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## **A Proposed Problem-Based Learning Model Based on Cognition and Creativity Skills Among Creative Art Students**

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### **Abstract**

To address the complicated difficulties confronting future generations, creativity is required. Most people have creative skill. The challenge is in stimulating, accessing, teaching, or developing such capacity in those persons. However, in many educational settings, innovation is actively discouraged. Students' talents deteriorated as they advanced from middle to high school. Some people can regain their creative powers, while others are doomed to lack them for the rest of their lives. Similarly, physical fitness benefits everyone, regardless of athletic ability. Creativity, regardless of the degree of creativity present in a person, is seen to aid all who may confront serious future obstacles. Teachers who understand what defines creative achievement and who use that knowledge to establish high objectives for themselves and their peers may benefit students of all ability levels. As a result, the purpose of this study is to present a creative problem solving (CPS) model as a resource for developing students' creative thinking.

**Keywords:** Creative Problem Solving; Creativity; design thinking.

### **1. Introduction**

The world is becoming increasingly complicated. Students will need to be educated on how to deal with complex issues. Relationship development, reflection on experiences, information exchange, and general participation in a learning community are all important aspects of this education. To solve real-world problems, students must have natural abilities [1]. The explosion of information is an excellent example of how the environment is becoming more complex.

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Technological advancements are accelerating the information age at an unprecedented rate. Because evolution necessitates and promotes innovation, it has become increasingly important and critical [2]. According to [3], it is the students who will seize power during adversity.

Educational institutions must be aware of and adapt to changes in society's needs as time passes. Many academic educational programs lack clearly defined goals. Teachers are also knowledgeable about the necessary materials, topics, presentation materials, and teaching methods for delivering the content. When developing an educational program, it is critical to have a clear understanding of the goals. The teacher should provide guidance in material selection, content outline creation, instructional process development, and test preparation. The first step in implementing a well-planned and well-executed educational program is to establish educational goals [4].

It is now more important than ever that educational institutions teach students how to improve their cognitive abilities to solve problems more effectively. Experience, according to [5], is an essential component of a high-quality education. According to him, conventional educational techniques shape all educational experiences. However, the design of the course determines the quality of the training. All educational institutions should strive to provide cutting-edge problem-solving strategies and approaches to their students.

According to a recent study [6], today's public schools do not sufficiently encourage students' creative thinking. It is said that our mental habits play a significant role in our achievements. As a result, twelve years of compulsory public schooling are insufficient to teach students how to think critically (creatively), solve problems creatively (critically), think globally (systematically), and think paradoxically (globally). Finally, systematic critical thinking technique training should be an essential component of any effort to improve the educational experience.

Reference [7] claims that Chinese art education has always been geared toward meeting Chinese society's educational needs. Since their inception, art schools have emphasised "hands-on" and "minds-on" learning experiences for students. The philosophical foundations of art education are based on the problem-solving method. At the suggestion of John Dewey, art education was made a secondary school subject. It influenced many early art educators' courses and field readings [8].

Despite an increase in the need for creativity in the classroom, the increasing pressure to meet state and national accountability requirements has harmed creativity [9]. To be creative, one must be able to freely express oneself. Because of the inflexibility of the current accountability system, rigidity rather than approximation is valued. On the other hand, constraining an issue too early in the design process inhibits creativity. Due to mandated national and state requirements, art instructors are forced to create programmes that target both academics and so-called "soft" skills. Academics as well as soft skills are required for students to be successful in their careers [10]. It is necessary to strike a balance between educational priorities and academic accountability responsibilities [11]. The issue is that many instructors do not have the necessary training to implement these requirements. To foster the kind of deep understanding required for creative thinking, educators must incorporate inferential reasoning into their presentations while still emphasising scientific concepts as a foundation [12].

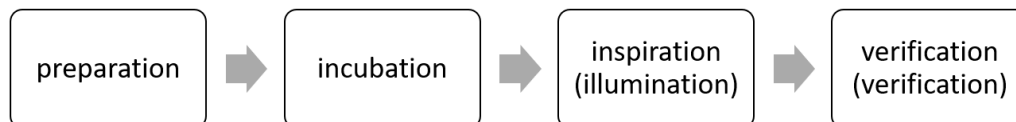
## 2. Literature Review

### 2.1 The Cognitive Process of Creativity

The term "creativity" can refer to a variety of things. According to [13], there are numerous problems, gaps in our knowledge, missing elements, and disharmonies in life that must be addressed before we can be creative. The steps in the creative process include developing sensitivity to these issues, searching for solutions, making educated guesses, and then testing and retesting these hypotheses. The fact that so many factors influence the emergence and expression of creativity helps to explain why it is so unique. Personal aspects (cognitive, motivational, and attitude) as well as social and environmental influences are included in this category [14]. A single study found it difficult to develop a clear, meaningful, and measurable instrument to assess creative problem solving (CPS).

"Creativity is a complex domain that may be employed in a variety of contexts, including the arts, science, stage performance, commercial activity, and corporate innovation" [15]. According to [16], who described the origins of creative cognition in the arts and sciences, creativity is not merely a cultural or social construct. Rather, creative cognition has its roots in the arts and sciences. Nevertheless, it is an essential psychological and cognitive process [17–21].

At the beginning of the 20th century, British psychologists [22] proposed a four-stage model of the cognitive process of creativity by analyzing the creative thinking processes of architects and artists. Figure 1 shows the creativity process.



**Figure 1:** Creative Thinking Process.

The first stage is preparation. Creators collect problem information through field visits and interviews, clarify the nature of the problem, and try to solve it.

The second stage is incubation. After failing to solve the problem, the creator put it aside; at this time, the problem has been internalized and organized in an inactive form in the subconscious.

The third stage is inspiration (illumination). After a period of processing, the key to the problem gradually emerges, and inspiration bursts out at this stage, and the creator gets inspired and finds a solution to the problem. The fourth stage is verification. Validation refers to the purposeful and conscious improvement of pr

blem-solving methods and testing their effectiveness.

The objective of education, according to [23], is to teach students how to think critically about real-world issues. Students should be provided with a choice of options for developing their own knowledge of what they are studying. In order for Chinese students to realize their full potential in the face of future problems, inventive thinking will be more important than ever. We urgently need experienced, willing, and able problem-solvers to navigate our current complex environment [24].

According to [25], creativity is underestimated in all educational environments, including elementary and secondary schools, colleges and universities, and postsecondary institutions. The basic objective of education should be intellectual development. Some contend that training can only affect a small amount of an individual's inventiveness. Prior research has shown that creativity can be taught and improved regardless of a person's current level.[26] argues that for creativity training to have the greatest benefit, it must be robust enough to permit generalization across multiple dimensions of creativity, rather than focusing solely on a few. In 1972, Torrance's analysis of 142 studies revealed that 72 percent of the trials were successful. According to his analysis, some techniques of interpreting the ratings were more helpful than others [27].

According to a recent meta-analysis of seventy studies undertaken by [28], well-designed creativity training regimens often result in enhanced performance. Effective educational programs emphasize the development of cognitive skills and the practice of real-world applications, according to the findings of this study. This schooling proved to be highly effective regardless of age, academic or professional standing, or degree of talent. This meta-analysis provides additional evidence that individuals can enhance their creativity [28]. References [29] did a literature study to examine the effectiveness of a curriculum to enhance creativity. According to the study [30], CPS had a bigger influence on people's creative ability than any other training method.

According to [31], the concept of creativity in education and psychology is one of the most cloudy and vague. However, even though creativity is an acquired trait, it is something that can be enhanced by everybody. As prophesied by Parnes and Harding more than four decades ago, we will need to be imaginative to address the problems of the future. The events of the last four decades in terms of population increase, resource depletion, urbanization, mobility, and immigration only enhance this position. As a result, the remainder of this analysis will focus on determining the most successful technique for designing a plan to train high school students' creativity in addition to the current curriculum [32].

### **3. Design Thinking Strategies and Methods**

Design thinking provides empowerment methods, providing support for the innovative design of learning activities from the method level; information technology provides enabling tools, providing support for the implementation of learning activities and learners' creative problem solving. In particular, the goal of the activity is to combine the use of knowledge and skills in a way that helps learners improve their subject knowledge, build inquiry and design skills, encourage creativity, and develop good traits. The learning task design adopts the overall task design method, is goal-oriented, guided by design-oriented questions, reflects the characteristics of interdisciplinary integration, and is closely related to life. The learning process design draws on the creative cognitive process of "problem discovery-conception-evaluation" and integrates seven links:

challenge introduction, investigation and inquiry, interpretation and reflection, design prototype, experimental test, iterative improvement, and learning evaluation. The evaluation design incorporates the concept and method of authenticity evaluation with a focus on two aspects of evaluation: work creativity and creative thinking.

An effective creativity training program for this study could be developed based on a review of creative problem-solving (CPS) concepts and research conducted by some of the field's leading scholars. As a result, while the primary goal of this study was to develop and measure creative problem-solving, examining creativity theories and conducting research on creativity assessment and promotion provide useful tools for evaluating the performance of creativity education programs [33].

As evidenced by a plethora of prior research, there has always been a need for and interest in creative problem solving (CPS). The ability of children to think creatively is becoming increasingly important as global issues and events become more complex. Creative thinking can be used to help students learn more effectively in a variety of educational settings. Children will have trouble in both their personal and professional lives if they can't think creatively, especially when it comes to solving problems.

### ***3.1 The Four-P's Approach***

The four-P method is used in several patterns for assessing creativity. This four-pronged approach to the creative process considers creative individuals, processes, outputs, and the press [35]. The four areas of creative development were researched with the goal of developing and making available a training program for creative thinking.

Post-test results show that this comprehensive training program allows students to develop their creative abilities. The training program for this study was created in a way that was closely aligned with instructional materials and practices that promote creative thinking in problem solving. The development of this creative paradigm was based on three distinct types of activities [36]. Training programs for creative problem solving, divergent thinking, or meta-analysis all incorporate elements of creativity regardless of domain focus.

Diverse thinking exercises, according to [37], aim to allow students to explore a variety of options. The six phases of problem solving were also studied as part of the curriculum because they lead to larger activities such as problem analysis, idea generation, and action planning. Throughout this course of study, students must improve their convergent problem-solving and problem-thinking skills through a variety of tasks and methodologies in meta-analysis. The majority of the study's early stages were spent on classroom activities and instructional strategies aimed at improving students' problem-solving creativity.

A training program, according to [38], must include the creation of an environment that fosters the development of creative talents and the creation of creative works. He made the following points: (1) metacognitive processing of incoming information and its application to existing knowledge bases, (2) domain-specific knowledge base mastery and mastery skills, and (3) personality traits such as attitude. Certain personality traits that encourage people to seek alternate configurations, innovative configurations, or especially suited solutions may be attributed to a combination of influences from parents, instructors, peers, or personal experiences. When

considering a product's creative effect, keep in mind that it takes just as much creativity to bring an idea to life as it does to come up with the idea in the first place [39].

The creative person is the first step in the CPS framework's Four-P technique. This model is divided into four categories. Genetics, neurology, anatomy, and physiology, as well as sociology, culture, and the economy, are all components. There are also knowledge components in which a person rationally and methodically evaluates a topic. While the person is putting the issue on the back burner, he or she is unconsciously focusing on it. The third stage of illumination occurs when a flash of insight appears in one's own mind. The final step in the solution verification process is to run the solution against the original problem.

Another school of thought holds that no creative problem solving (CPS) process is complete unless it includes both divergent and convergent thinking.

Reference [40] refer to problem identification, problem solving, and solution implementation as the three steps of creative issue resolution. In each of these stages, the ideation-evaluation process is a two-step procedure. Ideation is the act of generating numerous alternative perspectives and exceptions. Two approaches stand out as most relevant for the proposed research.

According to [41], anyone can become creative. People frequently express their creativity in accordance with their own interests and preferences. Self-audit and deliberate intervention can help to improve the conceptual and broad strategy knowledge components. This researcher focused on the types of creativity, or the techniques by which people generate ideas, rather than the degrees of creativity, when assessing a person's potential for innovation [42]. Cognitive process psychologists agree that each person's approach to problem solving is unique. Additionally, the distinctions between divergent and convergent styles should be considered.

Reference [43] investigated the differences in creative potential between people based on race and socioeconomic class. According to this theory, the pressure to conform stifles creativity in students of color and those from lower socioeconomic backgrounds. Creativity can be found in people of all races and socioeconomic backgrounds, but the ability to change is less closely associated with these factors. As a result, training programs must place the development of creative problem-solving skills ahead of the removal of potential racial and social barriers. Individual consideration should be prioritized in the four-part approach (Ps) to innovation.

Many different methods for the Four-P technique have been proposed, and it is difficult to say which one is more widely used in research. Most people would agree that being creative is an ongoing process. It is required for all human intelligence because it is improved by conscious intention and is a high-order cognitive process. [44] describe four distinct phases of the creative process using the Waller Model of the Creative Process. The first step is preparation, which entails a thorough examination of the subject under consideration. While the person is putting the issue on the back burner, he or she is unconsciously focusing on it. The third stage of illumination occurs when a flash of insight appears in one's own mind. The final step in the solution verification process is to run the solution against the original problem. Another school of thought holds that no creative problem solving (CPS) process is complete unless it includes both divergent and convergent thinking. [45] refer

to problem identification, problem solving, and solution implementation as the three steps of creative issue resolution. In each of these stages, the ideation-evaluation process is a two-step procedure.

Participants are taught to employ a variety of divergent and convergent strategies rather than rely on abstract arguments. Two approaches stand out as most relevant for this proposed research: a questionnaire and a survey. According to [46], anyone can become creative. People frequently express their creativity in accordance with their own interests and preferences. Individuals may benefit from instructional training or education to help them use their creative types more effectively, achieve greater levels of creative success, and realize their full range of creative abilities. Throughout the years, various conceptual frameworks for creative problem solving (CPS) have been developed.

CPS is a system that enables people to use knowledge about activities, important needs, and critical inputs to make decisions that result in meaningful outcomes. The CPS model, according to [47], is the most important and powerful framework for developing creative thinking.

Methods that are fundamentally different from one another or more similar to one another are both included in the CPS framework. These methods establish the framework for developing new approaches to problem-solving in the future. Although the method is structured, the stages will change based on the specifics of the issue or the situation at hand. For there to be success with a CPS framework, there needs to be diversity. CPS is a tried-and-true strategy that may be utilized in a number of contexts for the purpose of creative change management and problem-solving creatively. The model has been utilized for over half a century, and it has been the focus of several research studies carried out in different parts of the world. Because it is easy to learn and can be adapted to a diverse range of industries, scenarios, and cultural contexts, it can easily be transported from one place to another. The fact that it has the capacity to make people's lives and jobs better lends credence to my belief that it possesses significant power. It is helpful when applied to issues and opportunities in the short-term as well as the long-term perspective. In conclusion, it has the potential to refocus imaginative energy and productive concentration on other productive endeavors [48].

These new academics have a more comprehensive understanding of the CPS procedure because of the development of CPS. In light of this movement in perspective, researchers have moved away from fixed process phases and toward a more individualized assessment of each one of a kind circumstance. This adjustment in research methodology was precipitated by the shift in perspective. During this most recent assessment of the procedure, all of the results, personalities, settings, and procedures will be taken into consideration. "Task appraisal" is the name given to this newly developed process. In addition to the CPS process and phases, which are already components of the CPS system, the CPS management component and its integrated application are now also a part of the CPS system. This allows for more productive thinking tools for the production and focus of options. Additionally, the model has a diagnostic instrument for stylistic features associated with behavioral patterns of problem-solving [49].

Any group seeking to address a problem by applying the CPS framework cannot simply adhere to a pre-established set of operating rules. The CPS model requires a large amount of time and effort to be spent on

creative problem-solving activities. This contrasts with the model's primary goal, which is to successfully execute the current system. This framework, on the other hand, offers a logically organized collection of operational resources from which to draw. They are separated into four primary groups, each of which is comprised by a variety of subgroups. Throughout the next portion of this research review, a close focus will be placed on an analysis of the six unique stages that make up these fundamental components [50].

The progression of the CPS model over the past fifty years has demonstrated constant development as well as a dedication to the exploration of new pathways and the examination of the process from a range of different perspectives. However, this model will never be finished being developed. The creators of the model are continually conducting research and development on the model's various components, stages, procedures, and metacognitive features. This examination of the literature will end with a part that discusses the CPS's four primary components, each of which includes six phases, as well as a section that evaluates the CPS [51].

If the pertinent problem or circumstance is addressed throughout the CPS process, there is a chance that significant progress will be made. Understanding the Challenge in the CPS Model was the new name given to the study paper after the researchers had made more modifications to it. Academics generally hold the belief that the CPS model does not permit for a distinction to be made between the problem-finding stage of the problem-solving process and the other stages. The existence of a problem or scenario is a prerequisite to the successful application of the CPS model. This study might include details on the outcomes, the people involved, the environment, and the many research approaches that were used. According to [52], conducting this analysis is not necessary when the CPS component known as Understanding the Problem is applicable.

According to [53], the word "mess" is an effective way to describe a solution to a problem because it is all-encompassing, succinct, and efficient. This makes it a helpful way to describe a path to issue-solving. This stage is typically the major focus of problem solvers, as they research the subject from all angles, and as a result, as many facets as are physically possible are investigated. At this point, it can be difficult to get a clear picture of the problem because it is so wide and complex. Because every one of these activities has the potential to end in calamity, it is necessary to have a strategy prepared. Because of the adjustments that were made at this level of the CPS, the model is now referred to by its new name, "constructing opportunities." Problem solvers are able to channel their energy in a positive direction, and they are also able to proceed with self-assurance and a burning desire to do their best [54].

The researcher is going to use the data to make decisions that are well informed. The name given to this stage of the process is "Data-Finding." Questions like "who," "what," "when," "where," "how," and "why" are examples of open-ended questions that can be asked to get to the core of a situation. During this phase of the process, those tasked with finding a solution to the issue will collect information regarding the facts, their perceptions, and their attitudes regarding the matter. During the convergence stage of the process, major data clusters guide the way to the issue's solutions that are the most effective. When issue solvers use the step of the process known as "exploring data," they may be able to better focus on their primary objective of comprehending the situation by recognizing the facts that already exist and minimizing the factors that distract them from achieving that objective [55].



The third and final step of the CPS component called Understanding the Problem is called Problem-Finding. The purpose of this stage is to aid the person who is solving the problem in formulating problem statements that are exciting, precise, and plausible. During the divergence phase of this component, the emphasis is concentrated on providing answers to specific queries. It has been decided to adopt the "invitational stem" strategy in order to favorably frame a number of potential issue phrases ("How might" or "In what ways might"). An effective structure of the problem statement will result in the emergence of brand-new options that are not only condensed but also unrestrained. This process, which is referred to as "framing problems," provides problem solvers with assistance in expressing challenges in a manner that stimulates a desire to investigate and develop new ideas [56].

### ***2.9.2. The Origination of Ideas***

The CPS model includes the crucial step of coming up with a list of potential solutions to the issue at hand through the process of brainstorming. This component, in contrast to the many phases of Understanding the Problem, concentrates on a single significant CPS component. To identify a solution to an existing problem or circumstance, this stage involves the generation of a huge number of distinct, one-of-a-kind, or unexpected ideas. It is erroneously referred to as "brainstorming," but this component, which is utilized to find obvious solutions and viable alternatives, is called "brainstorming." Finding new ideas is the act of considering a number of different approaches to a problem in order to produce a selection of potential answers. Fluent thinking, flexible thinking, creative thinking, and/or elaborative thinking are all required during this stage of the model's divergent thought process, which is responsible for the generation of various possibilities (several detailed options). The findings from this phase of the divergent process are then compiled for review and incorporation into the subsequent phase of the convergent process for additional consideration. In addition to the generation of ideas, this step of the process enables those who are tasked with finding solutions to problems to think both "inside the box" and "beyond the box" [57].

The final and most important step in the CPS process is to plan and develop the chosen options in order to ensure their successful implementation. The output of this component lays out a strategy for implementing the solution that was devised. New or exciting possibilities may not be beneficial in the absence of effective thought (pondering). Acceptance and Solution-Finding This phase of the CPS process is divided into two parts. When looking for a solution, you must examine, refine, and improve potential solutions. Before making a final decision, consider all your options. This stage is primarily concerned with option refinement and, in some cases, ranking. This stage assists people who are attempting to solve problems in using practical strategies to transform great ideas into workable solutions [58].

Finally, the CPS process includes acceptance-finding, which entails looking for people who can help or even oppose potential solutions. This assistance can take the form of people, places, goods, or time. Individuals or groups of people, locations, materials, or objects may also object. Problem solvers benefit from anticipating what might go wrong to avoid obstacles to the proposed solution in the first place. Developing unique methods for obtaining assistance or overcoming obstacles improves effectiveness. This stage focuses not only on initiating but also on managing the change being implemented. The emphasis here is on putting the solutions

into action. Following through, demonstrating commitment, and garnering support for proposed solutions while reducing opposition to those solutions should be the focus of this stage [59].

CPS assists in the organization, selection, and application of problem-solving tools. Although it can be used to solve a variety of issues, CPS is not a panacea and will be less effective if implemented rigorously and mechanically in accordance with a set of predefined procedures or phases. It is critical that all stakeholders, the issue, or situation being addressed, and the specific job at hand be well defined for the CPS process to be as effective as possible in addressing problems. As part of today's CPS paradigm, you can now plan your approach ahead of time. Problem solvers can use this tool to keep track of their thoughts in real time and avoid deviating from the main goal. Because of this component, the CPS model can be used on a more individualized level [60].

The first level of this component, task appraisal, assists problem solvers in determining whether CPS is the best set of tools to use in each situation. Individuals, desired outcomes, working environments, and available options are all considered at this stage. That is why putting in place the right people, resources, and processes is critical to ensuring the model's effectiveness. When a problem solver completes a thorough task evaluation, they may be able to avoid a blind dive into the process, which could result in process misapplication. There is a lot to think about here, including how each person is wired and the specific traits and qualities of the task. Problem solvers who have gone through this process are more confident that CPS is the best way to resolve their issue and may proceed to the preparation stage without delay. The prospective costs and benefits of CPS should be considered as part of the task appraisal phase [61].

Following the determination that CPS is appropriate for the problem at hand, a number of design decisions must be made. The component and model enter the design process at this point. Based on their understanding of the task and the identified needs of the situation, problem solvers prepare the CPS components, phases, or procedures that are most successful in achieving the specified objective. The likelihood of success increases by using this method, which makes work more efficient.

Even if the task appraisal examined the client's specific characteristics, other aspects of the client must be considered when developing an effective CPS model. At this point in the process, it is critical to assess the client's interest, influence, and desire for originality. Understanding the task owner's true priority for the job is critical to the process's success. Several factors influence the design of the model, including how empowered individuals feel to participate in problem solving, how authority is perceived and used, and how leadership is perceived. The fact that a creative problem solver knows their customer really wants something unique or unusual (imagination) boosts their confidence in their work [62].

The identification of the roles that will be played by the various participants is a step in the design process that must be planned of time. This person must recognize their role as a facilitator of the process, especially in group settings. The facilitator is tasked with completing certain tasks and ensuring that everyone in the group has a basic understanding of what is going on prior to each CPS group meeting [63]. [64] identified four key needs that must be included in the task design for a task to be both educationally valuable and creatively stimulating. Here are some examples of these requirements: Task completion criteria must be functional and based on real-

world observations for learners to develop innovative task products; knowledge and skill needs must be accessible to all learners; and tasks must allow for a diversity of individual learning behaviors to solve them. To summarize, once all of the task evaluation and background information has been gathered, a thorough review of the task requirements and the CPS components that best meet those needs is performed. The primary components of understanding the problem, generating ideas, and planning for action will be reviewed in preparation for implementation.

#### **4. Proposed conceptual Model**

The study's main goal is to discover the impact of creative problem-solving on cognition and creativity. The independent variable will be creative problem solving, while cognition and creativity will be treated as dependent variables.

For the purpose of this research, an efficient creativity training program designed by drawing on the concepts of creative problem-solving (CPS) and the findings of research carried out by some of the most knowledgeable specialists in the field. As a result, even though the primary objective of this study was to develop and measure creative problem-solving, looking at different theories of creativity and conducting research on creativity assessment and promotion are both useful tools for evaluating the effectiveness of different programs for creativity education.

As evidenced by a plethora of earlier research, there has never been a time when there was not a demand for and interest in creative problem solving (CPS). Because of the increasing complexity of problems and events on a global scale, it is increasingly important for children to be able to think creatively. Students could benefit from learning in a more efficient manner from using creative thinking in a variety of educational settings. Children who do not develop the ability to think creatively, particularly when it comes to the ability to find solutions to problems, will not be able to achieve success in either their personal or professional lives.

There are many different interpretations that can be given to the word "creativity." Steps involved in the creative process include developing sensitivity to the issues at hand, looking for potential solutions, making educated guesses, testing, and retesting these hypotheses, and finally presenting one's findings. The fact that the emergence and expression of creativity is influenced by such a wide variety of factors helps to explain, at least in part, why it is so distinctive. Personal aspects (cognitive, motivational, and attitude) as well as social and environmental influences should be included in this category of considerations. One study suggests that it might be challenging to design a clear, meaningful, and measurable instrument to assess creative problem solving (CPS).

The four-P method is utilized in multiple models that are used to evaluate creative patterns. In this four-pronged approach to the creative process, consideration is given to creative individuals as well as creative processes, creative outputs, and the press. The purpose of this study was to develop and gain access to a training program for creative thinking, so research was conducted on these four areas of creative development.

The findings of the post-test demonstrate that participants in this extensive training program are provided with

the opportunity to develop their creative abilities. The training program for this study was developed in a way that was closely aligned with instructional materials and practices that promote creative thinking in problem solving. This alignment ensured that the training was as effective as possible. The formulation of this model for creative thinking was founded on the interplay of three distinct kinds of endeavors [65]. When it comes to training programs for creative problem solving, divergent thinking, or meta-analysis, all of these programs integrate aspects of creativity regardless of the area of concentration.

According to [66], the purpose of diverse thinking exercises is to give students the opportunity to investigate several different opportunities. The six stages of problem solving were also covered as part of the curriculum. This was done because these stages are the building blocks for more complex activities such as problem analysis, idea generation, and action planning. Throughout the course of this line of study, students will be required to improve their convergent problem-solving and problem-thinking skills to complete a variety of tasks and methodologies related to meta-analysis. Most of the early stages of the study were devoted to classroom activities and instructional strategies with the primary objective of fostering students' creative problem-solving abilities.

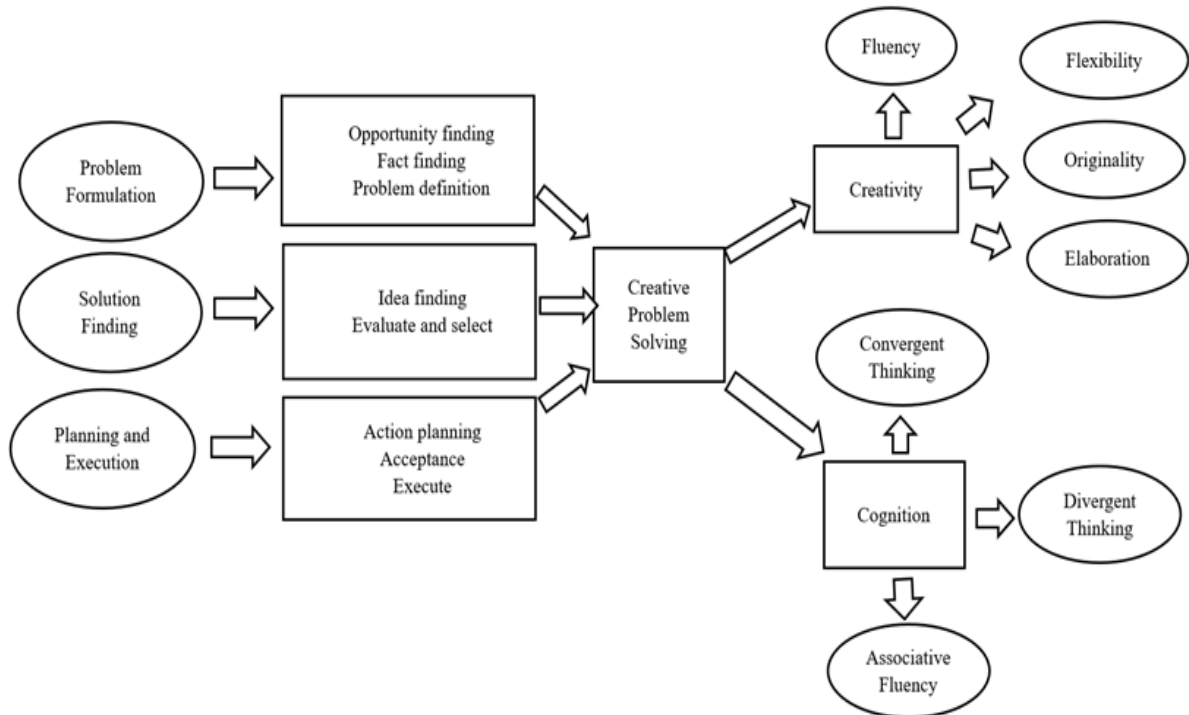
A training program must involve the provision of an environment that fosters the development of creative talents and the creation of creative works. This environment must also encourage the exchange of ideas among participants. He formulated the following points, some of which are as follows: (1) the metacognitive processing of incoming information and its application to existing knowledge bases; (2) the mastery of domain-specific knowledge bases and mastery skills; and (3) personality traits such as attitude. Certain personality qualities that encourage people to seek alternative configurations, innovative configurations, or solutions that are especially suited may be the result of a combination of influences coming from parents, teachers, peers, or even one's own experiences. These influences may have been present at some point in one's life. When you are considering the creative effect that a product has, it is important to keep in mind that bringing an idea to life requires the same amount of creative thought that was required to think of the idea in the first place [67].

The CPS framework begins with the Four-P technique, which begins with the creative person as the first step. This model can be broken down into four distinct categories. In addition to sociology, culture, and the economy, there are also biological, psychological, social, and economic aspects to consider. This includes aspects such as genetics, neurology, anatomy, and physiology. There is also a component known as knowledge, which requires an individual to evaluate a subject in a logical and methodical manner. Inadvertently, the person is concentrating on the problem even while they are attempting to put it off until later. The third stage of illumination is reached when one experiences a sudden burst of comprehension within their own mind. Testing the solution on the problem that it was intended to solve is the final stage of the solution verification process. One more school of thought asserts that the process of creative problem solving (CPS) cannot be considered finished unless it involves both divergent and convergent thought. In each of these stages, there is a procedure that consists of two steps, which is called the ideation-evaluation process. The process of coming up with several different points of view and exceptions is known as ideation. Regarding the research that is being proposed, two methods stand out as being particularly pertinent. This entails filling out a questionnaire, as well as conducting an interview.

Every individual possesses the potential to engage in creative behavior. It is also common practices for individuals to express their creative abilities in a manner that is in accordance with their individual interests and preferences. Both the conceptual and the broad strategy knowledge components have the potential to be improved through self-audit and intentional intervention. When determining a person's capacity for innovation, this researcher paid more attention to the types of creativity, also known as the processes, that people use to generate ideas, rather than the degrees of creativity that people possess [68]. Psychologists who focus their studies on cognitive processes agree that no two people approach the same problem in the same way. In addition to this, consideration ought to be given to the distinctions between divergent and convergent modes of thought.

References [69] conducted research that investigated the disparities in people's creative potential based on factors such as their race and their socioeconomic class. According to this theory, the pressure that students of color and those from lower socioeconomic backgrounds feel to conform stifles their creative potential and prevents them from reaching their full potential. The capacity to change is less closely linked to factors such as race and socioeconomic class than is creativity, which can be found in people of many different races and classes. As a result, training programs have a responsibility to place an emphasis on the development of creative problem-solving skills rather than the elimination of potential racial and social barriers. The consideration of the individual ought to be given a high priority within the framework of the Four-approach Ps to innovation.

There have been many different approaches to the Four-P technique proposed, and it is difficult to say which one is more prevalent in the research because there have been so many. Most individuals are of the opinion that being creative is a process that never ends. Because it is a higher-order cognitive process that can be improved by conscious intention, it is a prerequisite for all forms of human intelligence. The first thing that needs to be done is preparation, which entails conducting an exhaustive investigation into the subject at hand. Inadvertently, the person is concentrating on the problem even while they are attempting to put it off until later. The third stage of illumination is reached when one experiences a sudden burst of comprehension within their own mind. Testing the solution on the problem that it was intended to solve is the final stage of the solution verification process. One more school of thought asserts that the process of creative problem solving (CPS) cannot be considered finished unless it involves both divergent and convergent thought. In each of these stages, there is a procedure that consists of two steps, which is called the ideation-evaluation process. Participants are instructed not to rely solely on abstract argument but rather on a variety of strategies that can be either divergent or convergent. A survey and a questionnaire stand out as the two methods that would be most useful for this research project that has been proposed. It is also common practices for individuals to express their creative abilities in a manner that is in accordance with their individual interests and preferences. Individuals may benefit from receiving training or education in the form of instruction to make more effective use of their creative types, increase their levels of creative success, and realize the full range of creative abilities they possess. Over the course of many years, a number of distinct conceptual frameworks for creative problem solving (also known as CPS) have been developed. People can use their knowledge of activities, important needs, and critical inputs within a system known as creative problem solving (CPS), which is a system that enables people to make decisions that lead to meaningful outcomes. Research has shown that the CPS model is the most important and powerful framework for developing creative thinking, according to [70]. This conclusion was reached based on the findings of their study.



**Figure 2:** Proposed Conceptual Model.

## 5. Conclusion

A literature review was conducted in order to identify relevant research and theories. Relevant research on cognition and creativity must be included. The researcher concentrated on the underlying theories of the studies, as well as their primary emphasis on cognition, creativity, and creative problem-solving. The study's major goal is to discover the impact of creative problem-solving on cognition and creativity. The variable of creative problem solving will be considered an independent variable, whereas cognition and creativity will be considered dependent variables.

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