Journal of Posthumanism
2025
Volume: 5, No: 6, pp. 3529–3539
ISSN: 2634-3576 (Print) | ISSN 2634-3584 (Online)
posthumanism.co.uk

DOI: https://doi.org/10.63332/joph.v5i6.2479

Investigating the Decline of Fundamental Math Skills Among School Students in Jordan

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Abstract

Mathematics is a foundational subject in global educational curricula, closely linked to advancements in technological and scientific fields. In Jordan, mathematics is taught as a core subject in senior high school to equip students with problem-solving skills. However, many factors contribute to poor mathematics performance among students. This study examines the factors affecting poor mathematics performance and proposes possible policy directions to enhance student performance and improve results in the senior secondary certificate examination. The study sample included 214 students from public and private schools in Irbid city. The findings indicate that poor mathematics performance is primarily associated with ineffective teaching strategies, inadequate procedural approaches, challenging educational environments, and obstacles in following up on study tasks and assignments. These factors collectively impact students' mastery of fundamental skills and overall academic achievement. We recommend revising the mathematics curriculum focusing on topics that enhance students' ability to apply mathematical knowledge to solve real-world problems.

Keywords: *Mathematics, Core Subjects, Performance, Teaching Strategies, Jordanian School Students.*

Introduction

Understanding and retaining fundamental mathematical skills is crucial for students' academic success, yet many struggle to maintain these skills over time. Studies suggest that teaching methods play a significant role in student performance, with approaches like problem-based learning (PBL) and game-based learning showing promise in improving engagement and understanding Chusna,2023 Vieites, Komarudin,2021. A conducive learning environment, along with active parental involvement, further supports students' academic development, especially in foundational subjects like mathematics Muhasidah,2019, Salameh Mahmoud,2018, Agustin,2022. Despite these insights, students in Jordanian schools still face challenges in retaining basic math skills, suggesting a need to explore these factors within the Jordanian educational context.

This study seeks to examine the factors contributing to the loss of fundamental math skills among students in Jordan, with a focus on teaching strategies, learning environments, and parental

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involvement, to recommend effective interventions for enhancing students' retention and understanding of essential mathematical concepts.

Literature Review

Many factors influence students' understanding and academic performance Chusna,,2023 with teaching methods and strategies among the most significant Binandam, 2022. Effective teaching strategies can help address poor mathematics performance by integrating topics that foster real-life problem-solving skills, countering students' belief that mathematics is inherently difficult Vieites. For instance, problem-based learning (PBL) strategies can enhance students' problem-solving skills by guiding them through the steps to tackle various challenges effectively Listiana , 2023.

Game-based learning has shown promising results in other fields as well. For example, after incorporating game-based learning with third-year nursing students, their knowledge scores improved significantly Komarudin, 2021, and all students passed the Objective Structured Clinical Examination (OSCE), underscoring the importance of aligning pedagogical approaches with current educational trends Parichat,2023. Another effective post-pandemic strategy is blended learning, particularly when applying the RADI model for topics like Monera. This approach has been shown to improve students' argumentation skills and conceptual understanding at a high level Muhasidah ,2019. Several studies highlight the benefits of various instructional strategies. For example, flipped learning has demonstrated statistically significant improvements in students' reflective thinking skills, suggesting it is a recommended method for teachers Chand S ,2021,Salameh Mahmoud,2018 Additionally, the GITTW and REACT learning strategies have effectively enhanced students' creative thinking and communication skills Quainoo,2020. Language learning strategies (LLS) support pupils' language acquisition needs Lim,2023, and students' strategies for memorizing English vocabulary enhance their receptive language skills Bakri,2022. The STEM-integrated learning model has also proven effective in fostering 21st-century skills, depending on the specific model used Burusic,2019.

Another beneficial approach is the homework implementation method (MITCA), which has improved students' emotional and behavioral engagement in school, Vieites. Research suggests that giving students homework connected to real-life experiences and interesting topics can foster advanced cognitive skills Emsen,2011. Studies advocate for teacher and parent education programs based on video-recorded real-world interactions to further support learning, which encourage reflection on the impact of homework and family involvement on children's development Intang Sappaile,2023.

A conducive learning environment and skilled teachers are also crucial for academic achievement Agustin,2022. Schools can improve learning outcomes by fostering a positive climate and offering in-service training, seminars, and workshops for teachers, as well as providing sufficient teaching materials Sodikin,2023,. Limited technology use among mathematics teachers, coupled with gaps in subject-matter competence, has been linked to students' negative attitudes and poor performance in mathematics Luo,2023, Elian,2018. Students' academic performance can also be influenced by nutritional factors. Healthy school snacks and canteen options, ideally supervised by local health centers, can contribute positively to student health and learning outcomes Muhasidah,2019, Agustin,2022. Parental involvement is essential in children's early academic life, as parents help reinforce skills learned in the classroom. Active parental engagement, especially in language development, can boost children's learning enthusiasm, build good study habits, and foster an interest in learning English.

Conversely, ineffective parental involvement may have adverse effects Salameh Mahmoud,2018, Luo,2023. Family learning programs, such as phonics courses, have been shown to increase parents' confidence and skills in supporting their children's literacy Al-Katheri,2023. Lastly, while parents' economic level has an indirect and minor effect on learning outcomes, it still influences student motivation Yuliyanti,,2023.

Methodology

The results were analyzed based on demographic characteristics using independent samples t-tests, one-way analysis of variance (ANOVA), and Chi-square tests. Additionally, the Pearson correlation coefficient was calculated to examine relationships between the questionnaire components. Data analysis was conducted using SPSS, version 22, with statistical significance set at $p < 0.05$ (two-sided) for group comparisons and $p < 0.01$ (two-sided) for correlation calculations.

Data was analyzed using the Mann-Whitney and Kruskal-Wallis tests to compare results across demographic characteristics. Analysis was performed using SPSS, version 22, with statistical significance set at $p < 0.05$ (two-sided).

A questionnaire was distributed to students in grades 7 through 12 in both public and private schools. The questionnaire was organized into four main sections:

1. Teaching strategies and procedures.
2. Educational environment.
3. Study follow-up tasks and duties.
4. Influences on teaching basic skills and academic achievement.

Responses to each statement were recorded on a four-point Likert scale, with “always” scored as 4, “often” as 3, “sometimes” as 2, and “never” as 1. The results were analyzed based on demographic characteristics using independent samples t-tests, one-way analysis of variance (ANOVA), and Chi-square tests. Additionally, the Pearson correlation coefficient was calculated to examine relationships between the questionnaire components. Data analysis was conducted using SPSS, version 22, with statistical significance set at $p < 0.05$ (two-sided) for group comparisons and $p < 0.01$ (two-sided) for correlation calculations.

The Cronbach’s alpha coefficient for all items in the questionnaire was 0.82, indicating a high level of internal consistency. The study sample included 214 students, comprising 10 males and 204 females (95.3% female), from both public and private schools. Of these, only 4 students (1.9%) attended private schools, while the remaining 98.1% were enrolled in public schools. The grade distribution was as follows: 21.5% of students were in the eleventh grade, 19.6% in the seventh grade, 17.8% in the tenth grade, 16.8% in the eighth grade, 13.6% in the ninth grade, and 10.7% in the twelfth grade.

		Frequency	Percentage
Gender	Male	10	4.7
	Female	204	95.3
Grade	7th Grade	42	19.6
	8th Grade	36	16.8

	9th Grade	29	13.6
	10th Grade	38	17.8
	11th Grade	46	21.5
	12th Grade	23	10.7
Kind of school	Government School	210	98.1
	Private School	4	1.9

Table 1. Demographic Data

Results

The following section analyzes key constructs related to the educational environment and teaching methodologies assessed in this study. Each construct—spanning teaching strategies, classroom environment, study follow-up, and factors influencing academic achievement—offers insights into the effectiveness and areas for improvement within the educational setting. The results highlight strengths in student support and specific areas where adjustments could enhance the learning experience.

Table 2 outlines key educational constructs, with moderate scores across Teaching Strategies and Procedures (2.77), Educational Environment (2.99), and Study Follow-Up Tasks and Duties (2.92), suggesting a generally stable but improvable teaching and learning experience. The highest score, Influences on Teaching Basic Skills and Academic Achievement (3.59), indicates a strong and consistent impact on core skill development. Overall, these results highlight a sound educational structure with room for enhancement in teaching approaches and environmental support. A specific aspect of Teaching Strategies and Procedures, revealing varied effectiveness across items is shown in Table 3. The moderate mean for Varied Teaching Strategies (2.97) suggests occasional use of diverse methods, while a lower score for Memorization-Based Teaching (2.02) indicates minimal reliance on rote learning. The item Graduated Procedures for Skill Mastery scored higher (3.51), showing a structured approach that supports skill development, and Transition from Tangible to Abstract (3.13) suggests moderate effectiveness in guiding students from concrete to abstract concepts. Overall, these scores reflect a balanced, progressive approach to teaching.

Constructs	Mean	Std. Deviation
Teaching strategies and procedures	2.7652	0.63500
Educational environment	2.9881	0.61288
Study follow-up tasks and duties	2.9182	0.87027
Influences on teaching basic skills and academic achievement	3.5900	0.57309

Table 2. Study Constructs

Done by researcher

Construct A items	Mean	Std. Deviation
Teaching strategies are varied in most lessons.	2.97	0.857
The teaching strategies are completely based on Memorization and indoctrination.	2.02	0.961

The procedures and processes are followed to achieve mastery of learning the skill.	3.51	0.655
Moving from the tangible to the abstract in teaching skills	3.13	0.773

Table 3. Construct A: Teaching Strategies and Procedures

Table 4 examines aspects of the Educational Environment, showing strengths in providing a supportive and motivating classroom atmosphere. Key items like Self-Confidence and Encouragement (3.51) and Time for Skill Consolidation (3.48) indicate effective support for student development, while Teacher Influence (3.37) reflects positive moral and verbal reinforcement. Lower scores, such as Guardian Involvement in Learning (2.20), suggest that this area could benefit from enhanced family engagement. In Table 5 we evaluate the approach to Study Follow-Up Tasks and Duties. Higher scores for Task Division (3.36) and Use of Planning Skills (3.04) indicate an effective breakdown of assignments and skills practice, helping students manage and consolidate learning effectively. Table 6 reflects influences on skill development and academic success. Items like Participation in Competitions (3.47) and Supportive Environment (2.99) show that school activities and a conducive atmosphere positively impact skills, though lower scores for Parent Involvement (2.83) and Extracurricular Influence (2.88) suggest opportunities for increased support from family and extracurricular engagement.

Construct B items	Mean	Std. Deviation
The educational environment in the classroom is disciplined, comfortable, and flexible, which facilitates the teaching and stabilization of skills.	3.03	0.857
The student's learning of basic skills is monitored by the guardian in conjunction with the role of the (teacher).	2.20	0.997
Students are affected by the (teacher's) moral and verbal incentives in acquiring the skill.	3.37	0.822
Take into account individual differences and differentiation in your lessons.	3.33	0.853
Satisfy students' feelings of self-confidence and encourage students while performing the tasks assigned to them in class.	3.51	0.734
Students follow teachers' procedures in class with precision and commitment.	3.17	0.859
The focus is on basic concepts, not cramming information.	3.43	0.789
Students acquire skills from only one source (the teacher only).	2.75	0.793
Sufficient time is given to consolidate and stabilize basic skills.	3.48	0.791

Table 4. Construct B: Educational Environment

Done by researcher

Construction C items	Mean	Std. Deviation
Use the skills of reviewing lists with pictures, illustrative planning, or written summaries.	3.04	0.876

Large tasks and duties are divided into small ones to facilitate their performance and consolidate the skill.	3.36	0.75

Table 5. Construct C: Study Follow-up Tasks and Duties

Done by researcher

Construct D items	Mean	Std. Deviation
Participation in extracurricular activities (scientific, cultural, religious and sports activities) affects academic achievement and skills acquisition.	2.88	0.970
The school provides opportunities to participate in scientific, cultural, religious and sports competitions.	3.47	0.777
Parents have a role in encouraging students in your school to participate in extracurricular activities.	2.83	1.125
Your school has a supportive and stimulating learning environment	2.99	0.966

Table 6. Construct D: Influences on Teaching Basic Skills and Academic Achievement

This section presents statistical analyses examining variations across demographic and educational factors concerning the study constructs. Using the Mann-Whitney and Kruskal-Wallis tests, the study evaluates potential differences in teaching strategies, educational environment, study follow-up tasks, and influences on academic achievement based on gender, school type, and grade level. These analyses help identify whether these demographic factors significantly affect students' educational experiences and perceptions of the learning environment. We used the Mann-Whitney test to explore potential gender-related differences across study constructs, including Teaching Strategies and Procedures, Educational Environment, Study Follow-Up Tasks and Duties, and Influences on Teaching Basic Skills and Academic Achievement. The mean ranks for males and females show slight variations, with females consistently scoring slightly higher than males as shown in Table 7. However, the p-values for each construct (all above 0.05) indicate no statistically significant differences between male and female participants. This suggests that gender does not have a notable impact on perceptions of the educational constructs measured in this study.

Constructs	Gender	N	Mean rank	Sig.
Teaching strategies and procedures	Male	10	100.20	0.700
	Female	204	107.86	
Educational environment	Male	10	92.00	0.417
	Female	204	108.26	
Study follow-up tasks and duties	Male	10	92.60	0.428
	Female	204	108.23	
Influences on teaching basic skills and academic achievement	Male	10	100.05	0.694
	Female	204	107.87	

Table 7. Mean Rank for Males and Females

Done by researcher

Table 8 also employs the Mann-Whitney test to assess whether students from government and private schools differ in their views on the educational constructs. The mean ranks for students in government schools and private schools are close across all constructs, with p-values again above 0.05. These results indicate no statistically significant differences based on school type, implying that the type of school (government or private) does not significantly affect students' perceptions of teaching strategies, environment, study follow-up, or influence on skill development.

Constructs	School	N	Mean rank	Sig.
Teaching strategies and procedures	Government School	210	107.58	0.889
	Private School	4	103.25	
Educational environment	Government School	210	107.66	0.788
	Private School	4	99.25	
Study follow-up tasks and duties	Government School	210	107.59	0.881
	Private School	4	103.00	
Influences on teaching basic skills and academic achievement	Government School	210	108.10	0.304
	Private School	4	76.25	

Table 8. Mean Rank for Males and Females

Done by researcher

The Kruskal-Wallis test was applied in Table 9 to examine differences across grade levels in each construct. Although there are some fluctuations in mean ranks across grades, with 7th and 8th grades showing slightly higher ranks in several constructs, none of the constructs yield p-values below 0.05. This lack of statistical significance suggests that students' grade levels do not have a significant effect on their perceptions of the teaching strategies, educational environment, study follow-up tasks, or influences on academic achievement.

Constructs	Grades	N	Mean rank	Sig.
Teaching strategies and procedures	7th Grade	42	118.37	0.175
	8th Grade	36	120.75	
	9th Grade	29	99.97	
	10th Grade	38	108.32	

	11th Grade	46	104.29	
	12th Grade	23	81.48	
Educational environment	7th Grade	42	119.75	0.059
	8th Grade	36	126.38	
	9th Grade	29	92.53	
	10th Grade	38	97.01	
	11th Grade	46	110.28	
	12th Grade	23	86.22	
Study follow-up tasks and duties	7th Grade	42	124.67	0.272
	8th Grade	36	107.51	
	9th Grade	29	96.10	
	10th Grade	38	95.11	
	11th Grade	46	112.02	
	12th Grade	23	101.93	
Influences on teaching basic skills and academic achievement	7th Grade	42	115.93	0.076
	8th Grade	36	114.19	
	9th Grade	29	108.47	
	10th Grade	38	109.00	
	11th Grade	46	111.40	
	12th Grade	23	70.13	

Table 9. Mean Rank within Constructs According to Grades

Done by researcher

Discussion

Predominant Difficulties in Learning Mathematics is the problem-solving among Students. From the results above, most of the students faced text difficulties and unfamiliar contexts. Students need to master basic skills so they can transmit mathematical sentences into solutions Elian,2018. Previous researchers have proven that mastering language skills is more important now than ever, as students need to have high-level reading skills to translate and summarize questions given to them Al-Katheri.2023. Students are required to express their solutions in the language of mathematics. This is also following the opinion of Yuliyanti, ,2023 which states that the main difficulty experienced by students in solving problems is mathematical models. Furthermore, the results above prove that the second-most prevalent difficulty among students when solving problems was a lack of visual-spatial skills. Some researchers have identified the difficulties that students face in solving questions Husam,2022.

Conclusion

Students often face a range of challenges in learning mathematics, including difficulties in performing basic arithmetic operations, understanding abstract concepts, and solving complex problems that require analytical thinking and strategic approaches. These difficulties can arise from various factors, such as wandering attention, distractions, and trouble organizing their responses. Additionally, students may focus on trivial details rather than core concepts, while a monotonous and routine-based presentation of the curriculum can further hinder engagement and comprehension.

Additional barriers include a buildup of homework and school assignments that remain unsolved, as well as struggles with adapting to and engaging in the classroom environment. Insufficient class time and limited frequency of math sessions, relative to course content, also restrict students' ability to practice and reinforce concepts. Finally, irregular attendance and frequent absences disrupt continuity in learning, making it harder for students to keep up with their peers. Addressing these factors holistically could greatly enhance students' understanding and performance in mathematics.

Acknowledgments

The researchers acknowledge Applied Science Private University, Amman, Jordan, for the financial support granted to publish this research article.

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