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LOCALIZED PROFESSIONAL LEARNING PACKAGE (PLP) TOWARD LEARNERS' ENHANCED CREATIVE THINKING SKILLS IN MATHEMATICS 9

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Abstract

Recent findings from both international and local assessments about concerning trends in the performance of secondary learners in the Philippines, particularly in the areas of Mathematics and creative thinking encouraged the conduct of this study among eighty-four (84) Grade 9 learners in Indang, Cavite during the S.Y. 2024-2025. The study aimed to examine the effect of a localized Professional Learning Package (PLP) on the learners' creative thinking skills in Mathematics 9. It involved two groups: the control group used the original PLP, while the experimental group used the localized PLP which undergone validity and reliability testing. The creative thinking skills were assessed before and after the intervention, focusing on originality, flexibility, elaboration, and fluency. Before the intervention, both groups showed low levels of creative thinking. However, after using the localized PLP, the experimental group showed a significant improvement in creative thinking, while the control group remained at the same level. The study highlighted that the localized Professional Learning Package in Mathematics 9 enhanced learners' creative thinking skills in terms of originality, flexibility, elaboration and fluency. It also recommended the development and utilization of localized PLP in other grade levels to further enhance creative thinking skills in Mathematics.

Keywords: *Professional Learning Package, Localized, Mathematics, Creative Thinking Skills*

Introduction

The results of the Programme for International Student Assessment (PISA) in 2022 showed that the Philippines ranked second to the lowest among 64 countries in terms of creative thinking and ranked 77th out of 81 participating countries in Mathematics, wherein Filipino students scored an average of 14 points in creative thinking and 355 points in Mathematics which are below the Organisation for Economic Co-operation and Development (OECD) average of 33 in creative thinking and 472 points in Mathematics (OECD, 2023).

According to recent studies in mathematics education, students' success in mathematics is significantly correlated with their capacity for creative thinking (Saragih & Napitupulu, 2015). Also, they further revealed that students with more innovative thinking abilities outperformed students with less creative thinking abilities especially in mathematics.

PISA defines creative thinking as "the ability to generate, evaluate, and improve ideas that can result in original and effective solutions, advances in knowledge, and impactful expressions of imagination" (OECD, 2024). This assessment evaluates 15-year-old learners worldwide on how they productively generate ideas that require imagination and personal experience to produce a useful output. As a result, the low PISA performance reflects how Filipino students' creative thinking and mathematical abilities are embedded and developed in schools.

The Department of Education (DepEd) promotes the creation and use of educational resources that are essential to students' local language, culture, and history which include case studies and activities that are tailored to the local setting (DepEd, 2015). In order to make instruction relevant and meaningful for our students, learning materials should be contextualized through indigenization and localization (DepEd, 2015).

Professional Learning Packages (PLPs) in Mathematics were created in 2023 by the Research Institute for Teacher Quality (RITQ), the Department of Education (DepEd), and the National Educators Academy of the Philippines (NEAP) to address the problem. These PLPs aim to develop students' creativity and higher-order thinking skills (HOTS) while also strengthening teachers' abilities. To foster critical and creative thinking, schools are encouraged to adopt and modify the PLPs in their curriculum and try out suggested teaching and evaluation techniques.

In 2022, the Grade 10 students in a public secondary school in Indang, Cavite performed unsuccessfully on the National Achievement Test (NAT) in mathematics problem-solving and creative thinking. To improve future NAT results in mathematics, teachers must update and improve the current teaching and assessment methods used in the classroom.

For these reasons, the researcher was motivated to utilize the localized PLP in Mathematics 9 in teaching and determine its effectiveness in enhancing learners' creative thinking skills. Specifically, it aimed to test the following null hypotheses:

1. There is no significant difference in the level of creative thinking skills of Grade 9 learners in Mathematics in the control and experimental groups before and after the utilization of localized Professional Learning Package in Mathematics in terms of originality, flexibility, elaboration and fluency.

2. There is no significant difference in the level of creative thinking skills of Grade 9 learners in Mathematics in the control and experimental groups after the utilization of localized Professional Learning Package in Mathematics in terms of originality, flexibility, elaboration and fluency.

Methods

The researcher sought permission from the Schools Division Office (SDO) - Cavite Province to conduct the study. Upon approval, the researcher requested the assistance of the school principal for proper coordination. A letter of consent of the targeted respondents was also provided. The participation of the respondents in this study was entirely voluntary which were selected using purposive sampling.

This study used the quasi-experimental research design among 84 Grade 9 learners. This study employed a non-equivalent control group design to measure learners' creative thinking skills by selecting two groups of similar participants, control and experimental groups, except for the independent variable(s) that the researcher tested. The control group used the original Professional Learning Package (PLP) issued by DepEd while the experimental group utilized the localized PLP. The two groups were then compared to see if there were any significant differences in the outcomes before and after utilizing the localized professional learning packages in Mathematics.

The researcher used RITQ's developed PLP in Mathematics in 2023. Two (2) mathematics activities from the PLP were localized and used in this study based on the competencies from the First and Second Quarters of Grade 9 Mathematics curriculum for S.Y. 2024-2025. The activities were tested for validity and reliability.

Two (2) mathematics assessment tasks, pretest and posttest, from the PLP for Grade 9 were used in this study to test the creative thinking skills of learners in Mathematics. The learners' creative thinking skills in Mathematics

were assessed in terms of learners' originality, flexibility, elaboration, and fluency in performing the tasks using Munahefi et al. (2021) aspects of mathematical creative thinking and Blyman et al. (2021) 5-point mathematical problem-solving creativity rubric. Both assessment tasks were tested for validity and reliability. Data gathered were analyzed statistically using statistical software.

Results

TABLE I

Level of Creative Thinking Skills of the Respondents in the Two Groups Before the Utilization of Localized PLP in Mathematics 9

Creative Thinking Skills	Control Group		Verbal Interpretation	Experimental Group		Verbal Interpretation
	Mean	SD		Mean	SD	
Originality	1.88	0.22	Low	1.90	0.20	Low
Flexibility	1.89	0.21	Low	1.90	0.20	Low
Elaboration	2.18	0.35	Low	2.25	0.40	Low
Fluency	2.18	0.35	Low	2.24	0.40	Low
Overall	2.03	0.21	Low	2.07	0.23	Low

Legend:

4.21 - 5.00	Very High
3.41 - 4.20	High
2.61 - 3.40	Average
1.81 - 2.60	Low
1.00 - 1.80	Very Low

Table I presents the level of creative thinking skills of the respondents in the two groups before the utilization of the localized PLP in Mathematics 9. Most of the respondents in the control and experimental groups had a low level of creative thinking skills before the utilization of the localized PLP in Mathematics 9.

According to Blyman et al. (2021), a low level of creative thinking both in the control and experimental groups in the pre-test suggests that the respondents are also low in originality, flexibility, elaboration and fluency.

This finding aligns with the results of Silver (2015) who elaborated that the traditional method of teaching focused on procedural fluency rather than conceptual comprehension causing students to frequently have low levels of creative thinking skills in mathematics. Also, Lev-Zamir and Leikin (2021) stated that the traditional method discouraged students from experimenting thus prioritizing accuracy over idea generation and is one of the factors for low creativity since the emphasis is on procedural knowledge and not conceptual understanding (Rahman et. al, 2017). Furthermore, the traditional method of teaching mathematics, which includes rote memorization and procedural tasks, may not effectively foster students' creative thinking skills, particularly in terms of originality (Sabrina et. al, 2018).

TABLE II

Level of Creative Thinking Skills of the Respondents in the Two Groups After the Utilization of Localized PLP in Mathematics 9

Creative Thinking Skills	Mann-Whitney	p-value	Remark*
Originality	-4.544	0.00	Significant
Flexibility	-4.706	0.00	Significant
Elaboration	-7.137	0.00	Significant
Fluency	-5.037	0.00	Significant
Overall	-5.237	0.00	Significant

Legend:

4.21 - 5.00	Very High
3.41 - 4.20	High
2.61 - 3.40	Average
1.81 - 2.60	Low
1.00 - 1.80	Very Low

Table II presents the level of creative thinking skills of the respondents in the two groups after the utilization of the localized PLP in Mathematics 9.

Results revealed that most of the respondents in the control group remain at low levels of creative thinking skills while in the experimental group, most of the respondents advanced to average levels of creative thinking skills after the utilization of the localized professional learning package in Mathematics.

This indicated that the localized materials are effective in enhancing the level of creative thinking skills of the respondents which is supported by the findings of Zhang et. al (2021) who found that when students used learning materials based on local cultural contexts and real-world problems, they were more likely to elaborate on their solutions, providing detailed reasoning and exploring multiple areas of the problem. Also, Chen and Liu (2021) observed that students were more likely to come up with multiple solutions when exposed to localized materials.

TABLE III
Comparison of the Level of Creative Thinking Skills in the Experimental Group Before and After the Utilization of Localized PLP in Mathematics 9

Creative Thinking Skills	Control Group		Verbal Interpretation	Experimental Group		Verbal Interpretation
	Mean	SD		Mean	SD	
Originality	2.32	0.44	Low	2.92	0.59	Average
Flexibility	2.25	0.40	Low	2.86	0.59	Average
Elaboration	2.50	0.51	Low	3.10	0.43	Average
Fluency	2.50	0.51	Low	3.11	0.42	Average
Overall	2.39	0.41	Low	2.99	0.47	Average

* Using 0.05 level of significance

Table III presents the comparison between the level of creative thinking skills of the respondents in the experimental group before and after the utilization of the localized PLP in Mathematics 9.

Results revealed that there was a significant difference between the respondents' level of creative thinking skills before and after the utilization of localized professional learning package in Mathematics 9 in the experimental group. This indicates that the professional learning package in Mathematics 9 significantly increased the level of creative thinking skills of the respondents in the experimental group. This is supported by Keller and Walsh (2022) who found that professional learning packages encouraged students to elaborate, refine their ideas and develop detailed outputs thus enhancing creativity. Furthermore, Nguyen et al. (2018), revealed that localized materials encouraged students to think flexibly since they need to reconsider their ideas, generate insights and

integrate various approaches to come up with a solution.

TABLE IV

Comparison of the Level of Creative Thinking Skills in the Control and Experimental Groups After the Utilization of Localized PLP in Mathematics 9

Program	Objective	Strategy/ Activity	Time Frame	Persons Involved	Proposed Budget	Expected Output
Collaborative Learning Sessions for Mathematics Teachers	Provide appropriate technical assistance to Mathematics teachers on the use of the localized professional learning package (PLP) in Mathematics 9	Group activities, discussions, and brainstorming sessions such as training, FGD, and LAC sessions.	February-March, 2025	School Head, Head Teacher, Master Teacher,	Php 10,000	Increased teachers' confidence and mastery on the use of localized PLP in Mathematics 9
School-wide Localized Mathematics Enrichment Workshop	Improve students' creative thinking skills using localized PLP Mathematics 9	Hands-on mathematics workshop for all Grade 9 students using the developed PLP	April-May 2025	School Head, Head Teacher, Master Teacher, Mathematics teachers	Php 5,000	Improved students' creative thinking skills in Mathematics 9
District-wide Writeshop on Localized Materials in Mathematics 9 (3rd and 4th Quarters)	Develop localized materials in Mathematics 9 for the 3rd and 4th quarters competencies	Writeshop/ Training Workshop for Mathematics teachers of Grade 9	June -July 2025	School Head, Head Teacher, Master Teacher, Mathematics teachers	Php 20,000	Complete localized materials for Mathematics 9 for the 3rd and 4th quarters
Dissemination of Results Findings on Creative Thinking Skills in Mathematics 9	Present research findings on creative thinking skills in Mathematics 9	Research Symposium, Conference, Research Publication	March-December 2025	Researcher	Php 10,000	Certificate of Attendance Certificate of Publication

* Using 0.05 level of significance

Table IV presents the comparison between the level of creative thinking skills of the respondents in the control and experimental groups after the utilization of the localized PLP in Mathematics 9.

It was observed that there was a significant difference between the respondents' level of creative thinking skills between the control and experimental groups after the utilization of localized professional learning package in Mathematics 9. This suggests that the localized PLP significantly enhanced the level of creative thinking skills of the respondents in the overall. This coincides with the findings from other studies that revealed how contextualized and localized materials can improve creative thinking skills of students. According to Zhang et. al (2019), students who were exposed to culturally relevant and context-specific materials showed significant improvements in originality and flexibility. Furthermore, according to Chan and Lee (2020), the use of open-ended problem-solving tasks in the classroom led to significant improvements in students' creative thinking skills, particularly in the areas of flexibility and fluency.

TABLE V

Work Plan of the Proposed Programs for the Enhancement of Creative Thinking Skills in Mathematics 9

Creative Thinking Skills	Wilcoxon Value	p-value	Remark*
Originality	-5.599	0.00	Significant
Flexibility	-5.117	0.00	Significant
Elaboration	-5.107	0.00	Significant
Fluency	-5.430	0.00	Significant
Overall	-5.478	0.00	Significant

Table V presents the workplan for the proposed programs to enhance creative thinking skills in Mathematics 9 through continuous utilization of the developed localized professional learning package in Mathematics 9 for students and teachers. Activities include training and workshops for students and mathematics teachers of Grade 9 to be conducted in the next school year.

Discussion

Based on the results of the study, it was observed that both the respondents in the control and experimental groups are in a low level of creative thinking skills in terms of originality, flexibility, elaboration and fluency before the utilization of a localized professional learning package in Mathematics 9.

According to Silver (2015), the traditional emphasis on procedural fluency rather than conceptual comprehension causes pupils to frequently have poor baseline levels of creative thinking in mathematics. Additionally, this is a

product of existing ways of teaching mathematics, which do not inspire students to think creatively and instead emphasize rote learning and established procedures (Leikin & Levav-Waynberg, 2020). Because of this, students often have trouble coming up with unique ideas, adjusting to different viewpoints, and giving thorough explanations (Leikin & Levav-Waynberg, 2020).

After the utilization of the localized professional learning package in Mathematics 9, those in the experimental group increased at the average level while those in the control group remain in the low level of creative thinking skills in terms originality, flexibility, elaboration and fluency. According to Tan (2018), localized learning materials enhance creative thinking skills by making content more relevant and engaging which promote higher-order thinking by bridging the gap between theoretical concepts and real-world applications, thus a significant increase in terms of originality, flexibility, elaboration and fluency.

Also, there is a significant difference in the level of creative thinking skills of the respondents before and after the utilization of localized professional learning package in Mathematics 9 in the experimental group in terms of originality, flexibility, elaboration and fluency. Runco (2015) pointed out that creativity has distinct dimensions—originality, flexibility, elaboration, and fluency—and different instructional strategies may impact these dimensions to varying degrees. This is further supported by the study of Akyeampong et. al (2019) which stated that contextualized instruction improves students' ability to relate mathematical concepts to real-world scenarios, enhancing originality flexibility, elaboration and fluency.

Furthermore, there is a significant difference in creative thinking skills of the respondents between groups after the utilization of localized professional learning package in Mathematics 9 in terms of originality, flexibility, elaboration and fluency. In this study, the significant improvements observed in the experimental group after the experiment reflect the effectiveness of localized PLP in enhancing the creative thinking skills of learners. This is consistent with the findings from other studies that have shown how contextualized instruction can improve cognitive skills and encourage students to think creatively (Miller & Blackwell, 2017). Also, this coincides with the study of Zhang et. al (2019) which revealed that students who were exposed to culturally relevant and context-specific materials showed significant improvements in originality and flexibility. Furthermore, according to Chan and Lee (2020), the use of open-ended problem-solving tasks in the classroom led to significant improvements in students' creative thinking skills, particularly in the areas of flexibility and fluency.

Programs and activities which will integrate the localized PLP in Mathematics in teaching and learning were proposed to enhance the level of creative thinking skills of students in Mathematics 9 such as seminar, trainings, and writeshops.

It is further suggested that the integration and development of the localized professional learning package in Mathematics be implemented not only in Grade 9 but also in other grade levels in secondary schools.

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