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HEURISTIC APPROACH ON THE LEARNERS' READING COMPREHENSION SKILLS AND MATHEMATICAL ABILITIES

Airamae Rebancos Palero
Laguna State Polytechnic University Sta. Cruz Laguna 4009 Philippines

ABSTRACT

The main objective of this study is to explore the heuristic approach on the learners' reading comprehension skills and mathematical abilities. Specifically, it determines the level of utilization of heuristic approach, reading comprehension skills, and mathematical abilities of the learners. Also, it regulates the effect of utilization of heuristic approach on learners' reading comprehension skills and mathematical abilities.

The study's research design is descriptive method. The respondents for this study are sixty-three (63) Grade 6 students from Sto. Angel Norte Elementary School in the school year 2023-2024. The primary tool for data collection is a survey questionnaire developed by the researcher, Additionally, an adopted test question from Phil-IRI and a teacher-created test is utilized to assess the students' reading comprehension and mathematical abilities.

Findings revealed a high level in the the utilization of heuristic approach across different level. Likewise, the result of learners' reading comprehension in terms of inferential comprehension and critical comprehension is proficient while literal comprehension was marked approaching proficient. Results on the level of learners' mathematical abilities, demonstrated expertise in numeracy skills obtaining approaching proficient while critical thinking obtain proficient, and problem-solving obtaining approaching proficient. Utilization of heuristics approach has no significant effect to learners' reading comprehension skills and it also revealed that there is no significant effect in the utilization of heuristic approach to learners' mathematical abilities.

There is no effect on the utilization of heuristic approach to the learners' reading comprehension skills and mathematical abilities thus both the hypothesis is accepted. Based on the findings of this study, it is evident that further research is necessary to explore the complexities of the relationship between heuristic approaches and academic outcomes, informing instructional practices and curriculum development in both literacy and mathematics education.

Based on the results, considering how well heuristic techniques are thought to encourage creativity, innovation, and critical thinking, educational institutions may think about incorporating heuristic methodology into their curriculum design. Teachers may get training from these programs on how to use heuristic techniques to their education. Educational institutions may cultivate a feedback culture in their learning settings because of the significance of feedback in bolstering the usefulness of heuristic approach in problem-solving. Future research and assessment may be carried out in order to expand on the results of this study and improve our comprehension of the connection between heuristic techniques and academic achievements

KEYWORDS: *heuristic approach; reading comprehension skills; mathematical abilities*

1. INTRODUCTION

The heuristic method, which emphasizes the development of independent thinking and problem-solving abilities, is a break from routine learning. It is crucial to comprehend the wider difficulties of heuristic learning as educational institutions throughout the world struggle to prepare pupils for a world that is becoming more complicated.

Moving beyond traditional pedagogical models, this study examines the systemic impact of incorporating heuristic approaches in educational curricula. It explores how educational policies and frameworks can be adapted to accommodate heuristic learning strategies, considering the diverse needs of learners. By mapping the macro development, this research contributes to the ongoing discourse on educational reform and offers insights into the potential shifts in teaching paradigms to enhance overall cognitive development.

A child's capacity to succeed in each math lesson may differ based on his unique strengths and weaknesses (Hodnett, 2014). Hence, to address problems, one must exercise critical thinking, never give up, and come up with or apply a new strategy to take action right away. Learners' perceptions and problem-solving abilities vary. Finding efficient teaching methods has always been a goal in the field of education. A learning method that is becoming more and more popular is the heuristic approach, which pushes students to solve problems on their own by applying critical thinking and problem- solving skills.

From a broad viewpoint, this study looks at general patterns and their consequences down to the individual cognitive processes that are involved in mathematical reasoning and reading comprehension.

When the research zooms in on the average level, it takes on a more focused emphasis on the relationship between the heuristic approach and arithmetic and reading comprehension skills. This intermediate level of analysis explores how heuristic-based interventions are designed and put into practice

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within the current educational frameworks. In the framework of mathematics and reading comprehension skills, it explores the dynamics of heuristic learning and how these abilities interact and support one another. Additionally, the average development examines how teachers support heuristic learning.

The research aims to comprehend the possible opportunities and problems in utilization of heuristic approach into the learners' reading comprehension skills and mathematical abilities. It assesses how well heuristic tactics are incorporated into lesson plans while considering how flexible these methods are in various learning environments. The goal of this level of analysis is to close the knowledge gap that exists between general educational policies and the actual application of heuristic approach in mathematics.

1.1 Statement of the Problem

Specifically, the study sought to address the following specific questions:

1. What is the level of utilization Heuristic Approach in terms of:
   - 1.1 Problem Complexity;
   - 1.2 Task Type;
   - 1.3 Available Information;
   - 1.4 Task Familiarity; and
   - 1.5 Feedback?
2. What is the level of Learners' Reading Comprehension Skills in terms of:
   - 2.1 Literal Comprehension;
   - 2.2 Inferential Comprehension; and
   - 2.3 Critical Comprehension?
3. What is the level of Learners' Mathematical Abilities in terms of:
   - 3.1 Critical Thinking;
   - 3.2 Numeracy Skills; and
   - 3.3 Problem Solving?
4. Is there a significant effect on the utilization of Heuristic Approach on the learners' reading comprehension skills?
5. Is there a significant effect on the utilization of Heuristic Approach on the learners' mathematical abilities?

2. METHODOLOGY

The research design used in this study was a descriptive method which is used to identify the effects of utilization of Heuristic Approach on learners reading comprehension skills and mathematical abilities.

According to Sirisilla (2023), descriptive research design is a powerful tool used by scientist and researchers to gather information about a particular group. This method includes the gathering of data regarding current conditions and ascertaining what is typical or normal under specific conditions. The researcher used questionnaire as the instrument in gathering data.

3. RESULTS AND DISCUSSION

This chapter deals with the presentation, analysis, and interpretation of the data gathered used to determine the significant effect in the utilization of the Heuristic Approach on learners' reading comprehension skills and mathematical abilities.

Level of utilization Heuristic Approach

In this study, the level of utilization of the Heuristic Approach refers to Problem Complexity, Task Type, Available Information, Task Familiarity, and Feedback.

The level of utilization of the Heuristic Approach in the following tables reveals the statement, mean, standard deviation, remarks, and verbal interpretation.

The data provided in Table 1 shows how effective heuristic approaches are thought to be when solving issues of different levels of complexity. The mean scores across statements ranged from 3.57 to 4.06, indicating that participants generally agreed on the usefulness of heuristics for solving difficult situations. This implies a general propensity to use heuristic techniques when confronted with complex problem situations.

Furthermore, the comparatively low standard deviations suggest that respondents generally agree that heuristics are useful in a variety of difficult circumstances.

Table 1 shows the level of utilization Heuristic Approach in terms of Problem Complexity.

Table 1. Level of utilization Heuristic Approach in terms of Problem Complexity

STATEMENT	MEAN	SD	REMARKS
I am more likely to use heuristics to solve more complex problems.	4.06	0.86	Agree
I find myself relying on heuristics to make progress when dealing with difficult problems.	3.68	0.69	Agree
I find heuristic more helpful for solving complex problems than for solving simple problems.	4.00	0.97	Agree
I am more likely to use heuristics when I am unsure of how to solve a problem.	3.73	0.97	Agree
In attempting complex problems, heuristics help me break them down into manageable pieces.	3.57	0.98	Agree
Weighted Mean			*3.81*
SD			*0.91*
Verbal Interpretation			*High*

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The data presented in Table 2 depicts the perceived level of effectiveness in utilization heuristic approaches across different types of tasks. Participants generally agreed on the suitability of heuristics for specific problem-solving contexts, as evidenced by mean scores ranging from 3.60 to 4.06 across various statements. This suggests a consensus among respondents regarding the applicability of heuristic strategies in tasks that demand creativity, innovation, analytical thinking, and logical reasoning.

Table 2 shows the level of utilization Heuristic Approach in terms of Task Type.

Table 2. Level of Utilization of Heuristic Approach in terms of Task Type

STATEMENT	MEAN	SD	REMARKS
Heuristics are better suited in some types of problems than other approach.	3.84	0.94	Agree
Heuristics provide a structured approach in analyzing information and identifying patterns	3.73	0.75	Agree
Heuristics are more effective for solving analytical tasks that require logical reasoning and problem-solving skills	3.94	0.84	Agree
Heuristics are more likely to use when working on task that requires creativity.	4.06	0.94	Agree
Heuristics are more likely to use when working on a task that involves innovation and out-of-the-box thinking	3.60	1.01	Agree
Overall	**3.83**	**0.89**	**Effective**
Weighted Mean			*3.83*
SD			*0.89*
Verbal Interpretation			*High*

Moreovr, the relatively low standard deviations indicate a consistent agreement among participants regarding the utility of heuristics across different task types. This consistency suggests that individuals perceive heuristic approaches as valuable tools for navigating diverse problem-solving scenarios, thereby highlighting their versatility and effectiveness in addressing a wide range of tasks. Overall, the data supports the notion that heuristic approaches are an effective means of problem-solving across various task types, corroborating both theoretical frameworks and empirical evidence in the field of decision sciences.

Table 3 shows the level of utilization of the Heuristic Approach in terms of Available Information.

Table 3. Level of utilization of Heuristic Approach in terms of Available Information

STATEMENT	MEAN	SD	REMARKS
The amount of information available to me affects my use of heuristics.	3.75	0.95	Agree
When I have more information to work with, I am less likely to rely on heuristics.	3.59	0.94	Agree
Heuristics allow me to make informed decisions even when faced with incomplete or contradictory information.	3.90	0.98	Agree
With limited information, heuristics allow me to make informed decisions based on available clues and intuition.	3.97	0.86	Agree
Even when I don't remember the exact formula, using a heuristic approach based on the available information helps me make progress on solving a math problem.	4.05	0.92	Agree
Overall	**3.85**	**0.93**	**Effective**
Weighted Mean		*3.85*	
SD		*0.94*	
Verbal Interpretation		*High*	

This illustrates the perceived efficacy of utilization heuristic approaches in problem-solving tasks, contingent upon the amount and nature of available information. Participants generally agreed on the influence of available information on their propensity to employ heuristics, as indicated by mean scores ranging from 3.59 to 4.05 across different statements. This suggests a consensus among respondents regarding the adaptability of heuristic strategies in response to varying levels of informational availability.

This illustrates the perceived effectiveness of employing heuristic approaches in problem-solving tasks, contingent upon the familiarity with the task at hand. Participants generally agreed on the influence of task familiarity on their propensity to utilize heuristics, as indicated by mean scores ranging from 3.81 to 4.13 across different statements. This suggests a consensus among respondents regarding the adaptability of heuristic strategies in response to the familiarity level of the task.

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Table 4 shows the level of utilization of the Heuristic Approach in terms of Task Familiarity.

Table 4. Level of utilization Heuristic Approach in terms of Task Familiarity

Statement	Mean	SD	Remarks
My familiarity with a task affects my use of heuristics.	3.81	0.86	Agree
For tasks that involve pattern recognition decision-making, heuristics can be particularly helpful.	4.13	0.83	Agree
In situations where time is important, heuristics can offer a shortcut for solving familiar tasks without losing effectiveness.	3.97	0.82	Agree
I find heuristics to be particularly useful in getting started and making progress.	3.97	0.95	Agree
I rely on heuristics more when I am learning a new task.	3.81	1.08	Agree
Weighted Mean			*3.94*
SD			*0.91*
Verbal Interpretation			*High*

Moreover, the relatively low standard deviations imply a consistent agreement among participants regarding the impact of task familiarity on heuristic utilization. This consistency suggests that individuals perceive heuristic approaches as valuable tools for initiating and making progress in problem-solving tasks, particularly in scenarios where time is of the essence or when faced with tasks requiring pattern recognition.

Table 5 shows the level of utilization of the Heuristic Approach in terms of Feedback.

Table 5. Level of utilization Heuristic Approach in terms of Feedback

STATEMENT	MEAN	SD	REMARKS
I feel confident using this approach to solve problems on my own.	3.97	0.82	Agree
Compared to other methods, this approach will make solving math problems easier.	3.73	0.90	Agree
I believe I can use this approach to solve new and more challenging math problems.	3.90	0.89	Agree
I would recommend this approach to other students who are struggling with math.	3.97	1.02	Agree
I found this approach to be helpful way to learn math.	3.68	1.00	Agree
Weighted Mean			*3.85*
SD			*0.93*
Verbal Interpretation			*High*

The data in Table 5 elucidates the perceived effectiveness of employing heuristic approaches in problem-solving tasks, particularly concerning the presence and nature of feedback. Participants generally agreed on the impact of feedback on their confidence and efficacy in utilization heuristic strategies, as indicated by mean scores ranging from 3.68 to 3.97 across different statements. This suggests a consensus among respondents regarding the importance of feedback in reinforcing the utility of heuristic approaches in problem-solving.

Moreover, the relatively low standard deviations imply a consistent agreement among participants regarding the impact of feedback on their perception of the effectiveness of heuristic approaches. This consistency suggests that individuals perceive feedback as a crucial factor in shaping their attitudes and beliefs towards heuristic problem-solving methods.

Level of Learners' Reading Comprehension Skills

In this study, the level of Learners' Reading Comprehension Skills refers to Literal Comprehension, Inferential comprehension, and Critical Comprehension.

The following table reveals the score, frequency, percentage, mean, standard deviation, and Interpretation.

The data in Table 6 indicates a proficient level of reading comprehension skills among learners, particularly in terms of literal comprehension. With the mean score of 3.70 and most learners achieving scores in the "Very Satisfactory" to "Outstanding" range, it suggests a strong ability to understand explicit information from texts.

Table 6 shows the level of Learners' Reading Comprehension Skills in terms of Literal Comprehension.

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Table 6. Level of Learners' Reading comprehension Skills in terms of Literal Comprehension

SCORE	FREQUENCY (f)	PERCENTAGE (%)	REMARKS
5	17	27%	Outstanding
4	24	38%	Very Satisfactory
3	12	19%	Satisfactory
2	6	10%	Fairly Satisfactory
1	4	6%	Did Not Meet Expectation
	N - 63	**100%**	
Mean			*3.70*
SD			*1.15*
Verbal Interpretation			Proficient

Overall, the data underscores the importance of fostering reading comprehension skills in educational settings to ensure students' ability to effectively engage with and extract meaning from various texts, contributing to their overall academic development and success.

The data presented in Table 7 indicates learners' reading comprehension skills, specifically focusing on inferential comprehension. Most learners fall within the "Satisfactory" and "Very Satisfactory" categories, with 44% achieving a score of 5-6 (Satisfactory) and 27% scoring 7-8 (Very Satisfactory). However, no learners attained the highest score range (9-10), while only a small percentage (3%) fell into the "Did Not Meet Expectation" category, indicating a generally positive outcome. The mean score of 5.43 suggests that learners are approaching proficiency in inferential comprehension, though not yet at the level of "Outstanding" performance.

Table 7 shows the level of Learners' Reading comprehension Skills in terms of Inferential Comprehension.

Table 7. Level of Learners' Reading Comprehension Skills in terms of Inferential Comprehension

SCORE	FREQUENCY (f)	PERCENTAGE (%)	REMARKS
9-10	0	0%	Outstanding
7-8	17	27%	Very Satisfactory
5-6	28	44%	Satisfactory
3-4	16	25%	Fairly Satisfactory
0-2	2	3%	Did Not Meet Expectation
	N - 63	**100%**	
Mean			*5.43*
SD			*1.49*
Verbal Interpretation			Approaching Proficient

Overall, the data underscores the significance of fostering inferential comprehension skills in educational contexts to enhance students' ability to analyze and interpret textual information effectively, contributing to their overall literacy development and academic success.

Table 8 shows the level of Learners' Reading comprehension Skills in terms of Critical Comprehension.

Table 8. Level of Learners' Reading comprehension Skills in terms of Critical Comprehension

SCORE	FREQUENCY (f)	PERCENTAGE (%)	REMARKS
5	30	48%	Outstanding
4	14	22%	Very Satisfactory
3	11	17%	Satisfactory
2	8	13%	Fairly Satisfactory
1	0	0%	Did Not Meet Expectation
	N - 63	**100%**	
Mean			*4. 13*
SD			*1.18*
Verbal Interpretation			Proficient

Table 8 provides an overview of learners' reading comprehension skills, specifically focusing on critical comprehension. The data indicates a high level of performance among learners, with the majority achieving scores categorized as "Outstanding" (48%) and "Very Satisfactory" (22%). Additionally, 17% of learners attained a "Satisfactory" score,

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while 13% fell into the "Fairly Satisfactory" category. Notably, no learners scored in the "Did Not Meet Expectation" category. The mean score of 4.13 suggests a proficient level of critical comprehension skills among the learner population.

Overall, the data underscores the effectiveness of educational interventions aimed at fostering critical comprehension skills, which are essential for developing students' capacity for independent thought and informed decision-making.

Level of Learners' Mathematical Abilities

In this study, the level of Mathematical Abilities refers to numeracy skills, critical thinking and problem-solving skills.

The level of Mathematical Abilities in the following table reveals the score, frequency, percentage, mean, standard deviation and verbal interpretation.

Table 9 provides an overview of learners' mathematical abilities, specifically focusing on numeracy skills. The data indicates a varied distribution of scores, with the majority of learners falling within the "Very Satisfactory" (51%) and "Satisfactory" (33%) categories.

Additionally, 11% of learners achieved a "Fairly Satisfactory" score, while 5% attained an "Outstanding" score. Notably, no learners scored in the "Did Not Meet Expectation" category. The mean score of 9.48 suggests that learners are approaching proficiency in numeracy skills.

Table 9 shows the level of Learners' Mathematical Abilities in terms of Numeracy Skills

Table 9. Level of Learners' Mathematical Abilities in terms of Numeracy Skills

SCORE	FREQUENCY (f)	PERCENTAGE (%)	REMARKS
13-15	3	5%	Outstanding
10-12	32	51%	Very Satisfactory
7-9	21	33%	Satisfactory
4-6	7	11%	Fairly Satisfactory
1-3	0	0%	Did Not Meet Expectation
	N - 63	**100%**	
Mean			*9.48*
SD			*1.96*
Verbal Interpretation			*Approaching* Proficient

Table 10 outlines the level of learners' mathematical abilities, focusing specifically on critical thinking skills. The data illustrates a positive distribution of scores, with the majority of learners achieving scores categorized as "Very Satisfactory" (56%) and "Satisfactory" (30%). Additionally, 13% of learners attained an "Outstanding" score. Notably, no learners fell into the "Fairly Satisfactory" or "Did Not Meet Expectation" categories. The mean score of 10.30 suggests that learners are proficient in critical thinking skills within the context of mathematics.

Table 10 shows the Level of Learners' mathematical abilities in terms of Critical Thinking.

Table 10. Level of Learners' Mathematical Abilities in terms of Critical Thinking

SCORE	FREQUENCY	PERCENTAGE	DESCRIPTIVE VALUE
13-15	8	13%	Outstanding
10-12	35	56%	Very Satisfactory
7-9	19	30%	Satisfactory
4-6	1	2%	Fairly Satisfactory
1-3	0	0%	Did Not Meet Expectation
	N - 63	**100%**	
Mean			*10.30*
SD			*1.87*
Verbal Interpretation			Proficient

Overall, the data underscores the effectiveness of educational approaches aimed at fostering critical thinking skills in the domain of mathematics, contributing to learners' overall mathematical proficiency and academic success.

Table 11 presents an analysis of learners' mathematical abilities, specifically focusing on problem-solving skills. The data indicates a varied distribution of scores, with the majority of learners achieving scores categorized as "Very Satisfactory" (44%) and "Satisfactory" (43%). Additionally, 6% of learners attained an "Outstanding" score, while 6% achieved a "Fairly Satisfactory" score. Notably, no learners fell into the "Did Not Meet Expectation" category. The mean score of 9.30 suggests that learners are approaching proficiency in problem-solving skills.

Table 11 shows the level of Learners' Mathematical Abilities in terms of Problem Solving.

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Table 11. Level of Learners' Mathematical Abilities in terms of Problem Solving

SCORE	FREQUENCY (f)	PERCENTAGE (%)	REMARKS
13-15	4	6%	Outstanding
10-12	28	44%	Very Satisfactory
7-9	27	43%	Satisfactory
4-6	4	6%	Fairly Satisfactory
1-3	0	0%	Did Not Meet Expectation
	N - 63	**100%**	
Mean			*9.30*
SD			*1.92*
Verbal Interpretation			Approaching Proficient

This interpretation aligns with research emphasizing the significance of problem-solving abilities in mathematics education (Avvisati & Borgonovi 2020). The distribution of scores reflects a positive outcome, indicating that learners have demonstrated competency in applying mathematical concepts to solve a variety of problems.

Overall, the data highlights the effectiveness of educational strategies aimed at fostering problem-solving skills, which are essential for learners' success in both academic and real-world contexts.

Utilization of Heuristic Approach on the Learners' Reading Comprehension Skills

In this study, the significant effect of utilization of heuristic approach in learners' reading comprehension skills was determined.

The following table shows the heuristic approach, learners' reading comprehension skills, t-value, and p-value.

The analysis reveals varying levels of significance in the effect of utilization heuristic approaches on learners' reading comprehension skills across different dimensions. For problem complexity, task type, available information, and feedback, no statistically significant effects were observed on literal, inferential, and critical comprehension skills (all $p > 0.05$).

However, when considering task familiarity, there was a significant effect observed on inferential comprehension skills ($p = 0.017$). Specifically, as learners became more familiar with tasks, their inferential comprehension skills showed improvement.

Table 12 shows the significant effect of utilization of Heuristic Approach on the Learners' Reading Comprehension Skills.

Table 12. Utilization of Heuristic Approach on the Learners' Reading Comprehension skills

Heuristic Approach	Reading Comprehension Skills					
	Literal Comprehension		Inferential Comprehension		Critical Comprehension	
	t-value	p-value	t-value	p-value	t-value	p-value
Problem Complexity	0.87	0.390	0.91	0.367	1.19	0.239
Task Type	0.65	0.516	1.60	0.114	0.50	0.629
Available Information	0.86	0.392	1.71	0.092	0.67	0.504
Task Familiarity	1.38	0.172	2.45	0.017*	0.88	0.384
Feedback	1.10	0.274	1.66	0.101	0.01	0.990

*Note: * $p < .05$.*

This finding suggests that familiarity with tasks may enhance learners' ability to make inferences and draw conclusions from textual material. Interestingly, while there was no statistically significant effect observed for critical comprehension skills in relation to task familiarity, the effect was marginally significant for inferential comprehension skills.

Overall, these results highlight the nuanced relationship between heuristic approaches and reading comprehension skills, suggesting that certain factors, such as task familiarity, may have a more pronounced impact on specific aspects of comprehension.

Utilization of Heuristic Approach on the Learners' Mathematical Abilities

In this study, the significant effect of utilization of heuristic approach in learners' mathematical abilities was determined.

The following table shows the heuristic approach, mathematical abilities, t-value, and p-value.

The analysis suggests no significant effect of utilization heuristic approaches on learners' mathematical abilities across various dimensions. For problem complexity, task type, available information, task familiarity, and feedback, no statistically significant effects were observed on numeracy skills, critical thinking, or problem-solving abilities (all $p > 0.05$).

These findings indicate that the utilization of heuristic approaches does not have a discernible impact on learners' mathematical abilities in the contexts examined.

Table 13 shows the utilization of Heuristic Approach on the Learners' Mathematical Abilities

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Table 13. Utilization of Heuristic Approach on the Learners' Mathematical Abilities

Heuristic Approach	Learners' Mathematical Abilities					
	Numeracy Skills		Critical Thinking		Problem-solving	
	t-value	p-value	t-value	p-value	t-value	p-value
Problem Complexity	0.41	0.686	0.22	0.830	0.35	0.726
Task Type	1.51	0.123	0.02	0.982	0.36	0.718
Available Information	1.28	0.207	0.45	0.658	0.14	0.891
Task Familiarity	1.11	0.272	0.15	0.885	0.82	0.413
Feedback	0.62	0.535	0.75	0.456	0.01	0.992

*Note: * p < .05.*

However, it is important to note that statistical significance does not necessarily imply practical significance, and further research may be needed to explore potential interactions or nuanced effects that were not captured in this analysis.

4. CONCLUSION AND RECOMMENDATIONS

The study aimed to test two hypotheses regarding the effect of utilization heuristic approaches on the learners' reading comprehension skills and mathematical abilities.

It was observed that there is no effect between utilization of heuristic approach to the learners' reading comprehension skills. Through comprehensive research design and statistical analysis, the findings revealed implication relationships between heuristic approaches and academic outcomes. While heuristic approaches were perceived as effective in fostering certain aspects of reading comprehension skills, particularly in terms of inferential and critical comprehension, the statistical analysis did not yield significant results across all dimensions.

Similarly, there is no effect between utilization of heuristic approach and the mathematical abilities of learners. The findings emphasize the utilization of heuristic approaches did not lead to a discernible impact on learners' mathematical abilities. Thus, based on the findings of this study, it is evident that further research is necessary to explore the complexities of the relationship between heuristic approaches and academic outcomes, informing instructional practices and curriculum development in both literacy and mathematics education.

Based on the important findings of the study, the following recommendations are proposed:

1. Teachers may get training from programs on how to use heuristic techniques in their education, including how to structure lessons, encourage student participation, and give constructive criticism. Programs for specialized professional development may help educators apply heuristic-based teaching practices in an efficient manner. Educational institutions may guarantee that heuristic-based teaching approaches are successfully implemented in the classroom by providing educators with the required training and resources.
2. Educational institutions may think about incorporating heuristic methodology into their curriculum design. The creation of specific modules or units centered on heuristic problem-solving techniques in the teaching of mathematics and reading might be examples of concrete programming. These modules may be designed with certain learning goals and standards in mind, giving students organized chances to use heuristic strategies in a variety of scenarios for addressing problems.
3. Educational institutions may cultivate a feedback culture in their learning settings because of the significance of feedback in bolstering the usefulness of heuristic techniques in problem-solving. Empirical initiatives could encompass the deployment of peer review protocols, self-evaluation instruments, and cooperative education activities that stimulate students to offer and get input on their problem-solving endeavors. Educational institutions may help students improve their heuristic problem-solving abilities and overall academic performance by providing chances for continuous feedback and reflection.

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