Socius: Jurnal Penelitian Ilmu-Ilmu Sosial
Volume 3, Nomor 1, 2025, Halaman 230-236
E-ISSN: 3025-6704
DOI: https://doi.org/10.5281/zenodo.15831246

Effectiveness of The Kumon Method In Improving Mathematical Problem-Solving Abilities

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A R T I C L E I N F O

Article history:
Received May 19, 2025
Revised June 01, 2025
Accepted June 08,, 2025
Available online June 08, 2025

Keywords:
Kumon method; mathematical problem-solving; learning effectiveness; independent learning

A B S T R A C T

Penelitian ini bertujuan untuk mengeksplorasi seberapa efektif metode Kumon dalam meningkatkan kemampuan siswa dalam memecahkan masalah matematika, berdasarkan analisis mendalam terhadap literatur yang ada. Dengan menggunakan analisis dokumen tematik, tiga artikel ilmiah Indonesia kontemporer diteliti untuk menyelidiki dampak metode Kumon terhadap hasil pendidikan, praktik pembelajaran mandiri, dan kemampuan penalaran logis. Hasil penelitian menunjukkan bahwa metodologi pengajaran Kumon secara signifikan meningkatkan pemahaman siswa terhadap prinsip-prinsip matematika, meningkatkan keterampilan manajemen diri dan menumbuhkan sikap mandiri dalam lingkungan belajar, serta meningkatkan prestasi akademik. Meskipun demikian, karakteristik program yang repetitif dan terbatasnya kesempatan untuk berinteraksi dengan teman sebaya dapat memengaruhi motivasi dan tingkat keterlibatan siswa secara merugikan. Data empiris menunjukkan bahwa meskipun Kumon secara efektif mengembangkan keterampilan matematika dasar, lebih baik menerapkan pendekatan pembelajaran yang melibatkan interaksi dan kerja sama, sehingga pembelajaran lebih disesuaikan dengan kebutuhan setiap siswa. Temuan ini memiliki implikasi yang signifikan bagi para pendidik dan perancang kurikulum dalam merumuskan pengajaran matematika yang terorganisasi dan berpusat pada siswa.

A B S T R A C T

This study aims to explore how effective the Kumon method is in enhancing students' abilities to solve mathematical problems, based on an in-depth analysis of existing literature. Employing thematic document analysis, three contemporary Indonesian scholarly articles were scrutinized to investigate the effects of the Kumon method on educational outcomes, autonomous learning practices, and logical reasoning abilities. The results show that the Kumon teaching methodology significantly improves students' understanding of mathematical principles, enhances self-management skills and fosters an independent attitude in the learning environment, and improves academic achievement. Nevertheless, the inherent repetitive characteristics of the program and the constrained avenues for peer interaction may detrimentally influence students' motivation and levels of engagement. Empirical data shows that although Kumon effectively develops basic mathematics skills, it is better to apply a learning approach that involves interaction and cooperation, so that learning is more tailored to the needs of each student. This finding has significant implications for educators and curriculum designers in formulating organized and student-centered mathematics teaching

INTRODUCTION

The Kumon method was first developed by Toru Kumon in 1954 as a way to help his son study mathematics independently. Kumon has gained popularity in formal and non-formal education settings in this country because it improves students' discipline, perseverance, and confidence in understanding mathematical concepts (Halidin, 2020; Usmadi & Amelia, 2020). Through daily and incremental exercises, students are trained to think logically and solve problems independently and consistently (Davita, Nindiasari, & Mutaqin, 2020).

Implementing the Kumon method in various educational institutions in Indonesia has shown positive outcomes in improving students' mathematical abilities. Several studies have examined its effectiveness in supporting academic achievement and learning independence. Risaumami and Mardliyah (2019) showed that Kumon's individual pedagogical approach significantly improved students'

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mathematical skills while encouraging independent learning behavior. Similarly, Ardhana and Hanik (2024) reported that applying the Kumon method led to a classical mastery rate of 82.6%, along with high student engagement and responsiveness. Rahmadanti, Hamdunah, and Mardiyah (2023) further confirmed its effectiveness through a high N-Gain score and statistically significant t-test results.

Previous investigations have demonstrated that the Kumon method substantially enhances students' scholastic achievements and their proficiency in logical reasoning. Oktaviani and Rijal (2023) expounded upon the notion that this instructional strategy facilitates cognitive development through the enhancement of logical reasoning abilities. Marlene (2024) noted that the integration of Kumon with video-based instructional techniques markedly enhances critical thinking and mathematical representation competencies. Prabandari (2023) also emphasized that structured methods like Kumon help shape students' systematic and logical thinking patterns, although findings related to logical thinking skills have not been widely examined explicitly in most studies.

Most prior research has not thoroughly explored how the Kumon method develops structured problem-solving strategies based on learning theories. Many studies focus on outcomes rather than the underlying theoretical mechanisms that guide the learning process. For instance, Nur Azizah (2011: 6-7) showed that Kumon improved math learning outcomes but did not elaborate on how repetitive and individualized practices align with cognitive or constructivist learning theories. Likewise, Afifah (2011: 1-2) emphasized peer tutoring but did not examine its theoretical grounding.

This study assesses how effectively the Kumon method enhances students' ability to solve mathematical problems. Additionally, the research seeks to explore in greater depth how Kumon supports independent learning, sharpens problem-solving skills, and contributes to overall academic success. The advantage of this research is anticipated to provide critical insights for educators, guardians, and curriculum designers in the application of systematic pedagogical approaches that prioritize learner autonomy. The results of prior investigations substantiate the function of this methodology in augmenting mathematical learning achievements. For instance, Panggabean (2017:38) observed substantial enhancements in test scores among students engaged with the Kumon program. Apriana (2014:71) highlighted that repeated, structured practice through Kumon helps mastery of basic concepts. Ramadhan (2022:18) noted increased student motivation and activity with Kumon. However, some studies also note potential limitations of the Kumon method, such as reduced student motivation and limited peer interaction due to its repetitive and individualized nature.

METHOD

Research design

This study chose a descriptive qualitative approach through a literature review as the primary method. This study investigates explicitly how the Kumon method supports students in developing mathematical problem-solving skills. A literature-based method was selected for a more in-depth examination as it does not require direct data collection in the field.

Time and place of research

A research team conducted this research independently from March to July 2024. The entire process from searching to analyzing articles—was done from each team member's home. Given the limitations in terms of time and resources, this approach was chosen because it was considered the most efficient and realistic way to carry it out.

Research targets and subjects

The three journal articles used as sources in this study represent groups of students who have participated in learning with the Kumon method. To maintain the confidentiality of the source's identity, the three articles were coded as Articles A, B, and C. The articles were selected by considering their relevance to the educational context in Indonesia and their ability to describe the real application of Kumon. The three studies cover various levels of education to provide a concrete and contextual picture of the use of this method.

Research procedure

The literature review begins with a manual search for articles through platforms such as Google Scholar, ResearchGate, and several other academic databases. Once the articles are collected, each document is carefully selected based on its relevance to the Kumon method and its relationship to students' problem-solving abilities. By taking this step, researchers can remain focused on the direction of the study that has been determined and ensure that every source used is truly relevant to the core objectives of the research.

Data and instruments

The primary data in this study were obtained from several selected journal articles that discuss using the Kumon method in an educational context. The articles contain research findings, direct quotes,

and conclusions that form the basis for the analysis process. Because the sources used are publications that have gone through a peer-reviewed process, the information taken is considered credible and academically valid. To assist the analysis process, the researcher formulated seven indicators: increased learning outcomes, student activity, independent learning ability, discipline, self-confidence, logical thinking, and method weaknesses. These indicators were developed using previous studies' theoretical basis and objectives.

Data collection techniques

This research focuses on collecting articles and journals that discuss the Kumon method and solving mathematical problems. Each source is checked one by one, then only those that really discuss the two things directly are selected. This method is used so that the sources used remain in accordance with the direction of the research.

Data analysis techniques

The data in this study were analyzed using a document-based thematic analysis approach. Three journal articles were reviewed and labelled Articles A, B, and C. To support the analysis, seven analytical indicators were compiled: K1 (learning outcomes), K2 (student activities), K3 (independent learning), K4 (discipline), K5 (self-confidence), K6 (logical thinking), and K7 (method weaknesses). Each article was reviewed to determine the presence of these indicators through a comprehensive content analysis. The results are presented in a table showing which indicators appear in each article in the "Emerging Indicators" column and an explanation of the method's effectiveness in the "Evidence/Justification" column. It should be noted that although seven indicators were used, not all articles contained explicit data on all aspects, especially regarding method weaknesses (K7).

RESULTS AND DISCUSSION

The findings from the reviewed articles suggest that the Kumon method is generally effective in improving students' mathematical abilities through structured and independent learning. An analysis of three reviewed articles reveals consistent improvements in learning outcomes, student engagement, and independent learning behavior. These indicators are summarized in Table 1.

Table 1. Summary of Indicators and Evidence from Reviewed Articles

Article	Indicators Present	Evidence/Justification
Article A	K1, K2, K3, K4, K5	Student scores improved from 67.60 to 72.99; learning activity reached 92.14%; students became more disciplined and confident
Article B	K1, K2, K3, K4, K5, K6	Scores increased from 15.97 to 75.57; students completed all Polya problem-solving stages; learning independence was achieved
Article C	K1, K2, K3, K5	Pre-test to post-test score increased from 48.86 to 86.79; learning activity reached 89.29%; students were more engaged and confident

As presented in Table 1, each of the three articles demonstrated improvements in key indicators related to student learning. These include learning outcomes (K1), learning activity (K2), and independent learning (K3). Two articles also reported increased student discipline (K4) and confidence (K5), while only one article discussed logical thinking (K6); none addressed weaknesses of the method (K7).

Article A shows moderate but significant improvements in student achievement and learning behavior. The study reports improved test scores, increased student participation, and stronger discipline

and self-confidence. This article reflects indicators K1 through K5 but does not address logical thinking (K6), indicating that the focus is more on behavioral outcomes than cognitive development.

Article B presents the most comprehensive results, covering all six relevant indicators. The findings show significant improvements in test scores and reveal that students can work on all phases of Polya's problem-solving process, including identifying a problem, making a plan, implementing it, and evaluating the results. This is in good agreement with Polya's systematic problem-solving theory. Article B also provides strong evidence of students' independence and logical reasoning, positioning it as the most comprehensive.

Article C focuses more on students' motivational and engagement aspects in learning through the Kumon approach. In practice, students experience quite significant improvements, both in terms of academic performance and participation during classroom learning. This article supports indicators K1, K2, K3, and K5. However, aspects of student discipline (K4) and logical reasoning ability (K6) are not explicitly reviewed. In general, the focus of this article is more inclined toward developing the affective side of students, especially in terms of building self-confidence and fostering a spirit of learning.

The three articles reviewed show that the Kumon method not only helps students in cognitive aspects but also encourages the growth of affective attitudes and independent learning habits. This is in line with several previous findings. For example, Panggabean (2017) noted a significant increase in scores through the application of Kumon; Apriana (2014) emphasized the importance of structured repetition, while Ramadhana (2022) observed an increase in student motivation and class participation. In general, the Kumon approach has been shown to encourage positive learning behaviors, such as perseverance, responsibility, and independence. However, the logical thinking indicator (K6) only appears explicitly in one of the three articles, indicating that this aspect has not been fully described in the data studied.

The theoretical basis of the Kumon method is reflected in the structure and outcomes of the studies reviewed. Polya's theory emphasizes systematic problem solving, which is clearly illustrated in Article B, where students complete all four stages of the model, namely, understanding the problem, making a plan, implementing the plan, and evaluating the results as part of their learning process (Indriani, Rambe, & Wandini, 2023). Knowles' self-regulated learning theory is reflected in Articles A and B, where students work independently through structured Kumon worksheets and demonstrate autonomy in managing their learning pace (Maulany, Neviyarni, & Nirwana, 2022). Meanwhile, Vygotsky's Zone of Proximal Development concept is most clearly seen in Article C, where gradual increases in task difficulty allow students to progress with minimal teacher guidance, supporting the scaffolding approach embedded in Kumon's design (Maulana & Ayu, 2024).

Although the three articles discussed highlight the various benefits of the Kumon method, none discuss its limitations. Several previous studies have revealed that the repetitive characteristics of the Kumon method and its emphasis on individual work are at risk of causing boredom and decreasing student learning motivation. In addition, this approach is also considered less supportive of social interaction or cooperation among students (Hermawati et al., 2023; Widiawati & Sofyan, 2013). Ramadhani and Supriyadi (2023) even recommend enriching the Kumon method with more interactive or group-based activities to encourage motivation and improve social learning. The absence of this issue in the three articles reviewed reflects important shortcomings, especially the K7 indicator related to evaluating the method's limitations. Several previous studies have clearly stated that excessive repetition can cause boredom in students (Hermawati, Qomariyah, & Nursaidah, 2023), while the lack of social interaction in the Kumon method can be an obstacle in the development of students' collaboration and communication skills (Widiawati & Sofyan, 2013). Therefore, educators must complement the Kumon method with more interactive learning strategies to create a more balanced and enjoyable learning experience. The absence of discussion of these limitations in the articles analyzed may indicate a gap in the scope of the study, which ultimately emphasizes the need for further research to examine in more depth how these weaknesses affect the implementation of the Kumon method in the classroom in real terms.

The effectiveness described in this study reflects the implementation of Kumon in extracurricular or tutoring settings rather than in formal classroom learning. The three studies each refer to research conducted with elementary and middle school students, which helps clarify the scope and relevance of the study results. This distinction is important for future research considering curriculum integration. As explained by Rahmawatie et al. (2014), their study involving fifth-grade students at SD Negeri 2 Jangkrikan showed that the Kumon method effectively improved students' understanding at the elementary level. In addition, Putri (2022) found that seventh-grade students taught using the Kumon method achieved higher mathematics learning outcomes than those taught through conventional methods, highlighting the value of the method for implementation in middle schools.

Several articles reviewed show that the Kumon method impacts many aspects of student development regarding thinking or academic abilities, attitudes, and behavior. Students who follow this

method appear more organized in learning, more confident, and show increased discipline and achievement. Because its benefits touch various aspects, Kumon is one of the additional methods that strongly support the learning process. Marziah and Sipayung (2024) found that when this method is used in thematic learning, students get better academic results and appear more actively involved and confident during the learning process. The same thing was expressed by Khairina and Suharni (2024), who saw that daily practice in Kumon with structured and consistent questions helps students form independent learning habits, sharpens concentration, and increases self-confidence. For this reason, many parties consider Kumon as a practical and relevant alternative to encouraging student development.

In addition to encouraging improvements in academic aspects, the Kumon method also helps to form essential life skills, such as perseverance, responsibility, and logical thinking. These three aspects are very useful in various contexts but become crucial when applied in mathematics learning, where students are required to solve problems independently and think systematically. Thus, the benefits of Kumon are not only limited to mastering the material but also to supporting students in solving math problems more confidently, coherently, and independently.

CONCLUSION

The results of the three scientific articles analyzed show that the Kumon method approach can play an important role in improving students' mathematical problem-solving abilities, especially at the elementary and secondary education levels. This approach contributes to the enhancement of educational outcomes (K1), promotes student engagement (K2), and facilitates autonomous learning (K3). It also helps students become more disciplined (K4), confident (K5), and shows potential in enhancing logical thinking skills (K6), although this indicator was only identified in one article.

Although the results are mostly positive, the three articles did not discuss the possible weaknesses of the Kumon method. Some other studies suggest that because Kumon is repetitive and done individually, students may feel bored or lack social interaction. For this reason, future research is recommended to explore combining Kumon with group activities or more interactive learning methods. This can make Kumon more suitable and effective in different learning environments.

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