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Effect of Metacognition Mastery Program on the Creative Thinking Skills of Primary School Students

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Abstract

Metacognition-based education is highly beneficial for students as it empowers students to understand their own learning processes, enabling them to regulate their thoughts and strategies effectively. This approach encompasses better and long-term understanding of knowledge, ultimately leading to better academic performance. In lower classes, metacognitive strategies are particularly important as they help young learners develop self-awareness about their learning habits and preferences. By teaching these strategies early on, educators can instill a sense of ownership in students regarding their learning journey, promoting lifelong learning skills. The main purpose of this research is to examine the effect of the Metacognition Mastery Program (MMP) on creative thinking skills of primary school students. For this purpose, Experimental group only Pretest – Posttest Design was used in the research. The study group of the research consists of 35 fourth grade students. The Program was developed with Metacognition Strategies. The prepared program was implemented for 8 weeks. Here, one week of the program was conducted for the development of Creative Thinking Skills. The data of the study were collected through Achievement tests (pretest and posttest). Paired sample t-test was used to determine whether there is a significance difference between pre and post-tests. As a result of the research, a significant difference was found in terms of Creative Thinking skills, prior to and after conducting the study. In this respect, it is seen that the Metacognition based Program has a positive effect on Creative Thinking skills among fourth standard students.

Keywords: Meta cognition Mastery Program, Creative Thinking Skills, Primary School Students

Introduction

Metacognition and creativity are two important cognitive processes that play significant roles in human thinking and problem-solving. In the world of education, Metacognition is an emerging word gaining much popularity and importance. Metacognition means 'thinking about thinking'. Flavell (1976) defined metacognition as referring to "one's knowledge concerning one's own cognitive processes and products or anything related to them, e.g., the learning-relevant properties of information or data". Creativity is recognized as an essential 21st century skill. Creativity is the process of sensing difficulties, problems, gaps in information, missing elements, something askew: making guesses and formulating hypotheses about these deficiencies; evaluating and testing these guesses and hypotheses; possibly revising and retesting them and finally communicating the results. "Creative thinking can be regarded as a metacognitive process in which the combination of individual's cognitive knowledge and action evaluation results in creation" (Jia et al., 2019). In the vibrant ocean of education, the interplay between metacognition and the cultivation of creative thinking skills among primary school students stands as an area ripe for exploration and innovation.

The significance of this study exceeds the traditional boundaries of education, resonating deeply with the soul of nurturing adaptable, creative minds. Understanding the symbiotic relationship between metacognition and the development of creative thinking skills among primary school students offers a paradigm shift in educational practices. It not only enriches their academic experiences, but also equips them with the cognitive tools to navigate the complex landscape of innovation in an ever evolving world. This exploration holds the ability to revolutionize the pedagogical approaches, empowering the educators to tailor teaching methods that foster not only academic excellence, but also the divergent and inventive thinking vital for success in the dynamic challenges of the future. "Metacognitive experiences are more important in the generative stage of creativity, whereas metacognitive knowledge is more influential in the exploratory stages" (Preiss, 2022).

Metacognition-based learning interventions can significantly enhance creative thinking skills in primary school students. By fostering awareness and regulation of their own cognitive processes, these interventions empower students to think more creatively and approach problems with innovative solutions. Metacognitive strategies encourage students to evaluate different approaches to problem-solving. This flexibility allows them to explore various solutions and think outside the box, which is essential for creative thinking. Students learn to reflect on the effectiveness of different strategies they use, enabling them to adapt and refine their approaches based on past experiences. This reflective practice fosters a deeper understanding of how to tackle complex problems creatively. By becoming aware of their own thinking processes, students can identify their strengths and

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weaknesses in creative tasks. This self-awareness helps them leverage their strengths while addressing areas that need improvement.

Metacognitive interventions encourage students to set specific goals for their creative projects and monitor their progress. This structured approach enhances motivation and encourages persistence in pursuing creative endeavors. Working in groups allows students to engage in metacognitive discussions about their thought processes. Sharing ideas and strategies with peers can stimulate creative thinking by exposing students to diverse perspectives and approaches. Collaborative environments foster feedback, which is crucial for creative development. Students learn to evaluate not only their own ideas but also those of others, leading to richer, more innovative outcomes. Metacognitive practices help students understand that failure is a part of the creative process. By reflecting on what went wrong and adjusting their strategies, they become more resilient and willing to take risks in their creative pursuits.

As students learn to monitor their progress and reflect on their efforts, they develop a sense of perseverance. This resilience is vital for creativity, as it encourages them to continue exploring ideas even when faced with challenges. Metacognition promotes critical evaluation of one's own ideas and those of others. Students learn to assess the feasibility and originality of different concepts, which enhances their ability to generate innovative solutions. By engaging in metacognitive reflection, students can make connections between seemingly unrelated ideas or concepts, fostering a more holistic approach to creativity.

Incorporating metacognitive strategies into educational practices for primary school students not only enhances their creative thinking skills but also equips them with essential tools for lifelong learning. By promoting self-awareness, flexible problem-solving, collaboration, resilience, and critical thinking, metacognition-based interventions create an environment where creativity can thrive. These skills are invaluable as students navigate increasingly complex academic and real-world challenges.

Review of Related Literature

Hargrove (2012) conducted a study titled “Fostering creativity in the design studio: A framework towards effective pedagogical practices”. According to him, Design is a discipline of innovation: its essence is the creation of something new and unique. An assumption has been that the inclination and ability of a person to respond in novel and useful ways is largely inherited. Present research refutes this view, and it is now believed by many that, however creativity is defined, it is a form of behaviour that can be taught. Acknowledging this point leads to the questioning of how creativity is situated in the design curriculum. If, as present research suggests, most creativity training programmes are successful in that they encourage the development of metacognitive abilities, then the study of creativity as a self-regulatory metacognitive process is timely and important to design education.

Miranti and Wilujeng (2017) conducted a study titled “Creative Thinking Skills Enhancement Using Mind Mapping”. The aim of this study was to determine the improvement of students' creative thinking skill. The method used is quasi experiment, with design of non-equivalent control group design. The results showed that mind mapping method can significantly improve students' creative thinking ability.

Tohir (2019) conducted a study on Students' Creative Thinking Skills in Solving Mathematics Olympiad Problems Based on Metacognition Levels. The research aims to describe the level of creative thinking ability of students in solving mathematics olympiad problems based on students' metacognition levels by using the qualitative descriptive approach. The results exhibited that the level of creative thinking skills of the students in solving mathematics Olympiad questions were 29.41% (less creative), 41.18% (quite creative), 11.76% (creative) and 17.65% (very creative). On the other hand, the metacognitive level of SMPN 2 Jember students were 64.71% at level 2 (aware use), 23.53% at level 3 (strategic use) and 11.76% at level 4 (reflective use). In addition, the literatures indicate that there are several factors affecting the creative thinking skills and metacognition level, among them is an understanding of the information of the problem, compiling an appropriate strategies, skills of the chosen strategy, skills of answer elaboration, mastery of the Mathematics Olympiad material and a tendency to rely on the memorization or imitations based on previous or discussed solutions.

Yusnaeni et al. (2020) conducted a study on the Contribution of Metacognitive Skills and Creative Thinking Skills in 21st Century Learning. It was a correlational research related to the multiple correlation between metacognitive skills and creative thinking skills with students' cognitive learning results. The research aimed at investigating the contribution of metacognitive skills and creative thinking skills simultaneously on the cognitive learning results of 226 senior high school science students of Kupang, Indonesia. The results of the

research showed that metacognitive skills and creative thinking skill simultaneously had a high contribution on students' cognitive learning results as much as 62.78%. Based on this result, teachers need to empower students' metacognitive skills and creative thinking skills in learning because both thinking skills are required in 21st century.

Need and Significance of the Study

Metacognition plays an important role in Revised Bloom's Taxonomy as it addresses the higher-order thinking skills and reflects a learner's capacity to manage their own cognitive processes. Revised Bloom's Taxonomy, developed by Anderson and Krathwohl, extends the original Bloom's Taxonomy by including the cognitive processes and knowledge dimensions. Metacognition is particularly relevant in the "Creating" and "Evaluating" levels of the taxonomy.

Metacognition is necessary when it comes to creating new ideas, designs, or solutions. Learners must to be aware of their own thinking processes, monitor their progress, and make adjustments as required during the creative process. In the evaluating stage, one need to make judgments and assess the validity and effectiveness of ideas or solutions. Metacognitive skills come into play as pupils reflect on their own criteria for evaluation, consider alternative perspectives, and monitor their own biases or assumptions.

Metacognition is essential for the development of primary school students as it plays an important role in their cognitive growth and academic success. Krathwohl's and Anderson's Revised Bloom's Taxonomy, which builds upon the original Bloom's Taxonomy, highlights the importance of metacognition in the cognitive processes of learning. Metacognition involves knowledge about one's own cognitive processes. This comprises understanding how one learns, monitors their understanding, and identifies areas of struggle. Primary school students who are aware of their thinking process are better furnished to choose suitable learning strategies and techniques that suit individual requirements (Metacognitive Knowledge). Students who can establish goals and plan their approach to a task are more probable to be self-directed learners, which is a key component of metacognition (Metacognitive strategies). Primary school students who can regulate their learning are more likely to identify when they need to pursue help, adjust their learning strategies, or revisit material to enhance their understanding (Metacognitive Regulation).

By reflecting on their thinking processes, primary school students can improve the ability to analyze problems, assess solutions, and apply critical thinking abilities to various academic tasks (Cognitive Skills). Metacognitive skills are transferable through different subjects and contexts. Pupils who improve strong metacognitive skills in one area can apply these skills to new and unfamiliar situations. The ability to transfer metacognitive skills is as important as students progress through primary school and encounter a broader range of subjects and challenges (Transfer of Metacognitive Skills).

This study addresses a critical need in education. In the primary years of schooling, children are like sponges, absorbing data and information and developing cognitive abilities. However, fostering creativity is often disregarded in traditional teaching methods. This study aims to throw light on the importance of incorporating metacognition into primary school education. By incorporating metacognitive strategies into teaching practices, educators can endow students to understand how they learn best, encouraging a more active and attentive approach to problem-solving and knowledge acquisition. This not only improves their academic performance but also arranges the foundation for a lifetime of creative thinking skills.

The significance of this study lies in its potential to transform primary education by stressing the link between metacognition and creativity. As educators embrace metacognition-based teaching programs, they equip students with valuable tools to navigate the challenges of learning, ultimately creating a generation of critical thinkers and innovators. By nurturing creativity at an early age, schools open the doors for the holistic development of students, preparing them to solve complex problems in an ever-changing world. This article aids as a catalyst for educational transformation, encouraging for a shift towards pedagogical practices which not only impart knowledge but also nurture the essential skills of metacognition and creativity in young learners.

Objective

To find out whether there exists any positive effect of Metacognition Mastery Program (MMP) on Creative Thinking Skills of Fourth standard students in Kerala

Hypothesis

There is a positive effect for Metacognition Mastery Program (MMP) on Creative Thinking Skills of Fourth standard students in Kerala

Methodology of the Study

Method

In this study, the effect of Metacognition Mastery Program (MMP) on the creative thinking skılls of prımary school students was investigated according to quantitative design. "Quantitative Research establishes statistically significant conclusions about a population by studying a representative sample of the population" (Lowhorn, 2007). The model of the research is Experimental Model. It was tested whether the independent variables (activities within the MMP) were effective on the dependent variable (creative thinking skills). In the pretest- posttest experimental group model, there is one group, the experimental group. 35 students from the 4th grade students studying at Creative High School in the Palakkad district were included. One class consisting of 35 students were selected randomly from 2 divisions. The groups were given a pre-test before the experimental application and a post-test after the application.

Structure of MMP

The Metacognition Mastery Program for 4th standard students is designed to enhance the four essential skills: reading, writing, arithmetic, and communication. The program comprises nine modules, each targeting specific cognitive and academic competencies. Module 1: Mindfulness introduces students to practices that cultivate focus and self-awareness, establishing a strong foundation for effective learning. Following this, Module 2: Reading emphasizes comprehension strategies and encourages engagement with diverse texts, while Module 3: Writing focuses on developing clear and coherent writing skills across various formats. Module 4: Arithmetic provides hands-on activities to strengthen foundational math skills, and Module 5: Communication hones students' abilities to express their ideas confidently and effectively in both spoken and written forms.

The latter modules of the program build on these foundational skills by introducing advanced cognitive techniques. Module 6: Mnemonic Techniques equips students with memory strategies to enhance information retention. In Module 7: Analytical Thinking Skills, students engage in critical thinking exercises that challenge them to evaluate information and solve problems creatively. Module 8: Logical Reasoning focuses on developing structured thought processes through logic puzzles and reasoning tasks. Finally, Module 9: Creative Thinking Skills encourages innovation by allowing students to explore their imagination through brainstorming and creative projects. This comprehensive approach not only aims to improve academic performance but also fosters a mindset of lifelong learning and adaptability in students.

Experimental Design

The study is a pre-test post test experimental group only design. The study group (n=35) of the research consists of 4th grade students studying at Creative High School in the Palakkad district of Kerala. The data, which are thought to serve the purpose of the research, were collected through Achievement tests.

Data Collection Tools

Creative thinking Skills Test: The "Creative Thinking Skills Test", developed by Anees & Zeenath (2022) consists of 12 questions. The tool was administered among 100 fourth standard students and Item Analysis was done. The final tool consisted of 10 questions. In order to ensure the Reliability of the test, 2 methods were adopted: Test-retest method and Cronbach's alpha to ensure internal consistency and the test was administered in 2 different samples to ensure the External Consistency. Thus the reliability was ensured. The Face Validity and Content Validity was ensured by a panel of 5 experts consisting of 3 educationists and 2 primary teachers. Thus the Creative Thinking Skills Test was standardised.

Metacognition Mastery Program: In order to standardise the Metacognition Mastery Program, the content and items of the Program was discussed with panel of 5 experts consisting of 3 educationists and 2 primary teachers. Based on their suggestions, appropriate modifications were made wherever necessary. A Rating Scale were given to the panel to ensure the content validity and face validity. They rated the program in the dimensions provided in the scale. Thus the Metacognition Mastery Program was standardised.

Data Collection

In this study, which was conducted to determine the effect of the Metacognition Mastery Program (MMP) on the creative thinking skılls of prımary school students, the program prepared with Metacognitive strategies and Neuro Linguistic Programming content was applied to the experimental group students for 6 weeks, 5 hours a week. Two weeks of the program was conducted for the development of Creative Thinking Skills. The suitability of the activities in the prepared program to the grade level was decided by taking the opinions of teacher educators and teachers.

In the first stage, a pre-test was conducted on the 35 students and their scores were recorded. In the next step, the MMP prepared within the scope of the research was started to be applied to the experimental group. The application was made in 30 hours. In the experimental group, the practice was continued for five days a week, one lesson per day, and continued for six weeks. Two weeks of the program were conducted for the development of Creative Thinking Skills. During the trainings, the motivation of the students was tried to be kept at a high level with verbal reinforcements. At the end of the 6-week period, posttest was applied and the scores of the Achievement test were recorded.

Data Analysis

The data gathered from the investigation was analyzed using the SPSS package application. In beginning, the normality test was run over the discrepancies between the pretest posttest findings collected within the scope of the research in order to decide which statistical data analysis types would be employed in the data analysis. The Mean, SD, skewness, and kurtosis coefficients were investigated in this study to see if the data had a normal distribution. The tested values were found to be in the normal distribution ($p<.05$). Since the data were in accordance with the normal distribution, t-test was used for the difference analysis of the paired groups, which is one of the parametric tests.

Table 1

Paired sample t-test Results Regarding the Pretest-Posttest Data of Experimental Group Creative Thinking Skills Scale

Test	N	$\bar{x}$	sd	df	t	p
Pre-test	35	15.44	6.249			
				34	15.331	.000
Post-test	35	28.09	3.866			

Findings and Discussion

The objective of the study is to find out whether there exists any positive effect of Meta Cognition Mastery Program (MMP) on Creative Thinking Skills of Fourth standard students in Kerala. The results can be seen as follow:

The t-test was used to determine if the difference between the means of both groups is significant. According to the test findings, there was a statistically significant difference between the groups in terms of creative thinking skills. According to the research, the influence of MMP on the creative thinking skills of fourth standard primary school students was found after the application. The changes in the students' results were found to be significant in the process.

According to the findings, the difference between the experimental group's pretest-posttest averages is significant and that the Metacognition Mastery Program prepared with Metacognition and Neuro Linguistic Programming strategies were successful in establishing a considerable difference between pre-test and post-test scores. Thus, it can be concluded that the Metacognition Mastery Program (MMP) has a positive effect on creative thinking skills of fourth standard students.

Suggestions for further study

The purpose of this study was to see how the Metacognition Mastery Program affected the creative thinking skills of fourth standard students.The following proposals for future studies, researchers, and practitioners are based on the experiences gained during the study process and the findings collected as a consequence of the research:

- The prepared program was implemented for 6 weeks. However, the duration of the program can be extended with the activities to be added in order to acquire good creative thinking habits permanently.
- In this research, the research data were collected using Creative thinking Skills Test. Quantitative data were obtained with this tool. In a similar study, observations and interviews can be made to obtain the opinions of students and teachers about the program, and the study can be supported with qualitative data.
- The program has been prepared considering the development level of primary school students. In a similar study, the effect of the program on creative thinking skills can be tested on different age groups with different activities to be added.

- In future studies, students from regions with different socioeconomic variables can be studied.
- The developed program can be easily applied by classroom teachers in the primary school period.
- It is thought that this program, which has an infrastructure that parents can easily apply at home, will provide great support to students in primary schools.

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