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Implementation of The Jarimatika Method In Elementary School

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Abstrak

Metode Jarimatika merupakan teknik berhitung berbasis jari yang dirancang untuk meningkatkan keterampilan berhitung siswa secara lebih praktis dan menyenangkan. Penelitian ini bertujuan untuk menganalisis efektivitas metode ini dalam pembelajaran matematika di sekolah dasar, mengidentifikasi faktor-faktor yang memengaruhi penerapannya, serta mengevaluasi respons siswa dan guru terhadap metode inovatif ini. Penelitian ini menggunakan pendekatan metode campuran yang melibatkan tes awal, tes akhir, wawancara mendalam, dan observasi kelas selama beberapa bulan. Temuan penelitian menunjukkan bahwa metode Jarimatika secara signifikan meningkatkan keterampilan berhitung, motivasi belajar, dan keterlibatan aktif siswa dalam proses pembelajaran. Selain itu, siswa menjadi lebih percaya diri dalam menyelesaikan soal matematika. Namun, terdapat tantangan dalam proses pelatihan dan adaptasi guru, terutama terkait pemahaman teknik secara menyeluruh dan keterbatasan waktu dalam penerapan di kelas. Penelitian lebih lanjut diperlukan untuk menilai dampak jangka panjang penggunaan metode Jarimatika terhadap prestasi akademik, sikap siswa terhadap matematika, dan keberlanjutan implementasi di berbagai konteks pendidikan yang berbeda.

Kata kunci: *Jarimatika, pendidikan dasar, keterampilan berhitung, pembelajaran matematika, metode pengajaran.*

Abstract

Jarimatika is a finger counting technique which makes the counting process more practical and fun for learners. This study aims to evaluate the effectiveness of this method in teaching mathematics on an upper-primary level, identify the barriers and facilitators to its implementation, and examine the perceptions of students and teachers concerning this pedagogical change. The study was carried out using a mixed-method approach, which included baseline and final testing alongside in-depth interviews and observations over several months. The findings demonstrated that Jarimatika was helpful in improving the students' ability to count, motivating them to learn, and actively engaging them during the lessons. In addition, students' confidence on the resolved math problems improved. However, the adaptation and training phases of teachers pose challenges which stem from lack of understanding of the method and minimal time to integrate it into lesson planning. More research is needed to determine the effects of the Jarimatika method on long-term academic outcomes, attitudes towards mathematics, and the sustained use of this technique in multiple educational contexts.

Keywords : *Jarimatika, elementary education, arithmetic skills, mathematics learning, teaching method.*

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INTRODUCTION

Strong numeracy skills in elementary school are an essential foundation for later math success and everyday applications. Counting skills allow individuals to explain and analyze information, which is very important to make decisions based on information in health and finance (ABBACAN et al., 2025). Applying strategies such as open questions can improve profound thinking ability and solve problems, increasing results (Ambarwati & Jupri, 2024). The number of illiterate students directly affects their academic results, as there is an increase in students' ability to manage numbers and symbols effectively (Masyithoh, 2023). There are difficulties and potential limits to standard methods in elementary schools

for teaching concepts of basic numbers, which shows the necessity of alternative options. Traditional teaching methods are usually less meaningful to students, resulting in a lack of motivation and student interest in learning arithmetic (Maryati et al., 2023). Students often forget the previous concepts, showing ineffective memorization strategies (Azizah & Liansari, 2023). This situation is exacerbated by the impact of the COVID-19 pandemic, which has lowered the quality of education standards.

Learning theories such as constructionism and dynamics support using treatments such as fingers in mathematics learning. These theories emphasize the active participation and knowledge development through direct experience, which facilitates manipulation. Methods for Jarimatika to use finger movements to perform calculations, serve vivid students who benefit from physical participation in learning (Huljannah et al., 2024).

The ready theoretical basis for kinesthetic learning in mathematics has prompted recent scientific investigation into hands-on approaches such as the jarimatika method, with recent research revealing its potential to improve students' numeracy and other positive outcomes in primary school students. The method simplifies doing math activities, especially multiplication, by using fingers as counting tools, making learning more interesting and less dependent on students' memory. Research shows that the Jarimatika method increases students' arithmetic skills and positively affects their attitude towards mathematics.

Furthermore, this research employs contrast and error analysis, a technique commonly employed in educational settings across the globe, including English as an extension of Foreign Language (EFL) education, to fully evaluate the effectiveness of the Jarimatika method. Moreover, EFL can use this method to clarify the significance of language structure and interlanguage systems in identifying particular error patterns. Students are scrutinized for errors made before and after implementing the jarimatika method to uncover numeracy improvements and qualitative changes in problem-solving techniques. This helps provide a more accurate representation of their learning journey. Additionally, students' errors during class are critically examined through this study.

This research aims to ascertain whether the Jarimatika technique enhances students' ability to count, evaluate the factors that influence their adoption of the method, and assess the reactions of students and teachers to it. Thus, this study can provide a comprehensive picture of the potential and challenges of the Jarimatika method in improving students' numeracy skills.

METHOD

The research utilizes a mixed-methods design that integrates both quantitative and qualitative approaches. The general aim of the study is to determine where the Jarimatika method is utilized and its effectiveness.

Research Participants and Data Collection

The study involved 30 pupils from one elementary school class. They were recruited through purposive sampling to ensure that they met some requirements concerning their mathematical capabilities. Data were collected through varied means as shown below:

1. Questionnaire: It was used to assess the students' perception and attitude towards the Jarimatika approach and students' math learning confidence. The questionnaire included pre-test questions and post-test questions and qualitative types of questions with open-ended responses.
2. Interview Guide: Semi-structured tool to collect in-depth information on the students' experience with the Jarimatika approach. The guide posed questions on problems faced, strengths noted, and suggestions for enhancement.
3. Document Analysis: Lesson plans and learning outcomes for pupils, e.g., worksheets, tests, were analyzed. Analysis tried to integrate the Jarimatika approach into the curriculum and evaluate students' progress and learning outcomes after adaptation.
4. Observation Guidelines: This involved two dimensions of observation. The author was instructor and observer over the period of the study in order to ascertain how well the Jarimatika technique was utilized in class. The observations included student mastery of the technique, clarity of demonstrations, management of the classroom, and participation by students.

During the implementation stage, ongoing monitoring was conducted through facilitated classroom observations and documentation of students' progress. Trained observers made use of available guidelines and took stringent field notes in documenting quantitative as well as qualitative progress in

students' work and behavior (Miller & Jones, 2023). Video taping of observed classes was conducted to facilitate stringent analysis of instruction interactions and student response.

A comprehensive impact analysis employed several data collection methods. After the implementation of the Jarimatika strategy, students' numeracy profiles, confidence levels, and attitude towards mathematics were measured through follow-up questionnaires, structured interviews, and standardized tests (Wylie & Jackson, 2024). The post-test also included teacher interviews that provided general feedback on the effectiveness of the strategy and areas of improvement. Member checking helped to establish confirmation regarding the correctness of interview meanings and quality check qualitative data (Roberts & Lee, 2022).

Data Collection Procedures

Data were collected systematically to ensure a comprehensive assessment of the efficacy of the Jarimatika strategy. The exercise commenced with an initial assessment to assess students' starting math abilities and learning predisposition towards performing well at the subject (Davis & Kumar, 2024). Baseline data were significant in the determination of the study point of beginning and personal learning requirements. Students' demographic data and past maths experience were also recorded in attempting to identify possible confounds (Brown & Thompson, 2023).

This was succeeded by the implementation process, whereby the researcher introduced and taught students to the Jarimatika method with a one-hour facilitated session. The process included systematic teaching, guided practice, and activity-building skills. Students who acclimatized to this new method were followed up weekly. Weekly observations were carried out to follow up on personal learning and adjust instruction accordingly (Garcia & Thompson, 2022).

Data Analysis

Analysis of data in this research utilized a mixed-methods data analysis approach, including quantitative and qualitative analysis to attain an intensive evaluation of the effectiveness of the Jarimatika technique. Data reduction started with the summarization of observation data and categorization of responses from the interview. Irrelevant data were discarded to attain significant data that was related to research interest.

After data reduction, systematic coding was used to classify and organize information. In qualitative analysis, the data were coded from the three fundamental categories: student engagement (SE), learning effectiveness (LE), and method comprehension (MC). The three key indicators were the subject of quantitative analysis: performance gain (PI), counting rate (CS), and accuracy percentage (AR). Data selection also ensued to locate representative information most directly aligned with the research objectives for further analysis.

The study applied four methods of triangulation to guarantee findings to be reliable and valid. Methodological triangulation applied cross-verification findings of various data collection endeavors in order to provide consistency. Source triangulation applied analysis of teachers' and students' opinion-pieces in getting multiple views on a single topic. Investigator triangulation applied more than one researcher to avoid personal bias and provide objectivity. Theory triangulation used constructivist theory as the theory of structure to data analysis for a better understanding of learning.

Two complementary approaches were used in the third stage of the data analysis. For evaluating differences in the mathematical abilities of learners before and after using the Jarimatika method, quantitative data were statistically analyzed in terms of descriptive statistics and inferential statistics. The qualitative observation and interview data were analyzed by thematic analysis to determine overarching themes of students' experience, learning history, and the approach. It allowed us to critically examine both quantitative measures and subjective measures of the learning intervention.

RESULT

The feedback gathered from the questionnaires on students' attitudes towards their learning experience post-Jarimatika implementation provides us with important insights regarding their emotions and thoughts (affective and cognitive) concerning this new learning approach. The primary goal of these questionnaires was to measure some specific components of evaluation, in this case, aimed at determining how well the method enhanced the learners' calculative skills (MC) along with its effects on motivation, interest, and self-esteem related to mathematics (SE). To help visualise these findings, Figure 1: Comparison of Average Scores of Students' Perception Dimensions in Each Individual is shown as a bar graph, illustrating students' responses to learning with the Jarimatika Method.

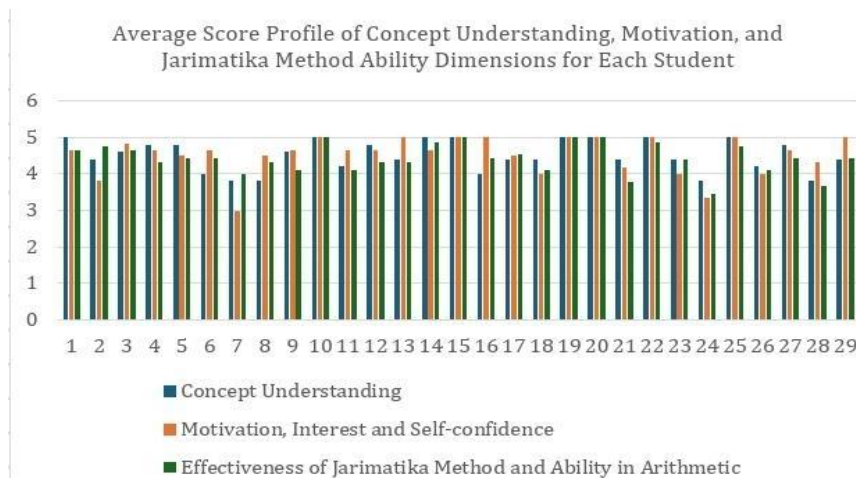


Figure 1 : Comparison of Average Scores of Students' Perception Dimensions in Each Individual

The bar graph shows that the majority of learners have a favorable view of the Jarimatika method's application in teaching mathematics. In particular, students noticed an improvement in their calculation skills (MC) after learning this method. This is indicated by the tall green bars associated with strong affirmative responses pertaining to using the method for boosting computation skills. Besides skill development, motivating and engaging students in mathematics (SE) also increased due to Jarimatika's implementation. Moreover, confidence levels (SE) regarding the ability to address mathematical problems using this finger-calculation technique were equally high as demonstrated by consistent orange and blue scores. The visual data thus proves learners felt stronger in performing calculations (improved MC) while becoming more enthusiastic and confident (improved SE).

Furthermore, these findings are consistent with prior research on how active learning methods influence students' intrinsic motivation and engagement in mathematics (Irvine, 2020). The alignment between these results and previous studies reinforces the argument that active learning approaches, like Jarimatika, can potentially improve both cognitive learning outcomes (LE) and vital affective aspects (SE) in education.

Analyzing student worksheets, especially the pre-test and post-test, was essential in determining the degree of improvement in students' arithmetic skills (PI) after the application of Jarimatika methods. An evaluation of test results before and after exposure to Jarimatika showed a remarkable boost in average scores for fundamental arithmetic functions performed by learners suggesting marked increase in performance Improvement (PI). Figure 2: Student Pre-test and Post-test Score Comparison demonstrates this enhancement noting that a majority of learners had significant increases toward their overall score.

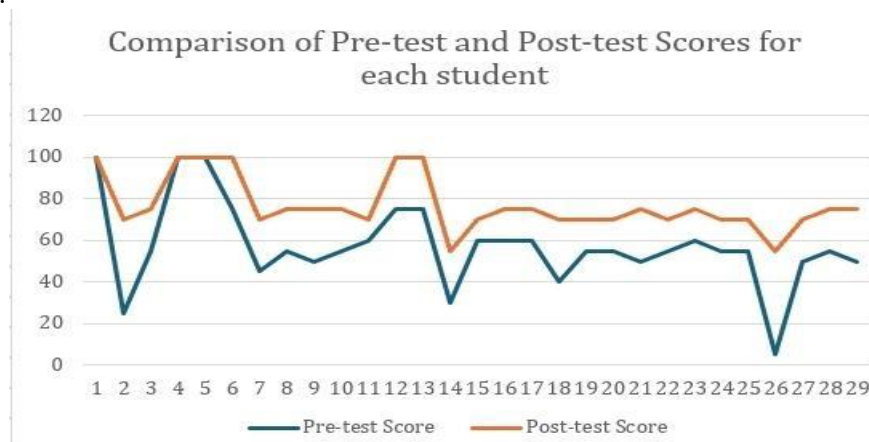


Figure 2 : Student Pre-test and Post-test Score Comparison

This is also reflected in the changes in the CS and AR of the students obtained from the survey results. The interpretation of the post-test worksheets showed that the students finished the arithmetic tasks faster and with greater accuracy than in the pre-test. This concurs with the Jarimatika survey about students' perceptions of its influence on their math skills (MC). This appears to reflect some kind of

balance between the objective and subjective measures. These findings together with other studies such as the one titled "Effectiveness of Using Manipulatives in Mathematics Teaching in Inclusive Education Programs in an Elementary School," published in 2023, seem to provide evidence of a visible effectiveness on the basic conceptual understanding and applications, termed as procedural skillset (LE).

Furthermore, an analysis of the types of common error committed by students prior to the implementation of Jarimatika revealed the presence of procedural errors as well as insufficient understanding of the basic concepts. The types of errors began to shift more towards a few mistakes in finger manipulation during operations that were far more complex, although the overall frequency of error had drastically reduced, thus signaling a notable improvement in accuracy rate (AR) henceforth. This shift in error characteristics is of capital importance because it shows that the students were in an adaptation process to a different method, rather than just improving their computation skill (PI). Such a change in error pattern, referenced in studies of error analysis in mathematics learning research (Qonita, 2024), indicates that the Jarimatika intervention has initiated a change in the cognitive strategies (LE) of students in solving arithmetic problems.

The distribution of Students' Gain Scores After Implementing the Jarimatika Method detailed in Figure 3 presents the distribution of gain scores for a more specific overview of Jarimatika's influence on learning achievement. The scores are defined as the difference between the post-test and pre-test results of students, thus representing the direct enhancement of performance improvement (PI).

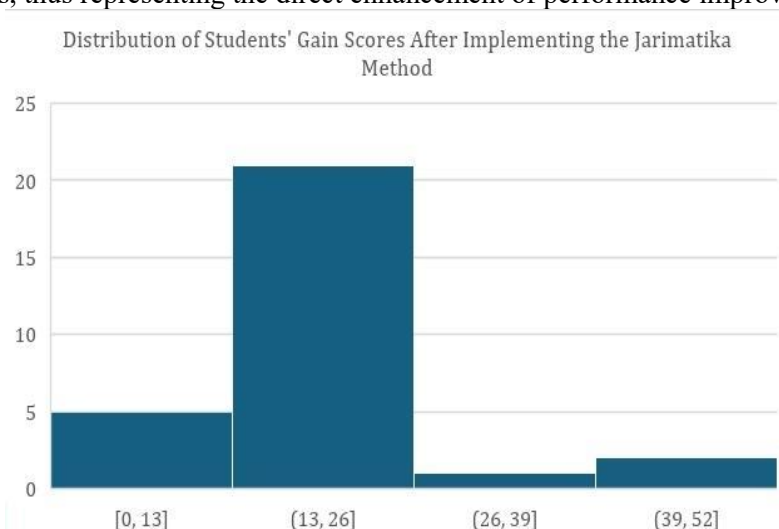


Figure 3 : Distribution of Students' Gain Scores After Implementing the Jarimatika Method

Confirming the efficacy of the technique in improving learning results (PI), the graph in Figure 3 shows that most pupils saw a major improvement in their marks (positive gain scores) following Jarimatika's introduction. This distribution of gain scores, which is mostly favorable, helps to confirm the main results from the pre-test and post-test study and fortifies the case for Jarimatika's beneficial effects. The efficacy of this approach (PI) is also supported by a recent meta-analysis research on how manipulative-based interventions affect numeracy learning in elementary education, "The Effect of Using Manipulatives on the Performance of Pupils in Primary School Mathematics," 2023. Therefore, the quantitative data from student worksheets shows that Jarimatika is an effective tool for enhancing calculation skills (PI, CS, AR) and supporting student adaptation to more efficient calculation techniques (LE).

Teachers' interviews provided ideas on her grasp of Jarimatika (MC), how she utilized it in her teaching methods, problems she ran into, and possible solutions for during its adoption. Although the instructor knew Jarimatika as a finger-based calculation technique, the depth of her method understanding (MC) differed according to the interview results. About its use, the instructor noted efforts to include Jarimatika into activities and gave real examples. The frequency and length of its execution were not yet consistent, nevertheless. The teacher at the elementary school we visited expressed: "I observed that the kids understood addition and subtraction more quickly because they could directly see their fingers moving. It is more concrete than just imagining numbers," therefore demonstrates a positive perception of its usefulness (LE). Regarding visualisation, the instructor noted,

"Using fingers is very helpful. Children used to often get perplexed when it came to lengthy stories. With Jarimatika, they can 'see' the process on their fingers, hence it's simpler to imagine and resolve the issue, therefore underlining its impact on method understanding (MC).

Among several challenges noted were time constraints, different rates at which pupils adapted to the approach, and a lack of supporting materials. On this challenge, the instructor commented: "For somewhat difficult questions, it calls for further practice; but, at least, Jarimatika gives them a methodical basis for the first stages," implying the need of more assistance for more in-depth application (LE). The teacher's solutions included the need for more in-depth training, systematic learning modules, and school management backing. This fits the teacher's comment that Jarimatika is regarded as "a really successful instrument overall, not just for counting but also for developing children's positive attitudes towards mathematics (SE)." Research on using inventions in elementary education by (Salilama et al., 2022) also underlines the need for continuous assistance and enough teacher materials.

By means of my simultaneous responsibilities as researcher and teacher, my direct observation of the implementation of the Jarimatika approach provided me valuable insight of its real application and influence on student performance. Direct involvement in teaching provided a different perspective on understanding the intricacies of Jarimatika's application. I clearly and step-by-step presented the Jarimatika ideas, painstakingly illustrating the finger motions for basic tasks. This methodical organizing of lessons seemed crucial given how often it helped pupils grasp the strategy comprehension (MC). My confidence in presenting the approaches directly corresponded with students' willingness to explore; thus, instructional clarity and student engagement (SE) appear rather related. Though adapting the approach to tackle more challenging math questions or individual student misunderstandings, asked for quick and flexible teaching changes on my side. This continuous modification during lessons highlighted the need of the teacher knowing the method and being competent in spotting and correcting varying learning speeds inside the classroom.

Simultaneous research and teaching positions let me observe the implementation of the Jarimatika method straight, thus substantially increasing my understanding of its actual use and impact on student learning. Direct participation in teaching provided a distinct viewpoint on appreciating Jarimatika's complicated application. I clearly and step-by-step presented the Jarimatika concepts, accurately illustrating the finger motions for basic operations. Considering how frequently it aided students in understanding the approach comprehension (MC), this methodical lesson planning looked to be really important. Students' eagerness to try the methods matched my confidence in demonstrating them exactly; therefore, student participation (SE) and instructional clarity appear really close. Though changing the method to handle more difficult math assignments or personal student misinterpretations required rapid and adaptive instructional changes on my end. This ongoing correction during lectures highlighted how essential it was for the teacher to grasp the technique and be able to recognize and respond for diverse learning speeds in the classroom.

Nevertheless, certain difficulties came up. I found patterns where students occasionally misconstrued finger placements or ignored carrying/borrowing ideas, especially when doing multi-digit operations. This suggested that while the technique made elementary calculations easier, more sophisticated uses demanded exacting practice and my focused instruction. The points of difficulty seen match exactly the changes in error patterns (AR) found in the pre-test and post-test analysis, therefore showing active cognitive restructuring (LE) as the pupils got used to this fresh systematic approach.

My double capacity as teacher and scientist helped me to grasp the dynamic effects of Jarimatika like never before. Direct observations confirmed that the technique provided a tangible link between abstract mathematical ideas and concrete manipulation, improving computational abilities (PI, CS, AR) and promoting a more confident and involved learning environment (SE). The difficulties faced during implementation, mostly about the sophisticated application for tough issues and individual adaptation rates, drew attention to important areas for more perfection in instructional approach. Given careful and flexible teaching approaches by the teacher, this close viewpoint surely validates the idea that Jarimatika is a strong instrument for early numeracy.

DISCUSSION

Through a comprehensive review of the information collected by student testing scores, teacher interviews, and classroom observations, several major results have arisen. First of all, the Jarimatika method, used in this research, engaged the methodical use of fingers as a calculation aid for elementary

arithmetic activities using organised steps practiced repeatedly throughout the learning process. With instructors serving as facilitators via demonstrations and guided practice, this methodical approach helps the method comprehension (MC). Furthermore, the Jarimatika learning progression was developed through a series of sequential stages, from the introduction of basic finger usage ideas to their application in solving more complex problems, therefore supporting learning efficiency (LE). Jarimatika's most strong learning medium for the pupils were their fingers; however worksheets and written examples were also employed sometimes, and other supporting resources were scarce.

Clearly seen in the better student learning outcomes (PI), the ramifications of the use of this technique show great improvement in pre-test and post-test results (PI). This result complements recent studies that show how visual and kinesthetic-based techniques help students improve their comprehension (MC) (Ediyanto, 2023). Moreover, most pupils showed a strong knowledge of Jarimatika ideas, therefore pointing toward high method comprehension (MC). Variations in competence levels were noted, however, and observations showed a positive link between the rate of idea acquisition (CS) and the level of learning outcomes improvement (PI). High levels of interest and drive seen during Jarimatika-based instruction were consistent with studies on the influence of interactive teaching approaches on mathematics learning motivation among elementary school pupils (Fahrurrazi and Jayawardaya, 2024). Students also reacted emotionally (SE) positively.

After a few practice sessions, the student felt that using Jarimatika to solve basic arithmetic problems was simple, which helped them adopt this approach. Furthermore, the simplicity of Jarimatika's fundamental ideas and procedures—especially for addition and subtraction—provided a strong basis for applying to more intricate operations. However, as has been documented in studies on the difficulties of implementing educational innovations at the elementary school level, Jarimatika was also accompanied by challenges and barriers for teachers, such as time constraints within the curriculum, differences in students' learning pace, and limitations in specific supporting resources (Dairo et al., 2023).

Several well-established educational theories provide strong theoretical validation for the positive outcomes of the Jarimatika method. Constructivist learning theory, for example, strongly supports these findings as the method enables students to actively construct mathematical understanding through direct finger manipulation rather than passively absorbing concepts. Bruner's enactive-iconic-symbolic framework aligns perfectly with the progression from concrete finger movements to abstract numerical understanding. Multi-sensory learning theory validates the improvements in engagement through the simultaneous activation of visual, kinaesthetic and tactile learning channels. Social Cognitive Theory validates the observed increase in confidence, as successful calculations enhance students' mathematical self-efficacy. Vygotsky's Zone of Proximal Development is reflected in the process of gradually transferring responsibility from teacher to students through scaffolding.

Several theoretical perspectives present contradictions that merit consideration. For example, traditional behaviourist learning theory contradicts the observed intrinsic motivation patterns, as the theory emphasises external reinforcement, whereas the students showed internal engagement that went beyond stimulus-response patterns. Cognitive Load Theory suggests that introducing finger movements while learning mathematics could overload working memory; however, the results showed reduced rather than increased cognitive load. Pure discovery learning theory contradicts the structured instructional approach, even though guided instruction was beneficial. Multiple Intelligence Theory has its limitations as it primarily caters for visual and kinaesthetic learners, potentially neglecting other types of intelligence. Information processing theory suggests that coordinating finger movements and numerical concepts simultaneously might challenge linear processing patterns. However, empirical results showed positive outcomes despite this theoretical concern.

CONCLUSION

This research addressed three primary questions regarding the implementation of the Jarimatika method and provided clear, data-supported answers.

The majority of students showed positive gain scores, proving beyond a reasonable doubt that the Jarimatika method is effective in enhancing students' numeracy skills through significant gains in calculation speed and accuracy. The method's accessibility (using fingers), multisensory approach, and conformity to learning principles were all facilitating factors when it came to implementation. Time constraints, individual learning pace differences, and inadequate teacher preparation were among the

limiting factors. The data showed overwhelmingly positive responses from both teachers and students: teachers acknowledged the method's effectiveness despite pointing out implementation challenges, and students reported increased motivation and confidence.

The success of the Jarimatika method provides valuable information about English instruction. Kinaesthetic components, such as gesture-based grammar instruction or physical movement to aid in vocabulary retention, may be advantageous in English instruction due to its multisensory approach. Since constructivist principles demonstrate that students learn more effectively when they actively construct their knowledge than when they passively absorb it, this concept can be applied to interactive English learning activities. Boosting motivation and reducing anxiety related to learning English could be accomplished with similar engagement strategies that altered students' perceptions of math. Implementation challenges are comparable to those in English language instruction, including time constraints, resource scarcity, and the need for teacher training. This implies that systematic support, such as professional development and institutional commitment to change, is necessary for successful pedagogical innovations.

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