

Assessment on the Use of the 2c2ir Approaches in Teaching Junior High School Mathematics: Basis for Teacher's Training Program

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ABSTRACT: This study aims to measure the extent of the utilization of the 2C2IR pedagogical approach in teaching mathematics. This study will also examine the respondents' level of performance in mathematics in terms of assessment, written works, and performance tasks to identify if there is a significant relationship between the extent of the utilization of the 2C2IR pedagogical approach and the respondents' level of performance in mathematics.

Based on the conclusions, future research may replicate this study using different schools with an increased number of respondents. Future researchers can make a training program as an output of the research based on the answers of the respondents. Future researchers validate the training program. Future researchers could use this study as their guide or reference for follow-up and future studies.

KEYWORDS: Pedagogical Approaches, teaching-learning method, assessment, written works, performance tasks

I. INTRODUCTION

An understanding of the meaning and significance of pedagogical approaches enables individuals to generate awareness in terms of teaching strategies. Instructors at all levels of education need to research pedagogical approaches. When they conduct research through various sources such as technologies, books, and other reading materials, they can enhance their knowledge in terms of different types of approaches that are needed to promote student learning. Over time, it is necessary to bring about improvements in pedagogical approaches. These approaches render a significant contribution in leading to the up gradation of the teaching and learning methods. They are different from each other. The instructors need to make use of them by the grade levels, subjects and concepts, academic goals, and the overall system of education. Furthermore, they need to ensure that they prove to be beneficial to the students and the overall system of education. Therefore, it is of utmost significance to research pedagogical approaches, especially, when the individuals are employed in teaching positions. The pedagogical approaches are commonly understood as the approaches to teaching. It is referred to the theory and practice of learning and how this process has an impact and is influenced by the social, cultural, economic and the political factors of the students. When the pedagogical approaches are to be formulated or put into practice, there are number of factors that the instructors need to be aware regarding the students. Some of these include, their academic goals and objectives, age groups, grade levels, subjects, and concepts, learning abilities, interactive abilities, personality traits, standards of education, laws and rules of the educational institutions and other needs and requirements of the students. Pedagogical approaches impart knowledge and understanding to the individuals in terms of how knowledge and skills are imparted in the educational framework. Major emphasis is put upon the interactions that takes place in learning. The instructors and the students will not be able to carry out their job duties well and achieve the desired goals without enriching their interactive abilities. Therefore, it is understood, up-gradation of socialization and interactive abilities are regarded as indispensable.

Learning is dependent upon the pedagogical approaches. If students need to augment their learning and understanding, they need to be well-aware in terms of pedagogical approaches. After generating awareness in terms of them, they need to augment their knowledge in terms of ways of putting into practice these approaches in an effectual manner. When these approaches will be implemented well, only then the students will be able to learn and do well. In the present existence, the technologies and internet are contributing a significant part in making provision of knowledge to the instructors and students in terms of pedagogical approaches. Furthermore, they can generate information in terms of measures to up-grade pedagogical approaches. The members of the educational institutions at all levels, such as heads, directors, administrators, professors, instructors, and students need to exchange ideas and viewpoints and be well-equipped in terms of measures, strategies and approaches needed to put into practice

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as well as bring about improvements in pedagogical approaches. Therefore, it can be stated, bringing about improvements in pedagogical approaches are regarded as efficacious and worthwhile in leading to up-gradation of the overall system of education. The primary aim of all the educational institutions is to ensure the students learn and understand the subjects and concepts. Furthermore, the educators make efforts to facilitate the students to emerge into good human beings and productive citizens of the country. When the students acquire education, they need to be well-aware of making use of their education in promoting well-being of themselves and their families and communities. If students need to augment their learning and understanding, they need to be well-aware in terms of pedagogical approaches. After generating awareness in terms of them, they need to augment their knowledge in terms of ways of putting into practice these approaches in an efficient and useful manner. When these approaches will be implemented in a well-ordered manner, only then the students will be able to learn and do well in their academic tasks and activities. Therefore, the pedagogical approaches are regarded as important and useful in enabling the instructors and the students to do well in their jobs, duties, and activities.

The purpose of this study to measure the extent of the utilization of the 2C2IR pedagogical approach in teaching mathematics. The approaches involved are constructivist, inquiry-based, reflective, collaborative, and integrative. This study will also examine the respondents' level of performance in mathematics terms of assessment, written works, and performance tasks. Then, this study will identify if there is a significant relationship between the extent of the utilization of the 2C2IR pedagogical approach and the respondents' level of performance in mathematics. The results of this study will be a basis for a training program that may be developed for application of 2C2IR pedagogical approach in teaching mathematics.

II. METHOD

The study employed a descriptive quantitative correlational strategy. According to Creswell (2005), descriptive quantitative design aims to characterize existing events, establish correlations between variables, and explain causal linkages between variables.

This research was entirely devoted to describing and interpreting the observed phenomena. The study's particular objective, guided by the characteristics of the quantitative design, was to ascertain the practices and obstacles associated with technology integration in elementary school curriculum implementation. The evaluation of literature bolstered the foundation for the dependent and independent variables, which are often represented by quantitative data.

III. RESULT AND DISCUSSION

Mean and Standard Deviation shall be used to analyze and interpret the perceptions of the respondents on the utilization of the 2C2IR pedagogical approach in teaching mathematics. Mean and Standard Deviation shall be used to analyze and interpret the perceptions of the respondents and rate the level of performance in mathematics.

One-way ANOVA shall be used in determining the significant differences among the perceptions of the respondents when they are grouped according to their profile.

IV. TABLE

Subproblem No. 1. Extent Of Utilization Of The 2c2ir Pedagogical Approaches In Teaching Mathematics The Following Tables Present The Utilization Of The 2c2ir Pedagogical Approaches.

Table 1. Extent of Utilization of Pedagogical Approaches in Terms of Constructivist Approach

Indicators	Mean	Descriptive Value
Thinking Skills	4.18	Great Extent
Activity Based	4.13	Great Extent
Direct Instruction	4.13	Great Extent
Overall	4.15	Great Extent

SCALE: 4.50-5.00 VERY GREAT EXTENT, 3.50-4.49 GREAT EXTENT, 2.50-3.49 MODERATE EXTENT 2.00-2.49, LEAST EXTENT, 1.00-1.99 NO EXTENT AT ALL

Table 1 presents the weighted mean distribution of status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of constructivist approach.

The data reveals that Mathematics teachers in Secondary were using thinking skills in utilizing pedagogical approach since this indicator obtained the highest weighted mean of 4.18 and descriptive rating of great extent. This connotes that thinking skills are essential for using and applying mathematics. It is also efficient in creating problem solving, communication and reasoning. However, using activity based and direct instruction are greatly extent also for Mathematics teachers where both of them obtained a weighted mean of 4.13. Active based and direct instruction are both useful for Mathematics teachers because these constructivist approaches focuses on the hands-on experiment and activities.

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It can be seen in the status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of constructivist approach is great extent and this evidence by the general weighted mean of 4.15. This concluded that constructivist approach is effective in pedagogical approach used by Mathematics teacher.

Table 2. Extent of Utilization of Pedagogical Approaches In Terms of Inquiry Based Approach

Indicators	Mean	Descriptive Value
Cyclic Inquiry Model and Practical Inquiry Model	4.23	Great Extent
Knowledge Building Community Model	4.32	Great Extent
Experiment	4.33	Great Extent
Conclusion	4.32	Great Extent
Discussion/Sharing	4.35	Great Extent
Overall	4.31	Great Extent

Scale: 4.50-5.00 Very Great Extent, 3.50-4.49 Great Extent, 2.50-3.49 Moderate Extent 2.00-2.49, Least Extent, 1.00-1.99 No Extent at All

Table 2 presents the weighted mean distribution of status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of inquiry based approach.

It further shows that Mathematics teacher allows the students to have a discussion or sharing their knowledge under inquiry based approach where it obtained the highest weighted mean of 4.35 and descriptive rating of great extent. On the other hand, the lowest weighted mean which is also have the descriptive rating of great extent with 4.32 as weighted mean stated that Mathematics teachers were using Knowledge Building Community Model and Conclusion.

In general, the status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of inquiry based approach is great extent and this evidence by the general weighted mean of 4.31. It revealed that inquiry based approach requires students to integrate knowledge, skills, and concepts and apply a body of knowledge to solve a real-life problem. It can be used to teach mathematics effectively.

Table 3. Extent of Utilization of Pedagogical Approaches In Terms of Reflective Approach

Indicators	Mean	Descriptive Value
Self-Evaluation	4.18	Great Extent
Self-reflection	4.12	Great Extent
Analyzes Information	4.18	Great Extent
Engenders improvement in teaching	4.17	Great Extent
Overall	4.16	Great Extent

Scale: 4.50-5.00 Very Great Extent, 3.50-4.49 Great Extent, 2.50-3.49 Moderate Extent 2.00-2.49, Least Extent, 1.00-1.99 No Extent at All

Table 3 presents the weighted mean distribution of status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of reflective approach.

Looking at the details in the table, the indicators that obtained the highest weighted mean of 4.18 pertains to the first and third indicators that stated for self-evaluation and analyses information. In teaching Mathematics, it is efficient to use self-evaluation and analysis information where the learners assess and examine themselves if they really understand the discussion. Furthermore, the indicator obtained the lowest weighted mean pertains to the self-reflection under reflective approach with descriptive rating of great extent.

Reflective approach is a regularly used term in mathematics education that often goes undefined. It refers to a contemplative review of mathematics learning and/or teaching in order to approve, evaluate, or improve practice. where it can be seen in the table that the status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of reflective approach is great extent and this evidenced by the general weighted mean of 4.16.

Table 4. Extent of Utilization of Pedagogical Approaches In Terms of Collaborative Approach

Indicators	Mean	Descriptive Value
Think Pair	4.21	Great Extent
Jigsaw Method	4.23	Great Extent
Integrative process Approach	4.23	Great Extent
Peer Teaching	4.21	Great Extent
Overall	4.22	Great Extent

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Scale: 4.50-5.00 Very Great Extent, 3.50-4.49 Great Extent, 2.50-3.49 Moderate Extent 2.00-2.49, Least Extent, 1.00-1.99 No Extent at All

Table 4 presents the weighted mean distribution of status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of collaborative approach.

It can be seen in the table that status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of collaborative approach is great extent. This is evidenced by the general weighted mean of 4.22. The indicators that obtained the highest weighted mean pertains to the jigsaw method and integrative process approach. These indicators obtained a weighted mean of 4.23 and this means that Jigsaw method and integrative process approach can be customized for use in a math lesson by the teacher as a collaborative or group activity. It can help students improve their understanding by summarizing or incorporating their topics in other areas. Moreover, the indicators obtaining the lowest weighted mean of 4.21 pertains to the think-pair-share and peer teaching and having descriptive rating of great extent.

Table 5. Extent of Utilization of Pedagogical Approaches In Terms of Integrative Approach

Indicators	Mean	Descriptive Value
Scaffold Knowledge Integration	4.21	Great Extent
Content-Based Instruction	4.23	Great Extent
Thematic teaching and Learning by Design	4.23	Great Extent
Overall	4.22	Great Extent

Scale: 4.50-5.00 Very Great Extent, 3.50-4.49 Great Extent, 2.50-3.49 Moderate Extent 2.00-2.49, Least Extent, 1.00-1.99 No Extent at All

Table 5 presents the weighted mean distribution of status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of integrative approach.

Examining the data in the table, the indicator obtaining the highest weighted mean of 4.23 refers to the second and third indicators which Mathematics teacher used content-based instruction and thematic teaching and learning by design. It revealed that Mathematics teacher find both approach as effective in teaching mathematics. It has been praised for relating mathematics to real-life situations. Moreover, the indicator Scaffold Knowledge Integration obtained the lowest weighted mean of 3.40 but having a descriptive rating of great extent.

Based on the table, the status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of integrative approach is great extent and this evidence by the general weighted mean of 4.22.

Subproblem No. 2. On the Level of performance of Learners in Mathematics

The following tables present the level of performance of learners in mathematics as assessed by the respondents.

Table 6. Extent of Performance of Learners in Mathematics In Terms of Assessment

Indicators	Mean	Descriptive Value
Diagnostic	4.18	Great Extent
Formative	4.23	Great Extent
Interim	4.12	Great Extent
Summative	4.18	Great Extent
Overall	4.18	Great Extent

Scale: 4.50-5.00 Very Great Extent, 3.50-4.49 Great Extent, 2.50-3.49 Moderate Extent 2.00-2.49, Least Extent, 1.00-1.99 No Extent at All

Table 6 presents the weighted mean distribution of the level of performance of Learners in Mathematics in terms of assessment.

It can be seen in the table that the level of performance of Learners in Mathematics in terms of assessment is great extent. This is evidenced by the general weighted mean of 4.18. This connotes that assessment provide the knowledge, information and skills that learners need to be learned. It measures how well a student can apply or use what he or she knows, often in real-world situations. The indicator that obtained the highest weighted mean pertains asking formative assessment. This indicator obtained a weighted mean of 4.23 and it concluded that formative assessment is perceived as useful in assessing the performance of the learners in Mathematics. Moreover, the statement obtaining the lowest weighted mean of 3.87 pertains to practicing English with other students and having descriptive rating of high.

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Table 7. Extent of Performance of Learners in Mathematics In Terms of Written Works

Indicators	Mean	Descriptive Value
Feedback and reflection.	4.23	Great Extent
Student self-assessments.	4.22	Great Extent
Student portfolios.	4.25	Great Extent
Teacher moderated student assessment tasks	4.18	Great Extent
Student self-reflections, interests and surveys.	4.29	Great Extent
Overall	4.23	Great Extent

Scale: 4.50-5.00 Very Great Extent, 3.50-4.49 Great Extent, 2.50-3.49 Moderate Extent 2.00-2.49, Least Extent, 1.00-1.99 No Extent at All

Table 7 presents the weighted mean distribution of the level of performance of Learners in Mathematics in terms of written works. It further shows that student self-reflections, interests and surveys are written works to evaluate the performance of the learners in Mathematics where it obtained the highest weighted mean of 4.29 and descriptive rating of great extent. On the other hand, the lowest weighted mean which is also have the descriptive rating of great extent with 4.18 as weighted mean stated that teacher moderated student assessment tasks.

In general, the level of performance of Learners in Mathematics in terms of written works is great extent and this evidence by the general weighted mean of 4.23. This evident concluded that written works in Mathematics will help students in many areas, including awareness, making connections with previously and weighing their performance.

Table 8. Extent of Performance of Learners in Mathematics In Terms of Performance Tasks

Indicators	Mean	Descriptive Value
Presentations	4.23	Great Extent
Portfolios	4.18	Great Extent
Projects	4.12	Great Extent
Exhibits and Fairs	4.15	Great Extent
Debates	4.19	Great Extent
Overall	4.17	Great Extent

Scale: 4.50-5.00 Very Great Extent, 3.50-4.49 Great Extent, 2.50-3.49 Moderate Extent 2.00-2.49, Least Extent, 1.00-1.99 No Extent at All

Table 8 presents the weighted mean distribution of the level of performance of Learners in Mathematics in terms of Performance Tasks.

In performance tasks, we can assess the performance of the learners in Mathematics through presentation where it obtained the highest weighted mean of 4.23 and descriptive rating of great extent. A presentation as performance task is any learning activity or assessment that asks students to perform to demonstrate their knowledge, understanding and proficiency. However, the indicator obtained the lowest weighted mean of 4.12 and having a descriptive rating of great extent goes to project.

This concluded that the level of performance of Learners in Mathematics in terms of Performance Tasks is great extent and this evidence by the general weighted mean of 3.17. This means Mathematics performance tasks require students to integrate skills across multiple domains, clusters, and standards. It demonstrates the learner's ability to use their math knowledge to solve real-world problems.

Subproblem No. 3. On the significant relationship between the extent of utilization of 2C2IR pedagogical approaches and the level of performance in mathematics.

The table below presents the relationship between the extent of the utilization of the 2C2IR and the level of performance of learners in mathematics.

Table 9. Significant Relationship Between the level of difficulty encountered by the teachers in teaching word problems and the extent of the numeracy skills of learners

Level of Performance	Utilization of 2C2IR				
	Constructivist	Collaborative	Inquiry-based	Integrative	Reflective
Assessment	0.46*	0.55*	0.76*	0.75*	0.46*
Written Works	0.45*	0.61*	0.75*	0.71*	0.55*
Performance Task	0.45*	0.55*	0.79*	0.75*	0.49*

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$N= 181$, r - value is significant at * $p < .01$, Zero correlation (0), Low correlation ($0 - \pm 0.25$), Moderate correlation ($\pm 0.25 - \pm 0.75$), High correlation ($\pm 0.75 - \pm 1$), Perfect correlation (± 1)

As gleaned from the table above, the relationship between the extent of utilization of 2C2IR pedagogical approaches and the level of learner's performance in mathematics shows a moderate and high correlation with a value between 0.25 to 0.75 and 0.75 to 1 respectively.

Moreover, the table indicates that the obtained R-value for the variable for extent of utilization of 2C2IR pedagogical approaches which yield a lower value than the critical level of p which is significant at $p = 0.01$. This can be attributed that the extent of utilization of 2C2IR pedagogical approaches and the level of learner's performance in mathematics is not significantly related and independent of each other.

While it can be clearly seen that all the computed R-values with the computed p value lesser than the critical value of $p = 0.01$. Therefore, we can say that there was no significant relationship between the extent of utilization of 2C2IR pedagogical approaches and the level of learner's performance in mathematics. This means that no significant relationship exists between those variables.

V. CONCLUSIONS

Based on the findings of the study, the following conclusions are drawn:

1.1. It can be seen in the status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of constructivist approach is great extent and this evidence by the general weighted mean of 4.15. This concluded that constructivist approach is effective in pedagogical approach used by Mathematics teacher.

1.2. The status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of inquiry based approach is great extent and this evidence by the general weighted mean of 4.31. It revealed that inquiry based approach requires students to integrate knowledge, skills, and concepts and apply a body of knowledge to solve a real-life problem. It can be used to teach mathematics effectively.

1.3. The Reflective approach is a regularly used term in mathematics education that often goes undefined. It refers to a contemplative review of mathematics learning and/or teaching in order to approve, evaluate, or improve practice where it can be seen in the table that the status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of reflective approach is great extent and this evidence by the general weighted mean of 4.16.

1.4. It can be seen in the table that status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of collaborative approach is great extent. This is evidenced by the general weighted mean of 4.22.

1.5. The status of the utilization of the 2C2IR pedagogical approaches in teaching Mathematics in terms of integrative approach is great extent and this evidence by the general weighted mean of 4.22.

2.1. The the table that the level of performance of Learners in Mathematics in terms of assessment is great extent. This is evidenced by the general weighted mean of 4.18. This connotes that assessment provide the knowledge, information and skills that learners need to be learned. It measures how well a student can apply or use what he or she knows, often in real-world situations.

2.2. The level of performance of Learners in Mathematics in terms of written works is great extent and this evidence by the general weighted mean of 4.23. This evident concluded that written works in Mathematics will help students in many areas, including awareness, making connections with previously and weighing their performance.

2.3. The level of performance of Learners in Mathematics in terms of Performance Tasks is great extent and this evidence by the general weighted mean of 3.17. This means Mathematics performance tasks require students to integrate skills across multiple domains, clusters, and standards. It demonstrates the learner's ability to use their math knowledge to solve real-world problems.

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