Teachers' Perspectives on Poor Mathematics Achievement in Iraqi Secondary Schools

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Doi: 10.23918/ijsses.v12i1p58

Abstract: Mathematics performance in Iraq has been of concern to education stakeholders in the post war years. This research aims to identify the causes of poor mathematics achievement in secondary schools in Iraq according to the teachers' point of view. An online questionnaire was used to collect data from 110 mathematics across the major cities of Iraq. The data was then analyzed using the Minitab software, employing t-tests techniques, analysis of variance, and general descriptive statics methods. Results indicate that among others, parental involvement, pedagogical approaches, mathematics teachers' anxiety, and the learners' weak mathematics foundation during the early years are factors that affect students' performance. Recommendations and suggestions to improve the situation are clearly discussed in the study.

Keywords: Mathematics Achievement, Poor Performance, Parental Involvement, Students' Motivation.

1. Introduction

Mathematics is accepted as the most prevalent subject in the world, and it is commonly utilized in one form or another in every career. Therefore, it has consistently received an immense amount of attention. Students' mathematics achievement is generally considered a major problem (Godfrey, Silvia, Gracious Kazaara, Deus, & Christopher, 2023). It is likely to be difficult for a country to advance in science and technology without establishing a strong foundation of mathematics in its educational system (Shao & Seif, 2014). However, due to the widespread perception that mathematics is highly challenging, students generally tend to avoid mathematics classes.

This study, therefore, aims at establishing main factors contributing to the poor mathematics achievement prevalent among secondary school students in Iraq, as seen through the lens of secondary school mathematics teachers across Iraq.

Received: 13.10.2024
Accepted: 21.01.2025
Waswa, D. W., Kavlu, A., Muhammed Al-kassab, M., & Kurudirek, A. (2025). Teachers' Perspectives on Poor Mathematics Achievement in Iraqi Secondary Schools. *International Journal of Social Sciences & Educational Studies*, 12(1), 58-73.

2. Theoretical Background

Tata, (2013) citing (Michael, 2015) attributes poor performance in mathematics in Nigeria to inadequate qualified teachers and teaching materials, students' fear of mathematics and negative attitudes towards the subject. Lubienski (2007), Di Fatta, Garcia, and Gorman (2009) and Waswa, Al-kassab, and Alhasoo, (2023) added parental involvement and socio-economic status as other factors that may impact students' achievement in mathematics. Students from low socioeconomic status (SES) are less motivated to learn mathematics than their peers from high-SES families (Lubienski, 2007), because lower SES students consider mathematics as facts to memorize which affects their mathematics achievement negatively (Lubienski, 2007; Muskens, Frankenhuis, & Borghans, 2024) . Hence, these students are more likely to forget what they have learned.

Furthermore, studies have shown that parental involvement such as work with, support, or oversee students while doing their assignments had strong positive effects on students' achievement (Ali, Ilyas, Bhutto, & Mughal, 2023; Kovács, Oláh, & Pusztai, 2024; Pinneo & Nolen, 2024). On the other hand, in as much as parents acknowledge the importance of mathematics in general education, they do not believe it is vital for personal development or opportunities as parents (Douglas & Rittle-Johnson, 2024; Hidayatullah & Csíkos, 2023; Jay, Rose, & Simmons, 2018). This makes it difficult for parents to meaningfully help or get involved in the children's learning of mathematics.

Another factor that affects students' academic achievement in mathematics is math teachers' anxiety (Ramirez, Hooper, Kersting, Ferguson, & Yeager, 2018). Unfortunately, math teachers have more anxiety than their colleagues in other fields of study (Bryant, 2009). According to Beilock, Gunderson, Ramirez, and Levine (2010)'s study, fear of mathematics which is modelled by math-anxious teachers hinders students' learning. Some math teachers experience anxiety in solving challenging math problems (Stoehr, 2017). Another study showed that young female students in classes with anxious math female teachers follow in the footsteps of their teachers and accept the traditional stereotype that women are bad at math (Brown, Westenskow, & Moyer-Packenham, 2012; Shapiro & Williams, 2012). Other research indicates that math-anxious teachers respond angrily when students ask for help with mathematics (O'Leary, Fitzpatrick, & Hallett, 2017), as well as over-emphasize rote learning (Vinson, 2001), they also teach in very inflexible and rigid way (Markovits, 2011), spend less time attending questions from students, and generally ask for single solutions to problems that may have multiple solutions, which harm students math learning and cause poor academic achievement in mathematics (Deleg, Zanabazar, & Ravdan, 2022).

Mathematics anxiety is not derived from mathematics itself but from the way that mathematics is taught, and teachers' approach causes students to develop mathematics fear and anxiety (Geist, 2010). In this context, many studies proved and showed that math anxiety affects students' math performance (Daker, Gattas, Sokolowski, Green, & Lyons, 2021; Khasawneh, Gosling, & Williams, 2021). Students with high anxiety had poor performance in mathematics classes. On the other hand, students with low mathematics anxiety had higher achievement in solving math-related problems (Musa & Maat, 2021). However, studies agree that teachers' belief in their students' learning capability affects students' performance in Mathematics (Wachira, 2016). Teachers' positive belief, encouragement, commitment to the approach to how mathematical concepts are transmitted, and high levels of enthusiasm improve learners' performance in mathematics (Ortiz-Laso, Diego-Mantecón, Lavicza, & Blanco, 2023).

Students' mindsets and beliefs about mathematics are other key factors contributing to students' academic performance in mathematics. Students generally naively accept the erroneous belief that some people are born with a mathematical brain rather than studying harder to pass (Bah, 2021).

To encapsulate, numerous factors can be attributed to students' poor academic performance in mathematics, including students' negative attitudes towards subjects, anxiety and fear of the subject (Hernández de la Hera, Morales-Rodríguez, Rodríguez-Gobiet, & Martínez-Ramón, 2023; Mazana, Suero Montero, & Olifage, 2019), as well as ineffective teaching strategies, poorly pedagogically qualified teachers, and scientific incompetence (Abdalgani & Eshan, 2019), lack of teaching experience (Subia, Salangsang, & Medrano, 2018), inadequate teaching and learning materials, overcrowded and poorly furnished classes and lack of guidance and counseling services. Family-related factors such as financial status, scientific and cultural level, and social stability.

3. Methods

This quantitative study employed an online questionnaire to collect data from mathematics teachers across Iraq. The questionnaire was translated back-to-back into Kurdish and Arabic, the 2 most spoken languages in Iraq besides English. 110 mathematics teachers from major cities of Iraq, including Baghdad, Erbil, Basra, Kirkuk, Halabja, Soran, Duhok, and Sulaymaniyah, responded to the questionnaire. A pilot study was done to assess the reliability of the items on the questionnaire and the validity determined by professionals in the field of statistics. Data collected were analyzed using Minitab and found to be approximately normal, with the mean average almost equal to the median, 135.19 and 136.00, respectively, and homogeneous with about 85% consistency. One-Sample T-Test was performed to verify the descriptive statistics, using the null hypothesis $H_o: \mu = 120$ against the alternative hypothesis $H_1: \mu \neq 120$.

Table 1: One-Sample T-Test for all data

Mean	StDev	SE Mean	95% CI for μ	T-Value	P-Value
135.19	20.58	1.96	(131.30, 139.08)	7.74	0.000

Table 1 shows that most of the respondents either agreed or strongly agreed with items in the questionnaire as the mean (135.19) is above μ, and so the null hypothesis is rejected at P-Value 0.000. This result confirms the descriptive data results that the data collected is homogeneous.

3.1 Gender

A Two-Samples T-Test was used to determine how male and female teachers treated the questionnaire. In the test, equal variance for male and female respondents was assumed with $\mu_1 = \mu_2$, where $\mu_1$is the mean for male respondents and μ_2 mean for female respondents, using the null hypothesis $H_o: \mu_1 - \mu_2 = 0$ against the alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$.

Table 2: Two-Sample T—Test for Gender

Gender	N	Mean	StDev	SE Mean	DF	T-Value	P-Value
Male	62	136.5	19.3	2.4	108	0.74	0.462
Female	48	133.5	22.3	3.2			

The results in Table 2 indicate that there was no statistically significant difference in the way the two genders viewed the items on the questionnaire, and therefore, the null hypothesis is not rejected at P-Value 0.462, thus, $\mu_1 = \mu_2$.

3.2 Type of Schools

A One-Way Analysis of Variance was performed to determine whether there were differences in the way teachers from the different types of schools answered the questionnaire.

Table 3: One-Way ANOVA for Types of Schools

School Type	N	Mean	Source	DF	Adj MS	F-Value	P-Value
Private Primary	38	192.32	Factor	3	994.8	2.44	0.068
Private Secondary	27	133.70	Error	106			
Public Primary	20	142.45	Total	109	407.6		
Public Secondary	25	139.92					

Results in Table 3 clearly show that there is no statistically significant difference in the way teachers from different types of schools answered the questionnaire. Therefore, the null hypothesis is not rejected.

3.3 Teachers' Level of Education

The sampled teachers' level of education was analyzed by One-Way ANOVA to determine whether academic qualification was a determining factor in the way they answered the questionnaire.

Table 4: One-Way ANOVA for Teachers' Level of Education

Number of Years	N	Mean	Source	DF	Adj MS	F-Value	P-Value
Diploma Certificate	6	136.8	Factor	2	67.52	0.16	0.855
Bachelor's Degree	93	135.46	Error	107			
Master's Degree	11	132.00	Total	109	67.52		

Results presented in Table 4 show that the level of education was not a determining factor among the respondents. The null hypothesis is, therefore, not rejected.

3.4 Teaching Experience

One-Way ANOVA was used to determine whether there was a significant difference in the way senior experienced teachers responded to the questionnaire as compared to the less experienced teachers.

Table 5: One-Way ANOVA for number of years of Teaching Experience

Number of Years	N	Mean	Source	DF	Adj MS	F-Value	P-Value
0 – 5 years	45	135.80	Factor	2	254.1	0.60	0.553
6 – 10 years	28	137.89	Error	107			
11 or more years	37	132.41	Total	109	426.9		

The result in table 5 shows that there was no statistically significant difference in the way teachers responded to the questionnaire. The number of years of teaching had no bearing on the views of the teachers about the current situation. The null hypothesis is, therefore not rejected.

3.5 Location of Schools

Data was collected from cities across Iraq. Therefore, One-Way ANOVA was used to determine whether the location was an influencing factor.

Table 6: One-Way ANOVA for Location of the Schools

Location	N	Mean	Source	DF	Adj MS	F-Value	P-Value
Erbil	31	131.45	Factor	7			
Sulaymaniyah	33	134.73			286.7		
Duhok	10	142.70					
Kirkuk	7	130.4	Error	102		0.66	0.704
Soran	3	141.0			433.1		
Halabja	7	139.71					
Baghdad	15	140.00	Total	109			
Basra	4	127.3					

Results in Table 6 clearly show that the location of the schools had no influence on the decisions taken by teachers about items in the questionnaire. Since there was no statistically significant difference between and among locations, the null hypothesis is not rejected.

4. Results

4.1 Descriptive Analysis

Descriptive statistics from the data are analyzed based on 6 variables: motivation and interest to study mathematics, mathematics foundation in early years, concentration when doing mathematics activities, mathematics curriculum, school/classroom environment, and instructors and instructing practices, and presented below as follows.

4.2 Motivation and Interest to Study Mathematics

Table 7: Motivation and Interest to Study Mathematics

Item	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
There is a decrease in the students' motivation and desire to study mathematics.	3.64	21.82	17.27	30.00	27.27
Students believe that mathematics is difficult.	0.91	4.55	11.82	37.27	45.45

Students feel that mathematics is useless in everyday life.	6.36	14.55	15.45	30.91	32.73
Students' lack of desire to study sciences and technical courses at the university.	1.82	13.64	27.27	36.36	20.91
Society in general has a negative perception towards education.	6.36	21.82	24.55	27.27	20.00

As can be seen from Table 7, more than half of the respondents agree that the level of students' motivation and desire to study mathematics has decreased, and the majority of them, 83%, also agree with the notion that students believe mathematics is difficult. Almost two-thirds of the respondents agree that students feel that mathematics is useless in everyday life. However, less than half of the respondents think that society, in general, has a negative perception towards education, as opposed to about 57% who think that students' lack of desire to study sciences at university may contribute to the poor performance in the subject.

4.3 Mathematics Foundation in Early Years

Table 8: Mathematics Foundation in Early Years

Item	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Parents' lack interest in the education of their children.	8.18	25.45	29.09	23.64	13.64
Weak mathematics foundation during primary school years.	2.73	19.09	14.55	21.82	41.82
Too many extracurricular activities take students' time instead of mathematics	10.00	20.91	23.64	22.73	22.73
Students are generally weak in mental arithmetic and abstract thinking.	0	8.18	30.00	39.09	22.73
Students have too many subjects to study	1.82	8.18	11.82	44.55	33.64
Students tend to study literary subjects at the expense of mathematics.	9.09	18.18	29.09	29.09	14.55
Mathematics teachers' sick/maternity leaves without replacements.	7.27	18.18	27.27	29.09	18.18

It should be noted from Table 8 that no respondent strongly disagreed that students are generally weak in mental arithmetic and abstract thinking, in fact, more than 60% agree with the sentiment. Almost 80% concur that students have too many subjects to study, and slightly more than a quarter of them disagree with the notion that parents lack interest in their children's education. Also, as many as 63% agreed that a weak mathematics foundation during primary school years is a contributing factor to poor performance.

4.4 Concentration when Doing Mathematics Activities

Table 9: Concentration when doing Mathematics activities.

Item	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Poor concentration by students while the teacher is teaching	0.91	9.09	15.45	40.91	33.64
Poor students' health conditions and weak physical fitness.	13.64	37.27	30.91	15.45	2.73
Students are exposed to too much psychological and social pressure.	1.82	12.73	31.82	34.55	19.09
Students have frequent absences from classes.	10.00	33.64	26.36	21.82	8.18
Noisy hallways and classroom environments.	3.64	23.64	25.45	20.00	27.27
Adopting evaluation methods based on traditional tests	3.64	15.45	28.18	40.00	12.73

Based on Table 9, majority of teachers, about 53%, agree to using outdated evaluation methods, whereas less than half said that noisy hallways and classroom environments affect the concentration of students when doing mathematics activities. However, perhaps the highest factor agreed upon by about 74% of the respondents is the realization that students exhibit poor concentration at the time teachers are teaching. Interestingly, slightly more than 50% disagreed with the notion that poor students' health conditions and weak physical fitness affect their concentration when doing mathematics activities. Additionally, more than one-third do not agree that students' frequent absences from classes affect their concentration.

4.5 Mathematics Curriculum

Table 10: Mathematics Curriculum

Item	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Teachers do not use modern methods of teaching mathematics.	8.18	30.00	21.82	16.36	23.64
The mathematics syllabus is too intense and difficult to cover effectively.	10.00	22.73	22.73	28.18	16.36
The mathematics curriculum does not match the general average level of students.	8.18	16.36	26.36	34.55	14.55
Lack of students' participation in the mathematics lessons.	7.27	34.55	21.82	23.64	12.73

Table 10 indicates that the number of respondents who agreed that teachers do not use modern methods of teaching mathematics, about 39%, is almost the same as those who disagreed, and almost half of them concur that the mathematics curriculum does not match the general average level of students. However, about 42% disagree that there is a lack of students' participation in the mathematics lessons, although approximately the same number agree that the mathematics syllabus is too intense and difficult to cover effectively.

4.6 School/Classroom Environment

Table 11: School/Classroom Environment

Item	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Too many students in one classroom.	10.00	13.64	30.91	11.82	33.64
Mathematics teachers do not use modern educational technology in the classrooms.	6.36	30.00	21.82	26.36	15.45
Lack of sports activities after school.	6.36	21.82	28.18	25.45	18.18
Lack of communication between teachers and parents of students.	18.18	20.00	19.09	25.45	17.27

Pupils' dependence on private lessons and lack of attention in the classroom.	2.73	12.73	21.82	40.00	22.73
Failure by students to do their mathematics homework.	5.45	9.09	30.91	41.82	12.73
Providing ready-made solutions to mathematical problems that deny opportunities for students to think.	3.64	13.64	19.09	40.00	23.64
Math classes are scheduled in the last hours of the school day.	5.45	18.18	29.09	23.64	23.64

Three factors come out strongly from Table 11, with over 60% of respondents agreeing that pupils' dependence on private lessons and lack of attention in the classroom, failure by students to do their mathematics homework, and providing ready-made solutions to mathematical problems that deny opportunities for students to think critically, affect students' performance in the subject. On the other hand, more than one-third of them disagreed that mathematics teachers do not use modern educational technology in the classrooms, and about 38% also disagreed with the assertion that there is a lack of communication between teachers and parents of students. However, a large number; 41%, 41%, and 30% could not decide on whether the number of students in classrooms is too large, or over-dependence on private lessons and lack of attention in the classroom or scheduling of mathematics classes in the last hours of the school day respectively, weigh on the performance of the students.

4.7 Instructors and Instructing Practices

Table 12: Instructors and Instructing Practices

Item	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Mathematics teachers lack content competence in their areas of specialization.	13.64	39.09	20.91	17.27	9.09
Students have negative perceptions towards mathematics teachers.	6.36	20.91	19.09	32.73	20.91
Mathematics teachers have too many hours to teach in a week.	10.00	17.27	20.00	21.82	30.91
Mathematics teachers do not attend to individual student's mathematics needs.	11.82	36.36	25.45	16.36	10.00

Difficulty in student understanding of mathematical symbols and concepts in English.	3.64	25.45	30.91	22.73	17.27
Lack of continuous training sessions for teachers.	4.55	21.82	23.64	24.55	25.45
Outstanding mathematics students are reluctant to become teachers.	8.18	15.45	22.73	28.18	25.45
Mathematics teachers do not move with students from one grade to the next.	3.64	19.09	22.73	27.27	27.27
Lack of academic competition and love of academic excellence within departments.	5.45	14.55	23.64	40.91	15.45
Failure of teachers to link mathematical concepts with other sciences.	8.18	22.73	24.55	30.91	13.64

Table 12 clarifies that more than half of the respondents disagree that mathematics teachers lack content competence in their areas of specialization, and close to 50% also disagree that mathematics teachers do not attend to individual student's mathematics needs. However, 56% agree to a lack of academic competition and love for academic excellence within departments, and 44% admit teachers' failure to link mathematical concepts to other sciences. Whereas 54% attribute poor performance in mathematics to the fact that teachers do not move with students from one grade to the next and the unwillingness of outstanding mathematics students to become teachers, 50% attribute it to the lack of continuous training for teachers and about 52% agree teachers have too many hours of teaching in a week, and also agree that students have negative perceptions of mathematics teachers.

4.8 Summary of Results

Having analyzed each variable separately, a final One-Way ANOVA was performed on the variables together to determine whether there was a statistically significant relationship among them.

Table 13: One-Way ANOVA for all the 6 variables

Variable	Mean	Source	DF	Adj MS	F-Value	P-Value
Motivation and Interest to Study Mathematics	18.400	Factor	5	5505.77	278.97	0.000
Mathematics Foundation in Early Years	24.482					
Concentration when Doing Mathematics Activities	19.809	Error	654			
Mathematics Curriculum	12.664			19.74		
School/Classroom Environment	27.136	Total	659			
Instructors and Instructing Practices	32.700					

Results in Table13 show that the differences within and between the factors are statistically highly significant, with a large F-value of 278.97 and a P-value of 0.000. Consequently, the null hypothesis is rejected. It is also clear from the table that the factor with the highest influence is 'Instructors and Instruction Practices' followed by 'School/Classroom Environment' with means of 32.700 and 27.136, respectively. Conversely, factors with the least influence are 'Mathematics Curriculum' and 'Motivation and Interest to Study Mathematics' with means of 12.664 and 18.400, respectively.

5. Discussion and Conclusion

Factors such as students' and teachers' attitudes, teaching methods, classroom environment, gender, and parental factors have been found to influence student achievement in mathematics. It is evident from the research that students' motivation to study mathematics has decreased, therefore, attitudinal transformation is required to generate interest as students' attitude influences their success in mathematics (Paksu, 2008). This calls for students' engagement in the learning process which involves brain stimulating mathematical materials and fun activities that cultivate mental growth and ultimate achievement (Kurudirek & Akca, 2015).

The curriculum issue can be addressed by the relevant government departments through workshops, symposiums, seminars, and conferences. Teacher preparation before class is essential and must be allocated ample effort by teachers. However, this is time-consuming and may affect the efficiency of the teacher since more time allocation translates to less student engagement time leading to reduced teacher efficiency. To address this, regular in-service programs should be done to update teachers on the trending global pedagogy techniques. Students' motivation, on the other hand, can be addressed through positive reinforcement (Aguilar, 2021), a simple but powerful technique

The findings of this study should enable parents and teachers to understand the children's perceived difficulties in mathematics so that they can participate in bringing out the children's abilities and inner attributes. Teachers can achieve this through designing and revising teaching routines for children with low math achievement. The methods of teaching can contribute to students' reluctance and passiveness (Nuri & Marsigit,2019); therefore, teachers should be encouraged to participate in teacher training programs and refresher courses for professional development.

There is an accepted fact that teachers' attitudes greatly influence student achievement in mathematics. The learner forms his attitude based on the teacher's disposition, which may affect learning outcomes. The necessity of all teachers to be role models, not just mathematics, is an issue that should always be considered. Exemplary and successful teacher attitude toward mathematics is significantly connected to high student accomplishment (Rasid et al., 2020). Everyone desires all teachers to be role models who are admired and followed by their students.

The study is limited to participants from private schools in Iraq. Therefore, the findings cannot be generalized to include the larger context.

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