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Presenting the Model of Influencing Factors on Mathematical Progress-Structural Equation Model Approach

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Abstract. Considering the challenges that exist in improving mathematics education and students' mathematical progress, the issue that is raised is what factors affect students' mathematical progress. The purpose of this research is to investigate the factors affecting maths performance and provide a model of students' mathematical progress. To evaluate the conceptual model of the research, first, by using a qualitative approach, the factors affecting mathematical progress were identified. Then, by designing a researcher-made questionnaire and considering students' maths scores as a measure of mathematical progress, the necessary data were collected by distributing the questionnaire amongst 384 students of the secondary level in schools in 22 districts of Tehran. In the following, after the descriptive analysis and the validity and reliability test of the questionnaires, the data were analyzed using structural equation modelling. The results of the research showed that at 95% confidence level, the learning environment variables, teachers' emotional support, teachers' teaching methods, students' interest, students' motivation and values, the quality and initiative of learning and students' self-efficacy have a positive and significant effect on their mathematical progress. Also, the results of the research showed that family income and parents' education have a positive and significant effect on students' mathematical progress.

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1. Introduction

Today's world calls for educational experiences that meet the demands of the 21st century. Students need relevant skills to solve challenging societal problems. For example, they need critical thinking skills to distinguish between important information and misinformation. The evolution of new technologies emphasizes the need for a maths curriculum that promotes critical thinking skills [23].

Mathematics is considered a core subject due to its practical and beneficial nature. Throughout history, its importance has been linked to its ability to develop mental discipline and enhance logic and reasoning skills. Research has shown that education leaders tend to prioritize reading and mathematics, reflecting their high status, by allocating resources and focusing on curriculum, instructional reform, and accountability efforts [24]. Skovsmose (1990) argued that "mathematics has a 'society-shaping' function important implications for development and organization of society [14]. It is crucial to have strong

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maths skills for success in education and the future workplace. However, many children experience maths learning difficulties, with around eight percent affected in a typical classroom [26]. However, many mathematics educators are confronted with inadequate Year 1 students’ mathematical skills. “This is often referred to as the ‘Mathematics Problem’ and relates to students entering higher education whose mathematics at school level is insufficient for the demands of their higher education Service mathematics courses and careers [15].

The quality of teaching and learning in mathematics is a major challenge and for educators. General concern about mathematics achievement has been evident for the last 20 years [3]. Mathematics teachers work hard to help all students make reasonable progress. There is a need for more insight to better understand the nature of students' struggles to learn mathematics and the factors that enable this group to progress mathematically. Various research studies are focused on gaining these insights [27]. The quality of the interaction between student and teacher and its impact on student learning depends on the teacher's grasp of the student's thought process [16]. When assisting students with problem solving, the teacher must understand the specific reasoning difficulties of the students and be able to discern between them. Failure to identify these specific difficulties may result in either revealing a significant portion of the solution, depriving the student of the opportunity for productive struggle, the responsibility to solve the problem, and the chance to learn from it [28].

In the literature, various factors have been mentioned as influencing variables on mathematical progress. Research finds that teachers’ attention to the relational aspects of classroom interactions is as important to the intellectual aspects when pursuing educational equity for culturally diverse students. Positive student–teacher relationships promote higher levels of behavioral engagement and academic outcomes for students, a higher sense of belonging, and feeling that their intellectual contributions matter [18].

The quality of the teacher is one of the most important criteria for student satisfaction, which leads to a positive result in the education process. In addition, understanding the learner's needs by the teacher ensures student satisfaction [13]. Therefore, it is hypothesized that the quality of teacher teaching significantly affects students' academic performance [8]. Because the teacher is responsible for all the teaching and learning activities of the student and must master all the appropriate mechanisms, processes and educational methods. The teacher's familiarity with the age-appropriate needs of the students and the use of new methods, which in turn lead to motivation in the students, have regarded the academic progress of mathematics to be equipped with a variety of teaching methods [11].

Research indicates that parents' level of education plays a significant role in their children's academic achievement. Parents who create a supportive learning environment at home and have positive attitudes towards their children's education often set high educational goals for their children. Studies have shown a strong correlation between parents' educational attainment and their children's academic success. For instance, students with parents who have not completed high school tend to perform worse in maths compared to students with parents who have higher levels of education. Therefore, it's clear that parents' educational background can have a substantial impact on their children's attitude towards learning [29].

Although various factors have been reported in the literature to explain academic progress, limited studies have investigated and modeled the factors that determine students' mathematical progress. This research aims to provide a comprehensive model to investigate the factors affecting mathematical progress. The main question of this research is, what factors affect the mathematical progress of secondary school students in Tehran, and which of these factors have a significant effect on mathematical progress?

2. Literature review

In [25], the authors assessed how middle school mathematics teachers perceived caring for students online during the COVID-19 pandemic. The researcher evaluated the role of the learning environment in the way teachers take care of students and their attitude towards mathematics by analyzing interview and focus group transcripts. The findings showed that the online learning environment limits and facilitates teacher care. According to the research, the vagueness of students' thinking online makes it difficult for teachers to take care of students' mathematical thinking. Moreover, the online learning environment limits collaborative problem-solving and enhances teacher care for student relationships. Additionally, teachers reported that in the online learning environment, there was more privacy for some students and their caring was conditional on the students initiating a relationship or reciprocity.

In 2024, it was conducted a study on teachers' self-efficacy in teaching mathematics (SETM) and its connection to their teaching and instructional practices [2]. The study collected data from 327 primary teachers in New Zealand and used a multilevel structural equation model to analyze the relationships between SETM scales, effective teaching practices, and teacher and school characteristics. The research results showed no significant differences in SETM based on gender, year level, or school. Experienced teachers displayed significantly higher SETM scores than their less experienced counterparts. Additionally, teachers with strong self-efficacy in teaching mathematics reported more effective teaching practices in the mathematics classroom compared to teachers with low self-efficacy.

In [26], the authors conducted an exploratory study to investigate how four mathematics teachers supported learners with mathematics learning difficulties in a Kenyan secondary school. The study aimed to understand teachers' perceptions of their students, their considerations when planning lessons, and the strategies they used to address mathematics learning difficulties.

In [32], it was investigated the differences in maths learning environments between Elementary Math Specialists (EMS) classrooms (n=28) and classrooms taught by their peers (n=33). They used path analysis to assess the connection between mathematical knowledge for teaching, beliefs, and background characteristics with the learning environment. The results showed that classrooms taught by EMS had learning environments with these elements significantly more often. Additionally, two paths showed mediating effects on the relationship between EMS status and the learning environment. One path was associated with teachers' beliefs about the importance of calculations in learning mathematics, whilst the other path was linked to teachers' mathematical knowledge for teaching and their beliefs about how learners construct mathematical knowledge.

In [6], a professional learning program that focused on addressing teachers' identified areas of need, namely, multiple thinking was developed. The program's content centered on the underlying concepts of multiple thinking, teaching strategies, challenging tasks, and classroom practice. The researchers conducted the professional learning program through six 90-minute modules in 13 schools during the second to fourth terms as part of professional education. For the study, student historical data were collected over four years (2016-2019) to analyze the average progress over time in participating and non-participating schools. Data from the National Assessment Program for Literacy and Numeracy (NAPLAN) and the Mathematics Assessment Interview (MAI) were utilized to assess the learning impact. The results indicated that schools that participated in additional learning and coaching support showed greater average progress in student learning over two years compared to other schools. The research findings confirmed that targeted school-based professional learning, coupled with classroom support from knowledgeable individuals, resulted in enhancing teachers' understanding of multiple thinking and educational content knowledge, thus supporting student learning.

The authors examined the impact of students' self-efficacy beliefs within an educational program on the development of their reasoning competence in [31]. The study involved the assessment of 1,261 students across 71 elementary grades using multilevel modelling. The results indicated that at the class level, formative feedback was a predictor of students' reasoning, with self-efficacy playing a mediating role. Additionally, at the individual level, formative feedback on students' performance was found to be effective.

It was conducted a study to identify factors that enhance the mathematical engagement of primary students in Australia across different learning environments in [27]. The study focused on extended mathematical understanding intervention lessons, classroom mathematics lessons, and home mathematics learning. The researchers used a mathematical model of participation, which included facilitators, indicators, and consequences of participation, to guide the data analysis process. The study examined changes in outcomes for the three categories of engagement and identified several key facilitators of mathematics engagement for students who struggle with math. These facilitators included maths tasks and games, the use of number lines to represent whole numbers, and the presentation of a wide range of mathematical content beyond just numbers. The results of the study also highlighted the social aspect of learning as an important factor in students' enthusiasm for learning mathematics. Having family members, peers, and supportive teachers involved in maths activities had a positive impact on students' engagement with mathematics.

In [22], it was evaluated the impact of the restrictions of COVID-19 on the mathematical progress of Spanish students. The data were collected quantitatively and qualitatively from a statistical sample of 368 Year 9 students (14 to 15 years old). The results show statistically significant differences when comparing students' mathematical progress before and after COVID-19. The results do not show any statistically significant difference between male and female students, and in general, the restrictions forced by COVID-19 have been able to cause a significant decrease in students' mathematical progress.

In [10], it was explored how teacher interaction affects the connection between students' self-efficacy and their performance in mathematics across three countries: Korea, Singapore, and the United States. The study utilized hierarchical linear modelling to analyze the data. The results of the research revealed that in all three countries, different types of teacher interaction play a moderating role in the relationship between self-efficacy and students' mathematics achievement. The study found that in Korea, students with lower self-efficacy tend to perform better when teachers interact with them more frequently. Additionally, in Singapore, students of all self-efficacy levels benefit from high levels of teacher interaction.

In [5], it was conducted a pre-registered meta-analysis to estimate the average weighted correlation coefficient between the home maths environment and children's maths achievement and how the potential moderators (i.e. assessment, study and sample characteristics) have given. The results of this research show that the environments and interactions related to children's learning in a specific field support mathematical progress, and in fact, a positive and significant relationship can be attributed to the home maths environment on mathematical progress.

A model with 53 items and the regression tree method to identify the predictors of students' mathematical progress in secondary education have been used in [7]. The researchers predicted which variables would affect the progress or decline in mathematics in Bland. The results showed that the family's monthly income, motivation and the possibility of receiving a scholarship, the rate of entering high-ranking universities are amongst the variables that are directly affected by mathematical progress.

In [17], it was investigated the effects of reverse learning with gamification, traditional learning and online independent study on students' mathematical progress and cognitive engagement. To achieve the goal, the researchers used a mixed method and divided the Year 9 students into an online independent study group of 21 people, a reverse study group of 28 people, and a traditional study group of 27 people. The results show that reverse learning with gamification improves students' cognitive interaction better than the other two approaches, and peer interactions inside the classroom are considered more necessary and effective for mathematics progress and students' cognitive engagement.

It was investigated the effect of problematic use of the Internet on the progress of mathematics, considering the mediating role of self-efficacy and teacher-student relationships in [36]. In this study, which was conducted amongst Chinese students, the data analysis shows that the problematic use of the Internet, both directly and indirectly, and with the help of the mediating role of self-efficacy and the moderating role of teacher-student relationships, has a negative and significant effect on mathematical progress.

In [30], the authors studied the learning outcomes of 38 students with intellectual disabilities from 31 classes. The researchers collected data on mathematical progress at the beginning and end of an academic year. Through cluster analysis, they identified four distinct groups with significant differences in mathematical achievement. The findings suggest that prior knowledge is a strong predictor of mathematical achievement and accounts for more variance than IQ.

A study on the connection between children's maths self-efficacy and their parents' emotional arousal towards math were conducted in [1]. The study involved 84 parent-child pairs from seven schools in New Zealand and utilized the embedded design method. The researchers did not find a significant correlation between parents' self-efficacy and emotional arousal and their children's maths self-efficacy and emotional arousal. However, they did discover that parents' emotional arousal towards maths affected their willingness to assist with their children's maths homework. Amongst the parents who helped with maths homework, there was a positive and significant correlation between their children's maths self-efficacy and emotional arousal. These parents were generally described as calm and using positive interaction techniques. The study also revealed that fathers tended to be calmer than mothers and were more inclined to help with maths homework. Furthermore, there was a positive and significant correlation between fathers' emotional arousal towards maths and their children's maths self-efficacy.

In [4], it was conducted a mixed-methods and causal-comparative study to evaluate two educational approaches in undergraduate engineering students' differential equations courses. One classroom emphasized decontextualization techniques for solving ordinary differential equations, whilst the other class emphasized modelling principles for deriving and interpreting ordinary differential equations as models of real-world phenomena. Both classrooms were lecture-based. The article provides a brief overview of both approaches and compares a lesson on the same topic in the two classes. The researcher used ANCOVA to compare the student's performance in the final exam with the control of their previous mathematics progress. According to the researcher's results, the modelling perspective for teaching differential equations helps students learn mathematics better.

As the review of the background of the research shows, although the issue of academic progress, especially in mathematics, is not one of the new topics; nevertheless, most of the research conducted in the field of mathematics and mathematical progress is classified into three areas: classroom education, educational research, and educational design, and all this research is aimed at improving the teaching and learning of mathematics. According to the review of the background of the research, it can be argued that there is still a gap in experimental studies in the field of providing an efficient model to identify the factors that affect mathematical progress, and as a result, the current research has significant innovation.

3. Methodology

In this research, qualitative and quantitative methods have been used to identify the factors affecting mathematical progress. In the qualitative part, using the interview, for open coding (reading the data line by line, extracting the main concepts and sentences, forming categories and primary classes) axial coding (classifying the data, identifying the components that affect mathematical progress, forming classes) has been used to extract the dimensions and indicators affecting mathematical progress. In the second stage of qualitative analysis, to validate the identified components affecting mathematical progress the fuzzy Delphi technique is used. The purpose of the fuzzy Delphi technique is to reach the most reliable group agreement of experts on a specific topic, which is done by asking experts for their opinions according to their feedback. The fuzzy Delphi technique is used both in forecasting and screening indicators which was used in this research to screen indicators and factors affecting mathematical progress. In the fuzzy Delphi technique used in the paper, scores were calculated based on triangular fuzzy logic. Two statistical populations have been used in this research.

The statistical population of the qualitative section includes teachers, professors and professors of mathematics, as well as academic advisers of the senior high school level of the government of 22 districts of Tehran, who are in contact with students for their profession and are aware of the state of learning and teaching mathematics. The statistical sample from the mentioned statistical population was selected by the snowball method and based on the saturation method. In saturation, sampling continues until the entry of a new member into the sample does not provide new information to the researcher. Usually, sampling by saturation method is between 5 and 25 members of the society, and in this research, 25 people were selected.

To ensure the existence of sufficient consensus regarding the identified dimensions amongst the group of experts, the coefficient of agreement has been used. After implementing the fuzzy Delphi method and ensuring the validity of the identified indicators, a questionnaire was designed to estimate the effect of each variable on students' mathematical progress. The statistical population of the quantitative part of this research is all the students of the second public high school for girls and boys in the 22 districts of Tehran. Based on Cochran's formula, 384 people were selected from this population using stratified sampling. The data collection tool is the researcher's questionnaire and students' maths scores. The validity of the questionnaire has been confirmed by consulting with experts, professors and experts in the field. Based on the findings of the qualitative analysis of the research, 42 indicators affecting mathematical progress were identified, and these indicators were classified into 9 groups (Table 1).

Parents' education: In this research, parents' education is divided into two variables, the mother's and father's education, each of which is a ranking variable that is given a score of 1 to 5 according to education level (Diploma or less = 1, Foundation Degree = 2, Bachelor's degree = 3, Bachelor's degree = 3 Master=4 & Ph.D.=5).

Family income: The family income variable is also a ranked variable that takes numbers from 1 to 5 according to the level of household income.

The job of each student's parent is also divided into 3 dummy variables, which are defined as follows:

Unemployment of parents (mother or father): If the mother (father) of the family is unemployed, the variable of unemployment of the mother (father) is set to 1, otherwise it is set to zero.

Government employment of parents (mother or father): If the mother (father) of the family is employed in the government sector, the variable of government employment of the mother (father) is set to 1 and otherwise to zero.

Private employment of parents (mother or father): If the mother (father) of the family is employed in the private sector, the variable of private employment of the mother (father) is set to 1, otherwise it is set to zero.

Table 1.Dimensions and indicators affecting mathematical progress from qualitative analysis.

Dimension	Items	Dimension	Items
Individual interest	Enjoy learning	Learning Quality	Student initiative ability
	The role of mathematics in learning interesting subjects		Using personal initiative in collecting materials
	Liking math		Ability to complete homework accurately
Family characteristics	Parents' education		Desire to spend free time to learn mathematics
	Parents' occupation		Good performance in mathematics
	family income		Doing maths homework without help from others
Students' self-efficacy	Learning speed	Learning initiative	Sharing learning experiences
	Skill in solving difficult problems		Collaborating with other students on maths learning problems
	The teacher's expression that the student is good in mathematics		Commenting in the classroom
	Interest in learning mathematics		Mental focus in the classroom
	The student's good record in learning mathematics	Emotional support from teachers	Teacher's ability to motivate students
	Student's positive attitude towards learning mathematics		Teacher's ability to guide students
	It is not difficult for students to learn		Encouraging by teachers
	Interest in learning mathematics without any compulsion		Understanding student problems by teachers
	Confidence to learning mathematics		Quick teacher feedback on student performance
Motivation & value	Positive attitude towards the role of mathematics in daily activities	Learning environment	Educational facilities of the teaching place
	Positive attitude towards the benefits of mathematics after graduation		Classroom space

	Ability to understand the objectives of mathematics	Teaching method	The attractiveness of the teacher's class
	Interested in choosing a career related to		The teacher's use of new teaching methods
	Not paying attention to the grade in the learning		Using new books and not using outdated books
	Motivation for choosing a university course		
	The role of mathematics in learning other subjects		

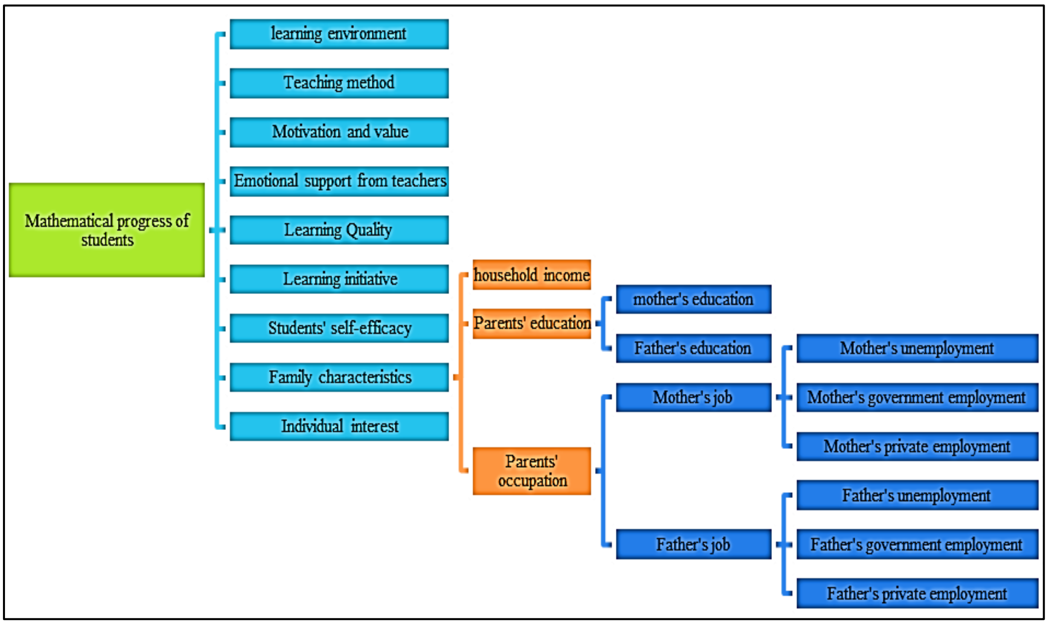

Figure 1: The conceptual model of the research.

The dependent variable of this research is students' mathematical progress, which is measured by students' maths scores. To model the factors influencing students' mathematical progress, a structural equation model with the PLS technique has been used. In this research, to ensure a good fit of the model, the following criteria will be applied in data analysis:

- Average Variance Extracted (AVE) is higher than 0.5 [9],
- Composite reliability is higher than 0.7 [9],
- Cronbach's alpha higher than 0.6 [9],
- The goodness of fit index of the model (GOF) is calculated by multiplying the square root of AVE by the adjusted average R^2. If the GOF is greater than 0.36, the fit is favourable [33].

The conceptual model of the research is presented in Figure (1). Based on the conceptual model of the research, the following hypotheses can be formulated:
H1: The learning environment affects the mathematical progress of secondary school

students in the 22 districts of Tehran.
H2: The teacher's teaching method affects the mathematical progress of the students of the senior high school level in the 22 districts of Tehran.
H3: The emotional support of teachers affects the mathematical progress of secondary school students in the 22 districts of Tehran.
H4: Motivation and values affect the mathematical progress of secondary school students in the 22 districts of Tehran.
H5: The quality of learning affects the mathematical progress of secondary school students in the 22 districts of Tehran.
H6: The learning initiative affects the mathematical progress of secondary school students in the 22 districts of Tehran.
H7: Students' self-efficacy affects the mathematical progress of secondary school students in the 22 districts of Tehran.
H8: Individual interest affects the mathematical progress of secondary school students in the 22 districts of Tehran.
H9: Family income affects the mathematical progress of secondary school students in the 22 districts of Tehran.
H10: Parents' education affects the mathematical progress of secondary school students in 22 districts of Tehran.
H11: The parents' job status affects the mathematics progress of second-secondary students in the 22 districts of Tehran.

4. Result and discussion

In this section, the descriptive analysis of the participants in the research is first discussed. Then, it is evaluated based on various indicators of reliability and validity of the research questionnaires, and finally, it is dedicated to the estimation of the structural model of the research and the analysis of its results. The characteristics of the students present in the statistical sample of the research are presented in Table 2. Out of all 384 students who are in the research sample, 15.4% are 15 years old, 19.5% are 16 years old, 16.7% are 17 years old, 15.6% are 18 years old, 17.2% are 19 years old, and 15.6% are 20 years old. Out of the total 384 students in the research sample, 54.4% are girls and 45.6% are boys.

Table 2. Characteristics of participants in the quantitative part of the research.

Variables	Categories	frequency	Relative frequency
Age	15 years	59	15.4
	16 years	75	19.5
	17 years	64	16.7
	18 years	60	15.6
	19 years	66	17.2
	20 years	60	15.6
Gender	Girls	209	54.4
	Boys	175	45.6

In Table 3, the results of the reliability and validity of the research indicators are presented. As can be seen in Table (5), Cronbach's alpha coefficient and calculated composite reliability for all measured criteria are greater than 0.7; Therefore, the research questionnaires have a good level of reliability. AVE criterion is also used to check convergent validity. Considering that this criterion is greater than 0.5 for all research indicators, in terms of convergent validity, the research questionnaires have a favourable condition.

Table 3. Reliability coefficient of the questionnaire.

Variable	Items	Cronbach's alpha	Composite reliability	AVE
Individual interest	3	0.939	0.961	0.891
Students' self-efficacy	9	0.952	0.960	0.727
Motivation and value	7	0.911	0.933	0.673
Learning Quality	6	0.867	0.902	0.608
Learning initiative	4	0.867	0.910	0.71
Emotional support from teachers	5	0.899	0.928	0.725
learning environment	2	0.943	0.972	0.946
Teaching method	3	0.900	0.937	0.833

In Figure 2, the results of the estimation of the coefficients of the mathematical progress model are presented. The estimation of this model is done in SMART PLS software.

Table 4 shows the results of the effects of each variable on students' mathematical progress. Based on Table 4, it can be concluded that at the 95% confidence level, individual interest had a positive and significant effect on mathematical progress; So that with an increase of one unit in the level of students' interest score, their maths score (mathematical progress index) increases by 0.146 units.

At the confidence level of 95%, students' self-efficacy has had a positive and significant effect on mathematical progress; with an increase of one unit in the self-efficacy level of students, their maths score (mathematical progress index) increases by 0.121 units.

At the confidence level of 95%, students' motivation and values have had a positive and significant effect on mathematical progress; with an increase of one unit in the level of students' motivation and values, their maths score (mathematical progress index) increases by 0.112 units.

At the 95% confidence level, the quality of students' learning has had a positive and significant effect on mathematical progress; with an increase of one unit in the level of students' learning quality, their maths score (mathematical progress index) increases by 0.1 unit.

At the confidence level of 95%, the student's learning initiative has had a positive and significant effect on mathematical progress; with an increase of one unit in the level of students' learning initiative, their maths score (mathematical progress index) increases by 0.258 units.

At the confidence level of 95%, teachers' emotional support has had a positive and significant effect on students' mathematical progress; So that with an increase of one unit in the level of teachers' emotional support, students' maths scores (mathematical progress index) increase by 0.130 units.

At the confidence level of 95%, household income has had a positive and significant effect on students' mathematical progress; so, with the improvement of one class in the income level of the households, the students' maths score (mathematical progress index) increases by 0.119 points.

At the confidence level of 95%, parents' education has had a positive and significant effect on students' mathematical progress; So that with the increase in the education level of the students' mother and father, the students' maths score (mathematical progress index) increases by 0.124 and 0.115 units respectively.

Also, the variables related to the parent's occupation at the 95% confidence level did not have a significant effect on the mathematics progress of secondary school students in the 22 districts of Tehran**.**

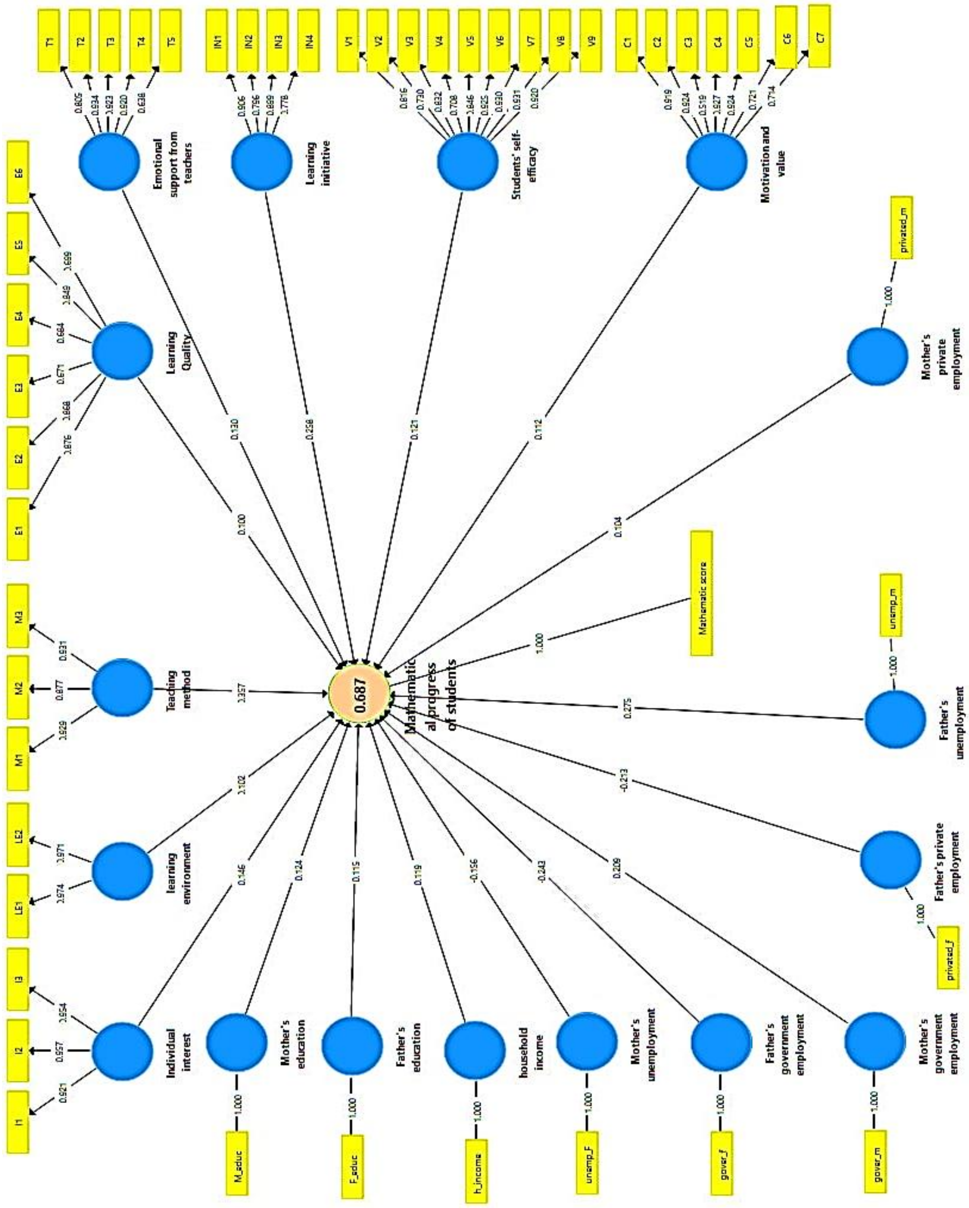

Figure 2: Estimation of the coefficients of the structural model of the research.

Table 4. Effects of variables on students' mathematical progress.

Path	Original Sample	STDEV	T Statistics	P Values
Learning initiative <- Mathematical progress	0.258	0.118	2.187	0.033
Mother's private employment <- Mathematical progress	0.107	1.663	0.065	0.949

Mother's private employment <- Mathematical progress	-0.213	0.336	0.633	0.53
Mother's government employment <- Mathematical progress	0.213	1.987	0.107	0.915
Father's government employment <- Mathematical progress	-0.243	0.366	0.663	0.511
Motivation and value <- Mathematical progress	0.112	0.053	2.133	0.038
Mother's unemployment <- Mathematical progress	-0.156	0.334	0.466	0.643
Father's unemployment <- Mathematical progress	0.28	2.099	0.133	0.895
Mother's education <- Mathematical progress	0.124	0.045	2.757	0.008
Father's education <- Mathematical progress	0.115	0.042	2.709	0.009
Emotional support from teachers <- Mathematical progress	0.13	0.044	2.956	0.005
Students' self-efficacy <- Mathematical progress	0.121	0.048	2.5	0.016
Household income <- Mathematical progress	0.119	0.04	3.003	0.004
Teaching method <- Mathematical progress	0.357	0.114	3.138	0.003
Individual interest <- Mathematical progress	0.146	0.046	3.165	0.003
learning environment <- Mathematical progress	0.102	0.045	2.25	0.029
Learning Quality <- Mathematical progress	0.1	0.048	2.105	0.04

Table 5. Fit criteria of structural models.

(GOF) Goodness Of Fit index	Adjudged R^2	R^2
0.724	0.689	0.702

In Table 5, the fit indices of the model are presented. As mentioned in the previous sections, in the proposed model, the dependent variable is students' math progress, and the independent variables of the model are equal to 17 variables reported in the first column of Table 4.

The coefficient of determination is one of the fit indices that shows the explanatory power of the model. The coefficient of determination shows how many percent of changes in the dependent variable (mathematical progress) are explained by the independent variables. The value of this index is between zero and one, and if it is more than 0.6, it shows that the independent variables have been able to explain the changes of the dependent variable to a large extent. As can be seen in the table, the model has a good level of fit; So that the coefficient of determination for the mathematical progress model is equal to 0.702, which shows that about 70% of the changes in the mathematical progress of students are explained by the independent variables of the proposed model.

The problem with the coefficient of determination is that its value increases with the increase in the number of explanatory variables in the model. To solve this problem, another fit index has been presented in statistics, which includes the effects of increasing the number of explanatory variables in the fit power, and this index is called the adjusted coefficient of determination. The adjusted coefficient of determination for the mathematical progress model is equal to 0.689, which shows that by adjusting the effects of explanatory variables, the research model is able to predict about 69% of the changes in students' mathematical progress.
The third model fit index is the overall goodness of fit index (GOF). GOF for the structural model of the research was calculated as 0.724, which shows that the fit of the entire structural model was very favourable.
The present study was conducted to model the mathematical progress of secondary school students in different areas of Tehran. The results of the research showed that students' mathematical progress is also influenced by the learning environment, emotional support and teachers' teaching methods. The maths classroom environment has positive effects on students' mathematical progress. Teaching facilities, learning atmosphere, teacher attractiveness, innovative teaching methods, new textbooks, etc. can accelerate students' mathematical progress. Also, teachers' emotional support is necessary to encourage and improve students' learning process. Having professional teaching experiences of teachers in mathematics and other effective factors in mathematics education can affect the progress of mathematics. These results are consistent with the findings of ([19], [34], [12]). For example, [12] showed that paying attention to new and active teaching methods has a positive and significant effect on students' mathematical progress. Based on these research findings, it can be argued that there was strong evidence to support the first to third hypotheses and these hypotheses are confirmed.

According to the results of the research, students' interests, motivation and values, quality and learning initiative and students' self-efficacy have a positive effect on their mathematical progress; to be more precise, the individual factors of students show a positive relationship with their mathematical progress. These results are consistent with the findings of ([20], [34]). Students' interest in learning mathematics, learning self-efficacy, learning initiative in mathematics, and students' motivation and values play an important role in students' learning process and mathematical progress. Based on these research findings, it can be argued that there was strong evidence to support the fourth to eighth hypotheses and these hypotheses are confirmed.

The results of the present study showed that household income has a positive effect on students' mathematical progress. Households with higher income levels can provide higher-quality education for their children. Based on this research finding, it can be concluded that there is strong evidence to confirm the ninth hypothesis of the research and this hypothesis is confirmed.

According to the research results, parents' education has a positive effect on students' mathematical progress. Also, the effect of the mother's education on the students' mathematical progress is greater than the father's education, which can be due to the more key role of mothers in the education process and their greater relationship with their children. According to this research finding, the tenth research hypothesis is confirmed.

Finally, the findings from fitting the structural model of the research do not provide reliable evidence that parents' occupational status affects students' mathematical progress; therefore, the eleventh hypothesis of the research is rejected.

5. Conclusion

The purpose of this research was to investigate the factors affecting maths performance and provide a model of students' mathematical progress. To evaluate the conceptual model of the research, first, by using a qualitative approach, the factors affecting mathematical progress were identified. Then, by designing a researcher-made questionnaire and considering the students' maths scores as a measure of mathematical progress, the necessary data were collected by distributing the questionnaire amongst 384 students of the senior high school level in schools in different areas of Tehran. In the following, after the descriptive analysis and the validity and reliability test of the questionnaires, the data were analyzed using structural equation modelling. In short, the results of the research showed that students' mathematical progress is directly affected by the learning environment, emotional support and teachers' teaching methods. Also, students' individual interest, motivation and values, quality and learning initiative, and students' self-efficacy have a positive and significant effect on their mathematical progress; to be more precise, students' individual factors have a positive relationship with their mathematical progress. The findings of the research also support the positive and significant effect of household income on students' mathematical progress. Finally, it can be said that parents' education has a positive and significant effect on students' mathematical progress. Also, statistical evidence shows that the education of the mother of the family has a stronger effect on the mathematical progress of students than the education of the father.

Considering the positive and significant effect of teachers' emotional support and teaching methods, it can be argued that teachers' attitudes towards mathematics and the level of confidence and support they give to students have an important effect on students' mathematical progress; therefore, it is suggested to teach teachers different skills regarding emotional support for students and efficient teaching methods during the internship period and the teaching period. Also, considering the positive effect of the learning environment and individual interest on students' mathematical progress, it is suggested that the educational planners design the classroom environment according to the student's interests so that the maths classroom is considered an attractive, fun and pleasant environment for maths students who tend to spend time spend more on it.

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