

Relationship Between Parents' Involvement with Students' Interest and Achievements in Mathematics Learning

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ABSTRACT

Parental involvement has been recognized as a crucial factor in shaping a child's educational outcomes across various subjects, including mathematics. When parents actively participate in their child's education by showing interest, discussing mathematical concepts, and assisting with homework, students are more likely to develop a deeper interest in mathematics. This engagement fosters a positive attitude towards learning the subject and can lead to improved grades and overall academic success. Mathematics has been defined as the study of assumptions and applications and is one of the compulsory subjects in Sijil Pelajaran Malaysia (SPM). The students need to achieve at least a passing grade, since most tertiary educational institutions in Malaysia, especially the public have very strict requirements for enrollment, not to forget the stiff competition. The main purpose of this research is to study how parents' involvement influences students' interests, as well as their self-perceptions, and consequently how these elements may affect their achievements in Mathematics. 186 Form Four students from SMK Bandar Baru Bangi were selected as the respondents. A quantitative method, using a questionnaire was opted as instrument for data collection. The collected data was analyzed using the IBM Statistical Package of Social Science (SPSS). The findings showed that majority of parents can provide the essential educational tools for children, such as geometry sets, scientific calculator etc. Most students prefer their parents to engage more in their learning process. There is a statistically positive significant relationship between parents' involvement and students' achievements, which proves the important roles of parents in improving the interest of their children towards learning. In a nutshell, based on the evaluations done by the students, this study may indirectly assist the parents to identify the ideas and the initiatives that they may take in improving their children's performances.

Keywords: *academic achievement, interest, mathematics, parent's involvement, secondary students,*

INTRODUCTION

Mathematics is a subject which involves numbers, measurement, data, and calculations. Mathematics is very crucial in various aspects of life, including medicine, engineering, finance, natural sciences, and economics. The development of mathematics is essential for mankind and society's progress (Yadav, 2017), and we need to understand its significance and numerous applications to develop the skills. In the educational field, basic knowledge in mathematics is essential to develop students' overall mental abilities, and to assist their understanding in other academic subjects. It is a very common opinion: those who are smart in mathematics will have no problems in other subjects. The Ministry of Education Malaysia (2018) seeks to develop students who are creative, innovative and mathematically minded. They should be able to apply their knowledge and skills effectively and be responsible for problem-solving and decision-making based on attitudes and values. The Kurikulum Standard Sekolah Menengah (KSSM) curriculum in Malaysia has undergone few revisions to ensure that every student gain information, skills, and values applicable to the demands and challenges of the 21st century. All students in Malaysia, from primary to secondary level are required to take mathematics and it is one of the compulsory subjects for the Sijil Pelajaran Malaysia (SPM). Good results in mathematics are required for students to further their studies to tertiary level, and a good grade is an added value to guarantee their place to the desired courses, especially for the high demand courses.

Ayebale Lillian et al. (2020) highlighted the influence of students' and teachers' attitudes, teaching methods, gender factors, as well as parents' influence on the students' mathematics achievement. Students' self-attitudes, particularly their interest in numbers and calculation, is the main factor contributes to their academic success. Teachers' attitudes and teaching methods, as role models, also play a significant role in shaping students' perspectives on the subject. On the other hand, teachers' perspectives toward the subject and how well their students perform are influenced by their views about mathematics, including the value of the subject, how it should be taught and whether it is tough or simple (Mazana et al., 2019). Gender factors, such as gender disparities (Xie & Liu, 2023), may also affect students' confidence in learning mathematics. Female students usually are less confident in mathematics, leading to lower academic achievement. Parental influence, which includes providing necessary educational materials and adopting specific attitudes and beliefs, also plays a crucial role in a student's achievement in mathematics. According to Ayebale Lilian et al. (2020), parents can act as an example and mentor by fostering a positive attitude and providing necessary educational materials so able to push their children towards high academic goals and ambitions.

The objectives of this study are to explore parents' involvement in students' Mathematics learning, identify students' perceptions toward their parents' involvement in Mathematics learning, and investigate the relationship between parents' involvement in Mathematics learning and students' achievements in the mathematics subject.

LITERATURE REVIEW

Parent's Involvement in Mathematics Learning

Parental involvement is the circumstance where parents are involved directly in their children's education. According to researchers, parents' involvement in their children's education can be divided into two categories: involvement at home such as what parents do at home to support the education of their children (Nguon, 2012) and involvement at schools like participation in activities held at schools, such as meetings with teachers, school events, and parental federation. A relationship between parental participation and academic achievement has been found in many studies. According to Gomes (2015), there are two advantages of parental involvement that need to be emphasized: (a) parents are aware of their children's skills and (b) they are aware of how and what they learn in school. Parents of students who perform poorly academically tend to have a more authoritarian parenting style. Secondary school parents may exhibit more controlling behavior when their children have more severe learning issues.

Núñez et al. (2015) looked at the connection between students' academic accomplishment, their perceived parental engagement in their homework, and their homework-related behaviors. However, in high school and junior high, there is a larger correlation between perceived parental participation and academic achievement than there is in primary school.

Parent's Involvement and Students' Achievement in Education

Parental involvement is crucial for students' education, and there are many benefits for them as well. For instance, family participation affects students' academic progress favorably. Students with high levels of parental involvement do better in reading and math, claimed Shaver & Walls (1998). Gonzalez-Peinda et al. (2002) also found that parental participation influences students' academic self-concept, which is crucial for academic performance and contributes to their academic progress. Some studies have even found that parents who communicate with schools and help their children with their homework have lower test scores, which is detrimental to their academic progress (Shumow & Miller, 2001). Some research showed that parental engagement heavily influences the academic performance of children. An illustration of this can be seen in the meta-analysis performed by Zheng and Mao (2023), which established a positive correlation between parental involvement in mathematics homework that is supportive and the academic performance of students. According to the study, these variables were associated with the academic achievements of students. This is also supported by Spreeuwenberg (2022), who stated that, parents who participate actively in the early childhood education process can ensure that their children get the resources necessary to grow and develop to their greatest potential. A connection between home and school develops through parental involvement, giving the kid a sense of belonging and comfort. Parents have an essential role in establishing motivation and engagement with mathematics learning (Chiu & Xihua, 2008). Besides, perceived parental involvement positively predicted academic motivation, which in turn predicted academic achievement among first-generation university students, according to a study by Zulfiqar et al. (2023).

Factors Affecting Parents' Involvement in Education

Some circumstances limit parents' capacity to participate actively in their children's academic endeavours. According to most of the research on parental involvement in education, three categories of characteristics affect parental involvement (Jafarov, 2015) which are parent-related factors, school-related factors and student-related factors. One of the parent-related factors identified by the study was the socioeconomic standing of the parents, which included their income, occupation, and educational attainment (Magwa et al., 2017). Parents were allegedly unable to assist their children with their schoolwork because of their low literacy levels. According to Hornby & Lafaele (2011), parents from low socioeconomic backgrounds are less involved, less informed, and more likely to experience issues with language, transportation, communication, and child-care. Therefore, parents with a higher socioeconomic position are more engaged in their children's academic performance than parents with lower socioeconomic status. Next, school-related factors occur because of several issues that arise and make parents difficult to give full involvement in students' learning. Magwa et al., (2017) discovered that the school has an impact on how parents are involved in their children's education from primary to secondary school. Parents, educators, and students generally believe that schools have an impact on parents' decisions to get active in their children's education. One of the issues is the attitudes of the teachers (Magwa et al., 2017) as teachers' attitudes toward poor parents may generate the impression that they have nothing to offer their children. Educators' attitudes affect the degree of involvement even when parents and teachers have no communication issues (Pena, 2000). Therefore, teachers' language and attitude affect how involved parents are likely to be in their children's education. Lastly, in student-related factors, some children, especially those in high school, are rumoured to be resistant to parental participation (Magwa et al., 2017). Parents are also more inclined to participate if they understand that both teachers and students expect them to (Hoover-Dempsey et al., 2001). According to Hornby and

Lafaele (2011), the age of the child affects how much the parents are involved in the educational process.

Parent's Attitude and Beliefs Towards Mathematics Education

Parents' attitudes and beliefs are a starting point for parents to get involved in education hence many research have been done to show the relationship between parents' attitudes and beliefs and students' interest and achievement in education. Parents' attitudes and desires are reflected in their children's academic accomplishments and involvement in higher mathematics courses (Soni & Kumari, 2015). In mathematics education, the affective domain includes attitudes, values, and beliefs (McLeod, 1992). We are aware that attitudes about mathematics change over time and other factors such as teachers, peers, and parents can have an impact on a students' attitude. Parents frequently have trouble teaching their children to understand math (Mohr-Schroeder et al., 2017). Parents' beliefs toward school and the subject matter improve when they are taught how to communicate with their children, especially about mathematical ideas; this could affect how children feel about mathematics (Pena, 2010). Children of parents who value mathematics and mathematical thinking are more likely to engage in the subject as well, perform, and pursue STEM-related occupations in the future (Mohr-Schroeder et al., 2017). Parents have a significant impact on their children's student achievement, and this influence is far greater than that of peers. Hence, children's interests and characteristics, which are most impacted by parental participation, have an impact on mathematics achievement (Figure 1).

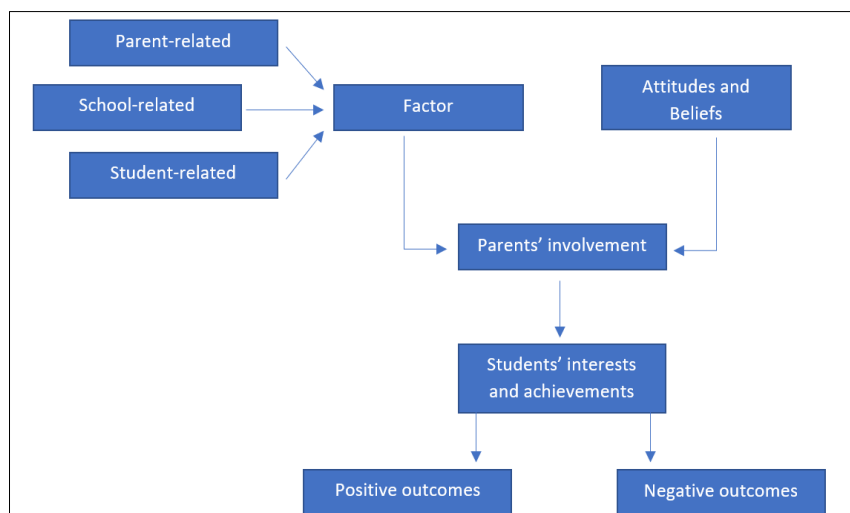


Figure 1: Conceptual Framework

MATERIALS AND METHODS

The respondents of this study consisted of 360 form four students from SMK Bandar Baru Bangi. The sample of this research was 186 students which been chosen by using probability sampling where all subjects in the population have equal chances to be selected. The sampling technique was carried out using the stratified sampling method. Stratified sampling is a probability sampling technique in which the population is divided into distinct subgroups, or strata, that share similar characteristics. A random sample is then drawn from each stratum in proportion to the stratum's size relative to the population. This method ensures that each subgroup is adequately represented in the sample, increasing the precision and reliability of the results. The students were divided into three groups according to the class ranking and for the selection of participants, a random sampling method was done for each group. The data were collected by using survey method (questionnaire), a similar methodology that was utilized by Chua (2016) to gather information directly from a group of participants. There were four

sections in the questionnaire. Section A was about students' demographic such as name, class and mathematics score while Section B was used to collect information on parents' involvement in the students' learning process. Section C was on students' perceptions of parents' involvement during their learning while Section D was used to collect information on students' achievements in Mathematics subject. The Likert scale was used to evaluate the questions in Section B, Section C and Section D. In Section B, the respondents were given a Likert-type in the following sequence of agreement: "never," "rarely", "sometimes", "frequently", and "always". In Section C, the respondent can choose either "yes", "neutral" or "no". Meanwhile in Section D, the respondent may choose to answer either "no", "not sure", "rarely", "sometimes" and "yes". The questionnaire for Section B and section C were analysed using the descriptive analysis. In both sections, the mean and standard deviation for each question were assessed. The results for Section D, on the other hand were evaluated using a Pearson Product Moment Correlation Test to find relationship between H_0 and H_1 . The significant level was set to be at 0.05. Using Pearson Product Moment Correlation allows for a precise measurement of the relationship between parental involvement and student achievement, provides statistical significance testing, and aligns well with the continuous nature of the data and the specific objectives of the research. The flow of the data collection was started with the researcher went to SMK Bandar Baru Bangi to get approval to conduct the research from the school administration and select participants from the school. In the next step, the researcher did some briefing to the population and selected a sample to distribute the questionnaire. There were 186 students who participated in this survey and selected from eleven classes. Each student took not more than 30 minutes to answer the questionnaire. Once the researcher got all the 186 respondents, the data was examined using the IBM Statistical Package of Social Science (SPSS).

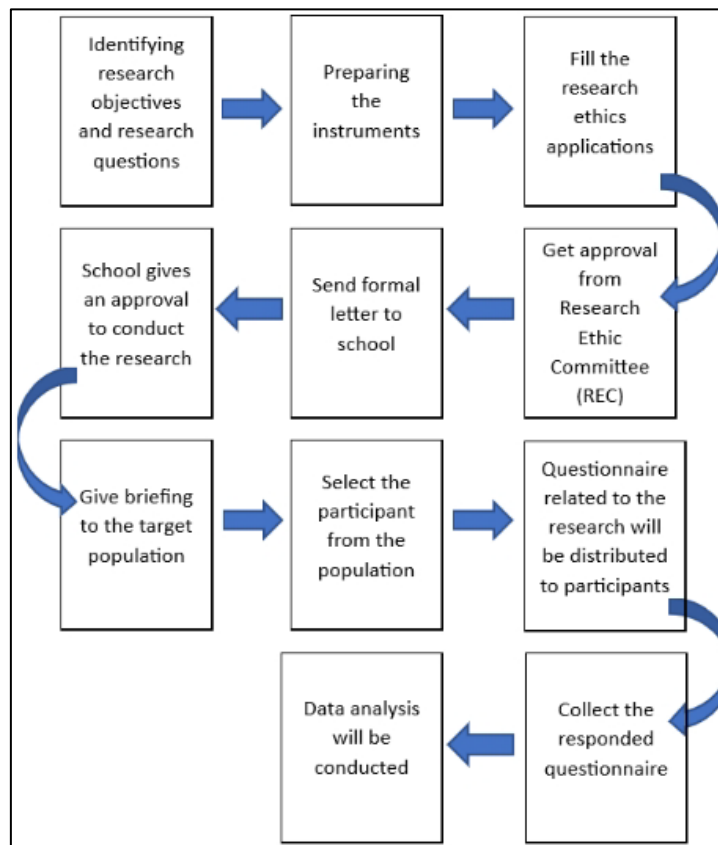


Figure 2 : Data Collection

RESULTS

The demographic data is presented in Table 1. A total of 186 students participated in the research. Most of the participants were female (58.6%). Two classes, Amanah and Damai dominated the number of students, with 10.75% of students, for both. Most of the students got grade F (34.9%) for their final mathematics examination.

Table 1: Demographic data on study participants

| Demographic | | Frequency | Percentage |
|-------------|---------|-----------|------------|
| Gender | | | |
| | Male | 77 | 41.4 |
| | Female | 109 | 58.6 |
| Class | | | |
| | Aman | 19 | 10.22 |
| | Amanah | 20 | 10.75 |
| | Budiman | 18 | 9.68 |
| | Bakti | 17 | 9.14 |
| | Cekal | 17 | 9.14 |
| | Damai | 20 | 10.75 |
| | Harmoni | 18 | 9.68 |
| | Ikhlas | 14 | 7.53 |
| | Jujur | 15 | 8.06 |
| | Murni | 13 | 6.99 |
| | Nurani | 15 | 8.06 |
| Exam grade | | | |
| | A | 7 | 3.8 |
| | B | 9 | 4.8 |
| | C | 17 | 9.1 |
| | D | 35 | 18.8 |
| | E | 53 | 28.5 |
| | F | 65 | 34.9 |

Table 2 shows parents' involvement in their children's mathematical learning. Most parents are very dedicative in providing physical and moral supports. Most of them can provide necessary mathematical tools for their children such scientific calculator and geometry sets (mean= 4.16, SD=1.170). They also emphasize the importance of mathematics in life to their children (mean= 3.34, SD = 1.230) and supporting their children's learning process (mean= 3.58, SD = 1.248) by providing good environment to learn at home (mean= 3.26, SD = 1.406). Students said that their parents take a serious concern about their mathematics score (mean= 3.57, SD = 1.277) and put high expectations on their achievements (mean= 3.35, SD = 1.266). Hence parents do encourage them to do more exercises (mean= 3.66, SD = 1.294). However, most parents seem to fail to contribute towards moral supports. For instance, they rarely check their children's homework (mean= 2.22, SD = 1.017). Besides, most students stated their parents do not lend a hand in their homework (mean= 2.31, SD = 1.099) and are not able to explain the questions (mean= 2.54, SD = 1.177) to them.

Table 2: Parent's involvement in students' mathematics learning

| | N | Mean | Std. Deviation |
|--|----------|-------------|-----------------------|
| Parent checks if there is Mathematics homework given. | 186 | 2.22 | 1.017 |
| Parent gives explanations for your Mathematics question. | 186 | 2.54 | 1.177 |
| Parent helps to solve your Mathematics homework together. | 186 | 2.31 | 1.099 |
| Parent emphasizes the importance of Mathematics in life. | 186 | 3.34 | 1.230 |
| Parent takes seriously your Mathematics score. | 186 | 3.57 | 1.277 |
| Parent gives support in your Mathematics learning. | 186 | 3.58 | 1.246 |
| Parent encourages you to do more exercises in Mathematics subject. | 186 | 3.66 | 1.294 |
| Parent provides a good environment to learn Mathematics at home. | 186 | 3.26 | 1.406 |
| Parent provides equipment to learn Mathematics. (such as scientific calculator, geometry set, measuring set) | 186 | 4.16 | 1.170 |
| Parent has high expectation of you in Mathematics subject. | 186 | 3.35 | 1.266 |
| Valid N (listwise) | 186 | | |

Table 3 shows the students' perception toward parent's involvement in mathematics subject. It can be seen that students would like their parents to participate more in their learning (mean= 1.80, SD=.587). Students also believe that their interest and achievement in mathematics are affected by their parent's involvement (mean= 1.77, SD=.654). Most of the students believe that their parents are able to teach Mathematics to them (mean= 1.72, SD=.681) and they would like their parents to emphasize more on the use and importance of Mathematics in real life (mean= 1.75, SD=.591). On average, the students prefer their parents to help them solve mathematics homework together (mean= 1.52, SD=.643) and explain the questions (mean= 1.53, SD=.616) since they are pleased with their parents attention towards their homework (mean= 1.76, SD=.616). But these result seems to be inconsistent with three items where the results were quite low; "You like it if your parent gives support in your Mathematics learning" (mean= 1.30, SD=.505), "You would like to be provided equipment to learn mathematics. (such as scientific calculator, geometry set, measuring set)", (mean= 1.31, SD=.519), and "You would like to get a good environment to learn Mathematics at home" (mean= 1.33, SD=.515). Therefore, this research may be improved in the near future by considering a few repetitions to enhance the accuracy.

Table 3: Students' perception toward parent's involvement in mathematics subject

| | N | Mean | Std. Deviation |
|--|----------|-------------|-----------------------|
| You like it If your parent give attention to your Mathematics homework. | 186 | 1.76 | .616 |
| You like if your parent gives explanations for your Mathematics question. | 186 | 1.53 | .616 |
| You like it when your parent helps to solve your Mathematics homework together. | 186 | 1.52 | .643 |
| You want your parent emphasizes the importance of Mathematics in life. | 186 | 1.75 | .591 |
| You like it if your parent gives support in your Mathematics learning. | 186 | 1.30 | .505 |
| You would like to get a good environment to learn Mathematics at home. | 186 | 1.33 | .515 |
| You would like to be provided equipment to learn Mathematics. (such as scientific calculator, geometry set, measuring set) | 186 | 1.31 | .519 |

| | | | |
|---|-----|------|------|
| You believe in your parent's ability to teach Mathematics. | 186 | 1.72 | .681 |
| You think your parent should participate more in Mathematics learning. | 186 | 1.80 | .587 |
| You think your interest and achievement in Mathematics subject is related to your parent's Involvement. | 186 | 1.77 | .654 |
| Valid N (listwise) | 186 | | |

A Pearson Product Moment correlation test has decision rule which is to Reject H_0 , if there is no significant relationship between parental involvement in mathematics learning toward students' achievement in mathematics subjects if $p\text{-value} \leq \alpha$. Since $p\text{-value}$ is less than 0.05, so rH_0 was rejected. A Pearson Product Moment correlation shown in Table 4 shows that the relationship between parent's involvement in Mathematics education and students' academic achievement are statistically significant, $r = 0.387$, $p = 0.000$. A correlation coefficient of $r = 0.387$ indicates a moderate positive relationship between parental involvement and students' interest and achievements in Mathematics. While this relationship is not very strong, it is practically significant in the educational context, offering valuable insights for designing parental engagement strategies. However, it is important to be cautious about inferring causality and to consider other contextual factors that may influence this relationship.

Table 4: The relationship between parent's involvement in mathematics learning and students' achievement in mathematics subject

| | | Average Parent's Involvement in Mathematics Education | Average Student's Academic Achievement |
|---|---------------------|---|--|
| Average Parent's Involvement in Mathematics Education | Pearson Correlation | 1 | .387** |
| | Sig. (2-tailed) | | .000 |
| | N | 186 | 186 |
| Average Student's Academic Achievement | Pearson Correlation | .387** | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 186 | 186 |

** . Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

The study's findings revealed varying levels of parental involvement in different aspects of their children's Mathematics learning. Specifically, certain areas of parental involvement, such as providing equipment, have higher means compared to others, like helping with homework. This variation can be attributed to several factors that influence how parents engage with their children's education such as accessibility and ease: providing equipment requires less direct interaction and specialized knowledge compared to helping with homework (Jay et al., 2018). Parents can purchase or provide necessary materials without needing to understand complex mathematical concepts. Financial Capability: Parents might feel more capable of contributing through financial means. Purchasing equipment can be a tangible way to support their child's education. The mean score for parental involvement in helping with homework is comparatively lower, due to the knowledge gap, time constraints and student independence (Xu et al., 2024).

The findings analyzed parents' involvement in their child's mathematical learning. The results indicated that parents were aware of their children's needs and played crucial roles in their children's education. As known parents have variety of roles in their children's mathematical education, including as motivator, resource provider, monitor, mathematics content advisor, as well as learning counselor

(Mann, 2022). Some parents believed that providing educational resources will make learning mathematics easier, while others need training to gain relevant knowledge, beliefs, and self-efficacy. However, little numbers of parents checked their children's homework. But this doesn't necessarily indicate that they are not concern about their children's education. Some possible factors to this issue are work pressures, health issues, or other constraints. Some parents may feel uncomfortable or lack confidence in helping their children with their work (Çelebi, 2022). Factors such as lack of involvement, discomfort, perception of homework, and time constraints may contribute to parents not being able to consistently check their children's homework. Despite these challenges, parental support and involvement in homework can influence students' motivation, engagement, and ultimately, improve their learning habits and success.

The finding revealed that students desire parental involvement in their mathematics learning, as it increases interest and motivation, even in challenging topics. Parental involvement improves academic performance, school attendance, and participation in advanced courses (Utami, 2022). It also acts as a buffer against socioeconomic or familial problems that may hinder a student's academic performance (Lamessa et al., 2023). Based on research by Batool & Riaz (2019), parental involvement also plays a role in self-grooming, psychological development, and character building, leading to better learning outcomes and producing confident, motivated, and independent individuals. However, students' perceptions of parental involvement in mathematics learning are less positive. While parental involvement can be beneficial, it can also lead to increased stress and academic burden (Peng et al., 2023). Students appreciate parent's participation, but high expectations and authoritarian parenting styles can increase pressure and stress (Ahmad et. al, 2023). Research by Grolnick & Pomerantz (2022), suggest that parents should be supportive and flexible in their involvement, considering their children's strengths and interests. In conclusion, parental support can have positive effects on students' education, including improved academic achievement, wellbeing, learning motivation, and self-regulation ability. However, challenges such as discrepancies between parental and teacher assessments and economic constraints may have negative effects on students' education.

The last finding was the relationship between parental involvement in mathematics learning and students' achievement in mathematics subjects. This finding was analysed by a Pearson correlation test. A positive correlation was figured out between parental involvement and students' achievement in mathematics subjects. Parents play a crucial role in ensuring students' success, as they are the strength and reason for their children's success. Research by Zheng & Mao (2023) showed that parents who actively participate in their children's education, such as assisting with homework, participating in extracurricular activities, and communicating with teachers, will contribute to positive impacts on their children's academic performance, school attendance, and participation in advanced courses. However, another study by Lazovic et al., (2022) found no significant relationship between parental participation and student academic achievement, suggesting the roles of other factors. Nevertheless, from our point of views, supported by this current research, we do agree that parental involvement significantly impacts children's academic success.

CONCLUSION

In conclusion, parents' involvement in mathematics learning has a favourable outcome on students' interest and achievement in mathematics learning. Therefore, parents are encouraged to spend more time and provide good facilities to their children in learning mathematics. By taking specific, actionable steps such as attending workshops, setting a regular study schedule, encouraging problem-solving skills, providing necessary tools, modeling a positive attitude, and maintaining open communication with teachers, parents can significantly enhance their involvement in their children's Mathematics learning. These targeted actions can help bridge the knowledge gap, manage time constraints, and support student independence, ultimately leading to improved student interest and achievement in Mathematics. The findings on students' perception of parents' involvement will also help parents to get ideas of what they should do to help their children get a better grasp on the mathematics subject. Students should

understand if parents cannot fulfil their needs in mathematics learning because of the generation gap, changes in the syllabus and some other reasons. Teachers, as intermediaries, play a pivotal role in facilitating parental involvement in Mathematics learning. By establishing regular communication, providing resources and guidance, creating a supportive environment, offering customized feedback, leveraging technology, and encouraging positive attitudes, teachers can significantly enhance the collaboration between home and school. This partnership not only supports students' academic achievement but also fosters a positive and conducive learning environment both in and out of the classroom.

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Hanafiah, N. I. M and Rosly, N. S. conceived and planned the experiments and also carried out the experiments and the simulations. Hanafiah, N. I. M. contributed to the interpretation of the results and took the lead in writing the manuscript. Ahmad, N. played a pivotal role in the manuscript refinement. All authors provided critical feedback and helped shape the research, analysis and manuscript.

CONFLICT OF INTEREST DECLARATION

We certify that the article is the Authors' and Co-Authors' original work. This research/manuscript has not been submitted for publication nor has it been published in whole or in part elsewhere. We testify to the fact that all authors have contributed significantly to the work, validity and legitimacy of the data and its interpretation for submission to Jurnal Intelek.

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