterates these findings by asserting that there is no significant association between the students' learning style and their academic performance for Malaysian Taxation and Financial Strategy subject. These results can be explained by the inconclusive association between learning styles and student achievement as well as performance in their work. This also implies that there is no actual relationship existing between students' learning styles and the form of curriculum that is in place as suggested in many studies.

#### *4.4 Learning Styles and Creative Thinking Skills Correlation*

While not many studies were able to show with certainty the relationship between learning styles and creative thinking skills, there were some few that found some correlation (Eishani, Saa'd, & Nami, 2014; Tsai & Shirley, 2013; Nirantranon & Nirantranon (n. d.). Eishani, Saa'd, & Nami (2014) revealed in their study that a linear type of correlation existed between learning styles and creativity. In this case, learning styles are thus positively associated with creativity. The study by Tsai & Shirley (2013) indicated that individuals who were divergers were more likely to record a higher sense of creativity as well have much higher sense of critical thinking. On the other hand, accommodators had the opposite reaction. However, the study by Kassim (2013) reported opposite result in that individuals who were divergers tended to correlate with much lower sense of creative and critical thinking while convergers had the highest. In both of these studies, the concept of engagement disposition to creative and critical thinking was essential. Nirantranon & Nirantranon (n. d.) reveal the relationship between creative thinking and learning styles as per their research results showed a statistical significance of 0.05. In the meantime, a study of correlation coefficient between creative thinking and learning styles as converger was found to be at 0.168. In other words, students who exhibit high creative thinking tend to adopt the learning style of a converger. Therefore, these are the individuals whose learning integrates abstract thinking, experimentation, and practices.

Friedel & Rudd (2006) in their study came to the conclusion that there was no definite correlation between

creative thinking and learning styles except for negative association which were identified between AR and creativity constructs sense of originality and fluency. Mohamad & Rajuddin (n. d.) come to a similar conclusion in their study in which they opine that there is no significant relationship between learning styles and creative thinking with regard to problem solving. Nonetheless, this relationship can be seen in the manipulation of data.

## 5. Discussion

The evolution of creative thinking across academic progress has been rather slow. This is evidenced by the fact that most studies have found that academic progress negatively correlated with creative thinking. Nonetheless, it is apparent this creative thinking has begun to gain acceptance among some academics. This systematic review has been essential in illustrating that there exist some prominent learning styles that are used in teaching and preferred by learners. Some of these learning styles are in the form of divergers, accommodators, and assimilators; convergers and divergers; learning through concrete experience and reflective observation; learning through abstract conceptualization; Felder and Solomon's learning style inventory; passive learning. This systematic review has also found that there is a link between learning styles applied and student achievement as evidenced in the above results. One of the reasons is that learning styles have a considerable impact on determining the extent of strength of a student's potential towards achievement. However, emphasis has been placed on the need for students to learn through their mainly preferred style of learning for effective achievement to be attained. This can be explained by the fact that learning style incompatibility tends to make some of the students feel uncomfortable in the course of learning. For other students still, it becomes almost impossible for them to change their learning style and adopt a new one that is in use.

Comparative findings across the relevant reviewed studies were essential in providing appropriate evidence on the type of relationship that existed between learning styles and creative thinking. In this case, a number of learning styles as presented by particular theoretical backgrounds were found to have a positive relationship to creative thinking.

## 6. Limitations

While much was done in order to ensure a reliable systematic review, a number of limitations were nonetheless experienced. The first limitation is in relation to data collection. In this case the data collected was the product of the work of other scholars. While the credentials of these scholars were beyond dispute, the results may to a degree be biased. In this case, firsthand information would have been the best choice. The second limitation in relation to this systematic review is the exploration of the relationship between learning styles and creative thinking in general as opposed to a focus on a specific form of learning or education. It would have been best to have placed focus on a particular area of study to avoid the results being too broad. These study limitations suggest a scope for future research.

## 7. Conclusion

The existing relationship between learning styles and creative thinking skills cannot be underestimated. Nonetheless, this relationship has not been extensively covered in research. This therefore provides an explanation as to why there has not been much emphasis on integrating creative thinking within the learning process. As seen in this systematic review, this may be attributed to the complex nature of these variables. This implies that to be able to adequately show the extent of relation between the variables, it is vital for the existence and strengths of the relationship to be done through multiple correlations. Therefore, the nature of this type of relationship remains rather vague. The research gap in the ontology of these two variables can further be pointed out as a reason for this as well. Despite this, this work has been essential in shedding some light on the extent of relationship between learning styles and creative thinking and therefore has been instrumental in closing the existing gap on this.

In addition, this systematic review indicates that it is possible for a potential relationship between the two variables to be revealed with their theoretical foundation. This is even more likely given that both concepts comprise habitual cognitive aspects. Therefore, gaining a better understanding of the connection between these two and the common characteristics that they share can serve as a critical point of motivating and supporting learners. In this way, they will be able to apply creative thinking in learning. In the end, this may become the main driving force towards advancement of learning.

Understanding the relationship between learning styles and creative thinking skills was better enabled through assessment of other related components. Assessment of the main learning styles was one of these components. This provided a window into what exactly encompassed learning styles. Linking these to student achievement was further significant in revealing how learning styles are applied within the education system and the impact



that they had. The evolution of creative thinking within academic progress has been rather slow. This might offer an explanation as to why research in regard to its relationship to learning style has been minimal.

## References

- Abidin, M. J., Rezaee, A. A., Abdullah, H. N., & Singh, K. K. (2011). Learning styles and overall academic achievement in a specific educational system. *International Journal of Humanities and Social Science*, 1(10), 143-153.
- Allison, J., & Hayes, C. (1996). The cognitive style index: A measure of intuition-analysis for organizational research. *Journal of Management Studies*, 33, 119-135. <https://doi.org/10.1111/j.1467-6486.1996.tb00801.x>
- Amabile, T. M. (2012). Componential theory of creativity. Retrieved from <http://www.hbs.edu/faculty/Publication%20Files/12-096.pdf>
- Anderson, L. W., Krathwohl, D. R., & Bloom, B. S. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. New York: Longman.
- Andreou, C., Papastavrou, E., & Merkouris (2013). Learning styles and critical thinking relationship in baccalaureate nursing education: A systematic review. *Nurse Education Today*, 34(3), 362-371. <https://doi.org/10.1016/j.nedt.2013.06.004>
- Dilekli, Y. (2017). The relationship between critical thinking skills and learning styles of gifted students. *European Journal of Education Studies*, 3(4), 69-96.
- Dixon-Woods, M. (2011). Using framework-based synthesis for conducting reviews of qualitative studies. *BMC Medicine*, 9(39). <https://doi.org/10.1186/1741-7015-9-39>
- Dunn, R., Beaudry, J. S., & Klavas, A. (2002). Survey of research on learning styles. *California Journal of Science Education*, 2(2), 75-98.
- Eishani, K. A., Saa'd, E. A., & Nami, Y. (2014). The Relationship between Learning Styles and Creativity. *Procedia—Social and Behavioral Sciences*, 114, 52-55. <https://doi.org/10.1016/j.sbspro.2013.12.655>
- Ennis, R. H. (1985). A logical basis for measuring critical thinking. *Educational Leadership*, 4, 44-54.
- Facione, P. A. (2013). Critical thinking: What it is and why it counts. *Insight Assessment*, 1-28.
- Friedel, C. R., & Rudd, R. D. (2006). Creative thinking and learning styles in undergraduate agriculture students. *Journal of Agricultural Education*, 47(4), 102-111. <https://doi.org/10.5032/jae.2006.04102>
- Gardner, H. (2009). *Five minds for the future*. Boston, MA: Harvard Business Press.
- Garton, B. L., Cano, J., & Raven, M. R. (1992). The relationship between learning and teaching styles and student performance in a method of teaching agriculture course. *Journal of Agricultural Education*, 33(3), 16-22. <https://doi.org/10.5032/jae.1992.02016>
- Gregorc, A. F. (1979). Learning/teaching styles: Potent forces behind them. *Educational Leadership*, 36, 234-237.
- Gregorc, A. F. (1982). *Gregorc style delineator: Development, technical and administrative manual*. Columbia, CT: Gregorc Associates.
- Guilford, J. P. (1950). Creativity. *American Psychologist*, 5(9), 444-454. <https://doi.org/10.1037/h0063487>
- Guilford, J. P. (1975). Creativity: A quarter century of progress. In I. A. Taylor & J. W. Getzels (Eds.), *Perspectives in creativity* (pp. 37-59). Chicago: Aldine.
- Gyeong, J. A., & Myung, S. Y. (2008). Critical thinking and learning styles at the baccalaureate nursing program in Korea. *Contemporary Nurse*, 29(1), 100-109. <https://doi.org/10.5172/conu.673.29.1.100>
- Ishak, N., & Awang, M. M. (2017). The relationship of student learning styles and achievement in history subject. *The International Journal of Social Sciences and Humanities Invention*, 4(3), 3372-3377.
- JilardiDamavandi, A., Mahyuddin, R., Elias, H., Daud, S. M., & Shabani, J. (2011). Academic achievement of students with different learning styles. *International Journal of Psychological Studies*, 3(2), 186-192. <https://doi.org/10.5539/ijps.v3n2p186>
- Jones, C., Reichard, C., & Mokhtari, K. (2003). Are students' learning styles discipline specific? *Community College Journal of Research and Practice*, 27, 363-375. <https://doi.org/10.1080/713838162>
- Kassim, H. (2013). The relationship between learning styles, creative thinking performance and multimedia

- learning materials. *Procedia—Social and Behavioral Sciences*, 97, 229-237. <https://doi.org/10.1016/j.sbspro.2013.10.227>
- Keefe, J. W. (1991). *Learning style: Cognitive and thinking skills*. Reston, VA: National Association of Secondary School Principals.
- Kirton, M. J. (1994). A theory of cognitive style. In M. J. Kirton (Ed.), *Adaptors and innovators: Styles of creativity and problem-solving* (pp. 1-33). London: Routledge.
- Kirton, M. J. (2003). *Adaption-innovation: In the context of diversity and change*. New York, NY: Routledge.
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall.
- Lumsden, C. J., & Findlay, S. (1988). Evolution of the creative mind. *Creativity Research Journal*, 1(1), 75-91. <https://doi.org/10.1080/10400418809534290>
- Mahmoud, H. G. (2012). Critical thinking dispositions and learning styles of baccalaureate nursing students and its relation to their achievement. *International Journal of Learning and Development*, 2(1), 398-415. <https://doi.org/10.5296/ijld.v2i1.1379>
- Mayesky, M. (2012). *Creative activities for young children*. Belmont, CA: Cengage Learning.
- Mednick, S. A. (1962). The associative basis of the creative process. *Psychological Review*, 69(3), 220-232. <https://doi.org/10.1037/h0048850>
- Michalko, M. (2001). *Cracking creativity: The secrets of creative genius*. Berkeley, CA: Ten Speed Press.
- Mohamad, M. M., & Rajuddin, M. R. (n.d.). *Relationship between learning style and creative thinking in problem solving skills among building construction students in vocational school*. Retrieved from [https://www.researchgate.net/profile/Mimi\\_Mohaffyza/publication/236682918\\_Relationship\\_between\\_Learning\\_Style\\_and\\_Creative\\_Thinking\\_in\\_Problem\\_Solving\\_Skills\\_among\\_Building\\_Construction\\_Students\\_in\\_Vocational\\_School/links/0deec519059551c7f1000000/Relationship-between-Learning-Style-and-Creative-Thinking-in-Problem-Solving-Skills-among-Building-Construction-Students-in-Vocational-School.pdf](https://www.researchgate.net/profile/Mimi_Mohaffyza/publication/236682918_Relationship_between_Learning_Style_and_Creative_Thinking_in_Problem_Solving_Skills_among_Building_Construction_Students_in_Vocational_School/links/0deec519059551c7f1000000/Relationship-between-Learning-Style-and-Creative-Thinking-in-Problem-Solving-Skills-among-Building-Construction-Students-in-Vocational-School.pdf)
- Nirantranon, W., & Nirantranon, S. (n.d.). *A study of relationships between creative thinking and learning styles of the bachelor's degree student at Institute of Physical Education Udonthani*. Retrieved from <http://www.ipeud.ac.th/images/1203076046/04-A%20study%20of%20relationships%20between%20creative%20thinking.pdf>
- Plucker, J. A., Beghetto, R. A., & Dow, G. T. (2004). Why isn't creativity more important to educational psychologists? Potentials, pitfalls, and future directions in creativity research. *Educational Psychologist*, 39(2), 83-96. [https://doi.org/10.1207/s15326985ep3902\\_1](https://doi.org/10.1207/s15326985ep3902_1)
- Price, L. (2004). Individual differences in learning: Cognitive control, cognitive style, and learning style. *Educational Psychology*, 24(5), 681-698. <https://doi.org/10.1080/0144341042000262971>
- Runco, M. A. (2004). Creativity. *Annual Review of Psychology*, 55(1), 657-687. <https://doi.org/10.1146/annurev.psych.55.090902.141502>
- Sternberg, R. J. (1986). The future of intelligence testing. *Educational Measurement: Issues and Practice*, 5(3), 19-22. <https://doi.org/10.1111/j.1745-3992.1986.tb00482.x>
- Suliman, W. A. (2006). Critical thinking and learning styles of students in conventional and accelerated programmes. *International Nursing Review*, 53(1), 73-79. <https://doi.org/10.1111/j.1466-7657.2006.00445.x>
- Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Med Res Methodol.*, 8, 45. <https://doi.org/10.1186/1471-2288-8-45>
- Torrance, E. P. (1998). *Torrance tests of creative thinking: Norms-technical manual*. Bensenville, IL: Scholastic Testing Service.
- Tsai, K. C., & Shirley, M. (2013). Exploratory examination of relationships between learning styles and creative thinking in Math students. *International Journal of Academic Research in Business and Social Sciences*, 3(8), 506-519. <https://doi.org/10.6007/IJARBS/v3-i8/175>
- Warn, T. S. (2009). Students' learning style and other academic achievements for taxation course—A comparison study. *Proceedings of the 2nd International Conference of Teaching and Learning (ICTL 2009)*, 1-7. Retrieved from <https://my.laureate.net/Faculty/docs/Faculty%20Documents/INTI%20Conferences/Parallel%20Sessions%2>

02/2A/2A-01-P5%20(Malaysia).pdf

Zhang, H., & Lambert, V. (2008). Critical thinking dispositions and learning styles of baccalaureate nursing students from China. *Nurs Health Sci.*, 10(3), 175-181. <https://doi.org/10.1111/j.1442-2018.2008.00393.x>

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