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RESEARCH ARTICLE

The Relationship between the Achievement of Senior High School Students in Mathematics and Their Achievement in Maturity Exams

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ABSTRACT

The aim of this study is to determine whether there is a relationship between the achievement of Turkish language students in the mathematics course and graduation maturity exam achievement in the last grades of high schools in Kosovo. The study group of the research consists of 186 students studying in Turkish language in five different high schools in the capital city of Kosovo, Pristina, Prizren, Mamuşa provinces during the 2022/2023 academic year. As a data collection tool in the study, an information questionnaire was created to obtain demographic information, high school, 1, 2, 3 mathematics achievement, general achievement, graduation maturity scores and mathematics exam scores, which is a compulsory course in maturity exams. Multiple Linear Regression analysis was used to analyze the data. The independence of the error term was analyzed using Durbin Watson analysis. According to the results of the study, it was determined that there is a significant relationship between the achievement of students in the mathematics course and the graduation maturity exam achievement of students. When analyzed in terms of gender, it was seen that the higher general achievement of female students compared to male students was effective in increasing the graduation maturity exam scores.

INTRODUCTION

Education is known as an effective process in gaining knowledge and skills throughout the life of an individual from birth to death. Education, which begins to be given to the individual in the family when he opens his eyes to the world, continues in schools in a planned and programmed manner (Byrd & Alexander, 2020). It is a fact that each course is of great importance in the education and training lives of individuals, as well as making different contributions to their lives. However, the different aspect of mathematics course from verbal courses, its complex structure, prejudices against this course and various negative experiences are important factors affecting general education (Taşdemir, 2009). The mathematical skills contributed by the course enable students to prefer the practical way in daily life and to be successful (Alkan, 2011). Individuals who spend most of their lives in educational institutions are expected to be successful and unsuccessful. This situation is associated with the success of mathematics course, which is considered to be difficult (Poyraz et al., 2013).

Primary education, secondary-high school and higher education transition systems, the student's achievement status and the graduation certificate (report card, diploma) differ according to the country. At the regional or national level, before graduating from high schools, achievement exams are conducted to measure secondary education knowledge covering a broad curriculum, including

mathematics-related questions, and are taken into account for university enrollment (Gölpek & Uğurlugelen, 2013).

The success in the mathematics course is directly related to the success in central exams. İn high schools, the mathematics course is the key to opening university doors for students. Therefore, it should not be surprising that many students care, worry and perceive the exam that will shape their lives as threatening (Ilgar, 2010).

Ma and Xu (2004) examined the mathematics anxiety and mathematics achievement of high school students and found that there was a significant difference between the causes of mathematics anxiety and mathematics achievement in terms of gender factor and that the effects of mathematics anxiety in female students were stronger than the effects of mathematics anxiety in male students. In the same study, it was concluded that decreasing mathematics achievement from year to year increases mathematics anxiety.

Çakmak (2007), in his study titled "Examination Anxiety: A Research on Senior High School Students Studying in Different Types of High Schools in Ümraniye District", tried to determine the exam anxiety levels of senior high school students studying in different high schools before the exam and the factors affecting exam anxiety. In the said study, while there was a significant difference in test anxiety according to the type of school and gender, there was no significant difference according to the variables of the score type of the preferred profession; whether the parents are living, dead, together or divorced; whether they take private lessons, whether they go to a tutoring center or not, whether they have a sibling who has taken the previous exam or not. According to the findings of the study, it was determined that the test anxiety of the participants studying in general high schools was lower than the participants studying in other high schools.

Aydın (2016), in his study titled "Investigation of Examination Anxiety of Students Preparing for the University Entrance Examination According to Different Variables", it was investigated how predictors such as exam anxiety, gender, family support, department and school type affect the anxiety status. Anxiety scale and State-Trait Anxiety Scale were used in the study conducted on 200 students studying in their final year. As a result of the study, it was determined that the variables of the financial and moral status of the family and the gender of the students significantly predicted the state of anxiety, but the type and department of high school in which the student was educated and the number of siblings did not predict exam anxiety.

Çiçek (2017), in his study "Examining the Relationship Between Mathematics Achievement of High School Graduates Preparing for University and Family Support", aimed to determine the relationship between the mathematics scores of 377 students from verbal, equal-weight and numerical high schools according to their graduation year and their math scores in the YGS (Transition to Higher Education Examination) according to the variables of gender, duration of attending the dershanes-family support, family income and education level of family members. According to the results of the study, no significant relationship was found between students' perceived family support, graduation year, gender and mother's education level and their math achievement in the YGS exam, but a significant relationship was found between the type of high school students were preparing for, their monthly income, and the duration of their attendance to classrooms and their math achievement in the YGS exam.

Özcan and Kontaş (2020), "Investigation of the Relationship between Mathematics Achievement and Mathematics Self-Efficacy Sources in High School Students" was designed in a relational design and it was examined whether high school students' scores from mathematics self-efficacy sources predicted their mathematics achievement scores. The participants consisted of 281 1st, 2nd, 3rd and 4th grade high school students, 129 of whom were female and 152 of whom were male. Students' mathematics achievement, report card grades related to the previous semester's mathematics course

were asked to the students and data related to mathematics self-efficacy resources were collected using the Mathematics Self-Efficacy Resource Scale (MSES). Multiple regression analysis was used to analyze the data.

According to the regression analysis results, direct learning experience significantly predicted the math achievement score. In conclusion, direct learning experience among self-efficacy resources has an effect on high school students' mathematics achievement.

Yaman (2020), in his study titled "The Relationship of Examination Anxiety of Senior High School Students of Different High School Types with Sleep Quality", it was tried to determine the result of the relationship between exam anxiety and sleep quality of senior high school students who are studying in different high schools due to the fact that they have different academic anxieties and are in adolescence. The study was conducted with 240 senior high school and data was obtained by asking the students "Personal Information Form", "Pitttsburg Sleep Quality Index", "Exam Anxiety Scale". The analysis of the data was subjected to independent sample t test, one-way analysis of variance (ANOVA) and Bonferroni post-hoc tests with SPSS program. According to the findings, it was observed that students' exam anxiety differed significantly according to the type of school they attended, and this differentiation was in favor of science high school students. When exam anxiety was compared with different high school types, it was concluded that exam anxiety was at the highest level in science high school students, while exam anxiety was at the lowest level in vocational and technical Anatolian High School. This may be an indication that test anxiety increases with increasing success.

Galangco (2023), in his study "Pathway Model of Success in Senior High School Grades", aimed to determine the variables of secondary school mathematics experiences, mathematics achievement, mathematics attitudes, mathematics anxiety and mathematics self-efficacy, which are effective on mathematics in the success of senior high school students. It was concluded that students' middle school general achievement, mathematics achievement-grade point averages were effective in the path model of senior high school achievement, but middle school mathematics experiences, mathematics attitudes, self-efficacy and anxiety were less effective. In the results of the path model of the research, it was determined that students' mathematics grade point averages in secondary school were the most effective variable.

In Uyar and Canpolat's (2023) study "Determination of Examination Anxiety Levels of High School Students and Factors Affecting Examination Anxiety", "Examination Anxiety Inventory" scale was applied to 955 high school students studying in Hatay province, and only 21 students from the study group were applied "Semi-structured Interview Form". According to the results of the study, it was determined that high school students' test anxiety levels were at a moderate level. In the study, it was determined that there was a significant difference between the exam anxiety levels of the students according to gender, GPA and mother's educational status variables. It was concluded that there was no significant difference in students' exam anxiety levels according to the variables of grade and father's education status.

Secondary Education System and High School Leaving Exams in Some Countries

Bosnia and Herzegovina

After 9 years of compulsory primary education in Bosnia and Herzegovina, students between the ages of 15-19 complete 4 years of education in different high schools such as High School, Vocational and Technical Schools, Art High School and Imam Hatip High School ("Gimnazija", "Srednje strucne i tehnicke skole", "Umjetnicke i vjerske skole"). At the end of upper secondary education, they receive a diploma of completion. They have the right to apply to university with their diploma, preferably without age limit.

https://essen.meb.gov.tr/meb_iys_dosyalar/2020_10/19215830_MEB_DENKLYK_KILAVUZU_2020.pdf.

Bulgaria

Upper secondary education in the Bulgarian state starts in the 9th grade and lasts 4-5 years. Upper secondary education is provided in general high schools (Profilirani Gimnazii) and vocational high schools.

Students who successfully complete the 12th grade of general high school and pass the state-administered "maturity exam" are awarded a diploma of upper secondary education and are eligible to continue on to higher education, while students who do not pass the maturity exam are awarded a certificate of completion of the last grade (Udostoverenie) and are assigned to the labor market.

Students graduating from vocational and technical high schools receive a secondary education diploma (Diploma za Sredno Obrazovanie) and a certificate of professional qualification (Svidetelstvo za profesionalna). Graduates of both high schools are given the right to continue to university-higher education with the diploma they have received (Ilgar & İncedere, 2016).

Croatia

Upper secondary (high school) education in Croatia consists of General Secondary Education (Gymnazija), Vocational Technical Secondary Education and Vocational High Schools (Strukovna Shkola) 9th-12th grades of 4 years duration and covers students aged 14-18. Since 2010, as in other countries, a maturity-maturity test has been introduced in Croatia. Those who are successful in the final year of high school are awarded the Diploma of Maturity (Gymnazija), Diploma of Technical Education (Vocational Technical) and Diploma of Vocational High School (Strukova Shkola) depending on the type of high school. With the diploma and maturity-matura test score they receive, they continue their education in the field they have chosen. Students can enroll in higher education institutions according to their maturity test scores.

https://narodne-novine.nn.hr/clanci/sluzbeni/2013_01_1_35.html.

Sweden

In Sweden, every student who successfully completes 9 years of compulsory education in multi-purpose schools (ages 7-16) can continue their 3-year high school education in the secondary education system. The total education period in primary education (Grundskola) and secondary education (Gymnasieskola) is 12 years (NAE, 2011). Each student who completes three years of secondary education receives a "Slutbetyg" certificate indicating the program they have completed. The credit score collected as a result of the grades students received during their secondary and high school education plays a role in university admission. If the credit points accumulated during secondary (high school) education are not sufficient for university enrollment, students have the right to take the "Higher Education Qualifying Examination" and are given the opportunity to increase their credit points. All students in the national education program show that they are ready for higher education with the diploma project they will prepare before graduating (Doğan, 2020).

Serbia and Montenegro

The secondary education system of Serbia and Montenegro consists of general high schools (Gimnaziya), vocational and technical high schools. The general high school is 4 years long and at the end of this education, graduation exams are oral and written, and in some regions, students are subject to a high school diploma with a graduation thesis on a subject of their choice. Students who receive a high school diploma are entitled to continue their higher education. Vocational high schools

vary between 3-5 years. Students who complete the 3-year education system but do not succeed in the exams cannot obtain the right to enter the university, in which case they are entitled to receive a secondary school graduation diploma. Those who complete 4-5 years of vocational high school, in addition to gaining a specific profession, graduates also have the chance to continue higher education.

https://essen.meb.gov.tr/meb_iys_dosyalar/2020_10/19215830_MEB_DENKLYK_KILAVUZU_2020.pdf.

Macedonia

The Macedonian secondary education system provides students with the opportunity to study in different fields such as general high school, foreign language high school, science high school and vocational high school. Maturity exams are held at the end of 4 years of education in general high schools, vocational and technical high schools. In the matriculation exam, the mathematics score is evaluated out of 100, each question is worth 1 point, and students who pass the exam with a score of 60 or above can continue their higher education.

The mathematics part of the exam covers 5 topics, mathematical logic 7, real and complex numbers 12, algebra 40, geometry 34, trigonometry 7 questions. The language exam consists of a total of 80 questions, and those who score 65 or above are considered successful. It is inevitable for students who graduate from art high school to be included in the compulsory state graduation exam.

http://www.matura.gov.mk/data_files/state_graduate/mk/3318_MATEMATIKA%20DRZAVNA%20MATURA%202022.pdf.

Greece

In addition to compulsory education, in the Greek state, the general high school "Geniko Lykeiou" and "Esperino Gymnasium" are the most common secondary education institutions and last for three years. Upon graduation, those who successfully pass the state graduation examinations (Apolytries exetaseis) are awarded the "Apolytirio Eniaeou Lykeiou" certificate. Vocational-technical high schools "Esperino Geniko Lykeiou" and "Esperino Epaggelmatiko Lykeiou" last four years (15-19 years). In the last year of their studies, the school administers the graduation exam "Panelladikes-Proagogikes Exetaseis" to each individual student and those who pass this exam are awarded the diploma "Apolytirio Technologikou Epaggelmatikou Ekpaedeftiriou"-"Vavaeosi". It is the students' preference whether or not to continue their higher education with the diploma they will receive and to graduate from the school graduation exams for secondary education-high school graduates.

https://www.minedu.gov.gr/geniko-lykeio-m/anakoinwseis-gel?start=10.

England

Secondary school education in the UK is 3 years long and students (16 years of age) complete the curriculum of the first three years and then take the national examination "General Certificate of Education (GCSE)", which is administered by the school, to determine the field of study according to the subjects they have studied in the last two years. Mostly Mathematics, English, Physics, Chemistry, Biology, Geography, History, Physics, Chemistry, Biology, Geography, History and French are required. Students who are successful in this exam are graduated by the school or continue to "Senior High School" according to the student's preference. Students who choose arts and humanities-based subjects tend to go into business or literature, psychology, etc. After a two-year preparatory program, students who are determined to study engineering or verbal sciences by the GCSE exam take the 3-hour "A Level" exams at the age of 18, which determine which universities the student can attend depending on his/her success. For enrollment in universities, in addition to the requirements set by

the university, the university is effective in selecting the student who is successful in at least two subjects in advanced-level (A-level) or equivalent hight school graduation exams (Saylık&Saylık, 2015).

Albania

In the Albanian education system, compulsory education lasts 9 years and requires completion of basic education by the age of 16. Citizens who lack basic education are given the chance to complete part-time schooling. The student has to go through two stages namely primary education cycle (Classes I-IV) and lower secondary education cycle (Classes V-IX). In Albania, as in the Kosovo education system, it is inevitable for the student who completes upper secondary education (high school education) to successfully complete the secondary education center (Maturë Shtetërore-Matura) state maturity exam in order to continue their higher education. When evaluating the state maturity exam (Maturë Shtetërore), the success average of all courses taken during secondary education, the exam results of three compulsory courses (Mathematics, Albanian Language and Literature, English) and one elective course are taken into consideration together. https://tiran.meb.gov.tr/www/temel-egitim/icerik/9.

Türkiye

In Türkiye, the 12-year compulsory education system was changed to 4+4+4 (primary, secondary and high school education) based on the Law No. 6287 adopted in 2012 and is still in effect today. Students who successfully complete secondary education are free to continue upper secondary education (high school education) either in formal or open education according to their choice.

In the transition from primary to upper secondary education, students are subjected to three different examination systems: direct placement, aptitude test and Secondary Education Placement Score (OYP). Until 2008, Central Placement based on the score of the Secondary Education Institutions Student Selection and Placement Examination (OKS) was replaced by the Secondary Education Transition System (OGES).

In the OGES system, according to the type of high school students will attend, the Placement Test (SBS) is evaluated in three steps: 70%, the year-end achievement score (report card grade) 25%, and the behavior score 5% (MoNE, 2007). Upper secondary education (high school) is provided in general and vocational high schools. General secondary schools consist of General High School, Science High School, Anatolian High School, Social Sciences High School, Anatolian Teacher High School, Sports High School and Anatolian Fine Arts High School. Depending on the type of high school, the net result of students' entrance scores plays an important role. In Türkiye, the Ministry of National Education has started to implement the High School Transition System (LGS) exam every year since the 2017-2018 academic year. With the decision of the Council of Higher Education, the two-stage ÖYS exam, which measures knowledge and achievement, was abolished in 1999 and replaced by the single-stage ÖSS (Student Selection Examination), which ensures the transition of students to higher education (YÖK, 1999).

Systems of Transition between Levels in Kosovo

Turkish education in Kosovo can be divided into five periods according to its developmental characteristics: 1- Ottoman Period (1455-1912); 2- Period of the Kingdom of Yugoslavia (1912 - 1945-1951); 3- Period of the New Socialist Yugoslavia (1951-1999); 4- Period of the UN Interim Administration and Local Government Bodies (1999-2008); and 5- Period of the Republic of Kosovo Administration (2008 - ~) (Durmuşçelebi & Koro, 2012).

Between 1951 and 1999, Turkish education in Kosovo survived against all odds and is still active today.

Although the UNMIK administration preserved the existing structure in Kosovo until 1999, it issued regulations on the restructuring of the education system. After the UNMIK administration issued the new Kosovo Curriculum Framework in 2001, the regulation on the enrollment of children over 6 years of age in the first grade of primary education and the Law on Primary and Secondary Education (Law No. 2002/2) in 2002, the new education system was introduced in the 2002/2003 school year. According to the new education system, students were enrolled in the first grade of primary school at the age of six instead of seven, pre-university education was 5+4+3 instead of 4+4+4, and the Bologna education system was introduced in higher education. Every student who completes 9 years of compulsory education is free to choose to continue their education (Bay et al., 2017).

In order to continue upper secondary education (upper secondary education), all candidates who have completed the 9th grade in the Republic of Kosovo are subjected to an Achievement Test (BT) (No. 04/L-032) Article 5. Students who pass this test can be enrolled preferably in the type of upper secondary school according to their score and overall achievement percentage. Since Kosovo is populated by people of different ethnic backgrounds, all educational institutions provide trilingual education in Albanian, Bosnian and Turkish, and students of each ethnicity study in their mother tongue.

Primary and Lower Secondary Education

Primary and lower secondary education is part of compulsory education, which means that all children and young people in Kosovo have an equal opportunity to learn. This education is based on the 5+4 years model and was introduced in the academic year 2002/2003.

- The first stage of basic education (primary school education) is 5 years and the normal age range is 6 to 12 years.

- Lower secondary education (the second stage of basic education) is 4 years and the normal age range is 12 to 15 years.

Upper Secondary Education

A new education system has been introduced in Kosovo since the 2002/2003 academic year. Upper secondary education is the education of students between the ages of 15-18. According to the directive of the Ministry of Education, Science and Technology (MoEST), all upper secondary education (high school) students study for 3 years in Science, Social and Vocational (Health-Medical, Economic and Technical) high schools. In the last year of upper secondary education (high school), near the end of the semester, the relevant school directorate fills in a form and sends it to the education directorate for each student to take the state maturity exam in which, in addition to the compulsory subjects, optional subjects (such as Physics, Chemistry, Biology, Informatics, Geography, History, Sociology, Psychology, Economics and Business, Public Education, Art History, Music Theory and Harmony) are selected. After the end of the courses, the students are prepared for the state matura exam for which they are responsible with training courses by the field teacher for 1 week on the relevant course subjects.

https://essen.meb.gov.tr/meb_iys_dosyalar/2020_10/19215830_MEB_DENKLYK_KILAVUZU_2020.pdf.

The State Graduation Examination is an assessment of students' knowledge, skills, abilities in their pre-university education according to the curriculum of the Republic of Kosovo. The history of the State Graduation Examination Nr. DL-044-2015, adopted on 29.12.2015, entered into force on

08.01.2016 and is still in effect today. Based on Law No. 05/L - 018 (Law on State Graduation Examination), all candidates who have successfully completed high school education, including candidates with special education, with disabilities, are subjected to the relevant examination. The content of the exam consists of 200 questions, including questions in Turkish, English, mathematics, chemistry, physics, chemistry, physics and elective subjects. During the worldwide pandemic, the question system was changed and reduced to 100 questions (Turkish Language Literature, English, Mathematics and Elective courses are included in the exam). Each field question is equally distributed (Turkish Language Literature-25; English 25; Mathematics 25 and Elective courses 25 questions). The threshold for success in the state graduation exam is 40% and above. Candidates who receive the certificate of achievement are eligible to apply to higher education institutions in Kosovo and other countries.

https://masht.rks-gov.net/wp-content/uploads/2023/04/TURK-Informata-udhezime-per-test-matures-2023.pdf.

For this reason, due importance should be given to teaching mathematics in high schools, as in all levels of education. From this point of view, the research topic gains value with the idea that students' mathematics achievement grades in high school will affect their overall achievement and their maturity exam success in the last year of high school, which is an important turning point in shaping the academic life of the last years of high school.

In this study, it was attempted to examine whether there is a relationship between the achievement in mathematics course and the graduation maturity exam achievement of Turkish language students in the last grades of high school in Kosovo. High school students' approach to mathematics as a difficult subject and their success in mathematics exams are among the factors that affect their success in general exams. In this context, the mathematics course grade, which includes the level of achievement of the semester outcomes of the mathematics course, was taken as a success variable in the study. The results of this study suggest that graduation maturity exams should be given more importance in the following years and high school students should be more interested in increasing their achievement in mathematics courses in determining their university or professional life. A similar study has not been found in the literature, and it is thought that this research is special and first and will be used as a source in academic studies.

METHODOLOGY

Study Group

The study group of the research consisted of 186 senior high school students studying Turkish in 5 different high schools in Kosovo's capital city Pristina, Prizren, Mamusha provinces during the 2022-2023 academic year. During the process of applying the data collection tools, 16 students could not participate in the study due to personal reasons, so the process was carried out with 170 senior high school students. The gender, high school type and age ranges of the students participating in the study are given in Table 1.

Table 1. Demographic Data of the Students

		N	%
Gender	Female	80	47.1
	Male	90	52.9
High School	Science	85	50
	Social	14	8.2
	Health	41	24.1
	Economy	16	9.4

	Technical	14	8.2
Age	17-18	101	59.4
	18-19	69	40.6

Of the students participating in the study, 80 (47.1%) were female and 90 (52.9%) were male. Most of the participants n=85 (50%) were science high school graduates. In addition, 101 (59.4%) of the students were between the ages of 17-18.

Data Collection Tools

The researchers created an information questionnaire to obtain information about the achievement of senior high school students in mathematics course and their achievement in Graduation Maturity exams. The first items in the questionnaire include the demographic information of the student, and the first items in the questionnaire include high school, 1, 2, 3 mathematics achievement, general achievement, graduation maturity scores and mathematics exam scores, which is a compulsory course in maturity exams.

The implementation time of the planned survey sample was determined with the approval of experts in the field and the permission petitions received from the national education directorates of the municipalities. The first state maturity exam was administered in June 2023, and the second exam was administered to the unsuccessful students in August of the same year. For the survey planned to be administered, the researchers contacted the senior guidance counselor in each high school and determined a time when the students of the relevant grade were in their schools. Particular attention was paid to the timing when the state maturity exam results were uploaded to the system. The researchers personally reached the students from each class one by one and asked them to fill out the questionnaire completely and it was made ready for the analysis.

Data Analysis

Multiple Linear Regression Analysis was applied to analyze the research problems. Before the analysis, the suitability of the data for analysis was examined. In this framework, the normality of the data was examined first (Tabachnick & Fidell, 2001). For unilinear normality, it was observed that the Skewness and Sharpness measurements were within the range of ±2. In addition, P-P Plot and Q-Q curves of all variables as well as histograms and Mahalanobis D2 distances were examined for outliers. In addition, standardized residuals and indices of leverage were calculated (Berry, & Feldman, 1985; Osborne, 2001). As a result of the analysis, it was observed that the data of all variables provided multiple normality and there were no outliers. Secondly, the presence of autocorrelation was examined (Cohen & Cohen, 1983). No high level of correlation was observed between the predictor variables (Table 2). The independence of the error term was examined using Durbin Watson analysis. Linearity between predictor variables and predicted variable(s) was analyzed through scatter plot (Tabachnick & Fidell, 2001). It was determined that all independent variables provided linearity with the dependent variable. In addition, no variable variance was observed (no heteroskedasticity). In the analysis of the reliability of the measurements, it was observed that the Math scores were 0.82, 0.88, 0.86, 0.91, 0.84, and 0.92 for Grade 1, Grade 2 and Grade 3, respectively

FINDINGS

Descriptive Analysis Results

What is the level of 1st grade mathematics, 2nd grade mathematics and 3rd grade mathematics achievement grades, general achievement, graduation maturity and mathematics maturity scores of high school seniors?

The distribution of students' 1st, 2nd and 3rd grade mathematics achievement grades, general achievement, graduation maturity and mathematics maturity scores are given in Table 2.

Table 2. Descriptive Analysis

	Minimum	Maximum	Mean	SD	Skewness	Kurtosis
Mathematics Grade 1 Score	2.00	5.00	3.64	1.05	-.043	-1.251
Mathematics Grade 2 Score	2.00	5.00	3.46	1.08	.133	-1.272
Mathematics Grade 3 Score	2.00	5.00	3.48	1.21	.072	-1.560
GPA	2.00	5.00	4.14	.90	-.558	-.928
Graduation Maturity Score	.00	87.00	47.86	18.93	-.755	.812
Mathematics Maturity Score	.00	25.00	9.60	5.12	.462	.627

N=170. Error for Skewness=.180. Error for Kurtosis=.370

As a result of the analysis, students' Math achievement grades are higher in 1st grade (M=3.64, SD=1.05). The general achievement average (M=4.14, SD=.90) is higher than the averages of mathematics grades 1., 2. and 3. the average graduation maturity score (M=47.86, SD=18.93) is close to the middle level. The mean Math Maturity score (M=9.60, SD=5.12) is below average.

Correlation Analysis

The second problem of the study was determined as "Is there a relationship between students' 1st, 2nd and 3rd grade mathematics achievement, general achievement, graduation maturity scores and mathematics maturity scores?". Pearson Moment correlation analysis was used to determine the relationship between students' scores. The results of the analysis are given in Table 3.

Table 3. Correlation Analysis Results

	1	2	3	4	5
1- Mathematics Grade 1 Score	1				
2- Mathematics Grade 2 Score	.723**				
3- Mathematics Grade 3 Score	.663**	.699**			
4- GPA	.647**	.605**	.654**		
5- Graduation Maturity Score	.355**	.395**	.395**	.517**	
6- Mathematics Maturity Score	.270**	.293**	.320**	.370**	.804**

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

The results of the correlation analysis showed that the highest correlation (r=.80, p<.05) was observed between Mathematics Maturity scores and Graduation maturity scores. There is a very high positive correlation between these two variables. The lowest correlation (r=.270, p<.05) was observed between Mathematics 1st grade achievement grade and Mathematics Maturity scores. All correlation coefficients are positive. There is a positive moderate correlation between Maturity Mathematics Score and Mathematics 1st Grade Achievement Grade and between Mathematics Maturity Score and scores belonging to variables other than Graduation maturity scores.

Regression Analysis Results

Analysis on the Predictive Power of Mathematics Achievement on Mathematics Maturity Scores

The third problem of the study was determined as "Do students' 1st, 2nd and 3rd grade mathematics achievement grades predict their mathematics maturity scores?". In order to determine the answer to the research question, regression analysis based on the Stepwise method was conducted. The purpose of using this method is to determine which independent variable has a higher predictive power. In the first step, math achievement grades and in the second step, gender and age variables were included in the equation as dummy variables. The results of the analysis are given in Table 4.

Table 4. Analysis Results Regarding the Predictive Power of Mathematics Achievement on Mathematics Maturity Scores

Model 1	R	R^2	F	Prob.>F	Beta	SH_B	β	T	P
Constant					4.893	1.139		4.296	.0001
Mathematics Grade 3 Score	.320	.102	19.134	.0001	1.352	.309	.324	4.374	.0001

Dependent Variable: Mathematics Maturity Score

The results of the analysis showed that only 3rd grade mathematics achievement grades were predictive of students' mathematics maturity scores ($F(3, 166)=19.134$, $p<.01$). It shows that 3rd grade mathematics achievement grades significantly shape Mathematics Maturity Scores ($\beta=.32$, $p<.05$). It was observed that 3rd grade math achievement grade explained 10% ($R=.32$, $R2=.102$) of students' math maturity scores. It was observed that gender and age variables were not predictive.

Analysis on the Predictive Power of Mathematics Achievement Grades and General Maturity Scores

The fourth problem of the study is whether students' 1st, 2nd and 3rd grade mathematics achievement grades predict their general maturity scores? It was determined as follows. Stepwise regression analysis was used to answer the research question.

Table 5. Analysis Results Regarding the Predictive Power of Mathematics Achievement Grades and General Maturity Scores

Model 1	R	R^2	F	Prob.>F	Beta	SH_B	B	t	P
Constant					26.376	4.080		6.465	.001
Mathematics Grade 3 Score	.395	.156	31.089	.001	6.171	1.017	.403	5.576	.001
Model 2									
Constant					21.222	4.575		4.639	.001
Mathematics Grade 3 Score	.428	.184	18.778	.001	3.643	1.526	.232	2.387	.018
Mathematics Grade 2 Score					4.028	1.700	.234	2.369	.019

Dependent Variable: Graduation Maturity Score

The findings of the analysis of the predictive power of mathematics achievement on graduation maturity scores produced two models. In the 1st model, only 3rd grade math achievement grades explained 15.6% of the variance ($F(1,168)=31.089$, $p<.01$). The β ($\beta=.40$) of 3rd grade math achievement grades was found significant ($t=5.576$, $p<.05$). In the second model, it was determined that 2nd grade achievement grades were added to the equation. It was observed that 2nd and 3rd grade achievement grades together explained 18.4% of the variance ($F2,167)=18.778$, $p<.05$). As a

result of the analysis, it was observed that the model contribution of 2nd grade achievement grades was 2.7%. In the 2nd model, the β values of both 3rd grade mathematics (β=.23, t=2.387, p<.05) and 2nd grade mathematics (β=.23, t=2.369, p<.05) achievement grades were found significant.

Analysis on the Predictive Power of Mathematics Achievement Grades and Mathematics Maturity Score for General Achievement

The fifth problem of the study was determined as "Do students' math achievement grades and math maturity scores predict their general achievement grades?". For the analysis, step by step with stepwise regression analysis was used. First, math achievement grades, then math maturity scores, and finally gender and age variables were entered into the model as dummy variables. The results of the analysis are given in Table 6.

Table 6. Analysis Results Regarding the Predictive Power of Mathematics Achievement Grades and Mathematics Maturity Scores for General Achievement

Model 1	**R**	**R^2**	**F**	**Prob.>F**	**Beta**	**SH_B**	**β**	**T**	**p**
Constant					2.427	.161		15.030	.001
Mathematics Grade 3 Score	.654	.428	125.499	.001	.491	.044	.654	11.203	.001
Model 2									
Constant					1.896	.181		10.493	.001
Mathematics Grade 3 Score	.714	.509	86.609	.001	.301	.054	.401	5.531	.001
Mathematics Grade 1 Score					.328	.062	.382	5.267	.001
Model 3									
Constant					1.783	.182		9.805	.001
Mathematics Grade 3 Score	.728	.531	62.560	.001	.314	.061	.366	5.129	.001
Mathematics Grade 1 Score					.271	.054	.362	4.991	.001
Mathematics Maturity Score					.028	.010	.155	2.758	.006
Model 4									
Constant					2.217	.200		11.082	.001
Mathematics Grade 3 Score	.760	.578	56.545	.001	.245	.052	.327	4.713	.001
Mathematics Grade 1 Score					.277	.059	.323	4.707	.001
Mathematics Maturity Score					.029	.010	.162	3.029	.003
Gender (Male)					-.416	.096	-.229	-4.313	.001

Dependent Variable: General Performance Score

As a result of the analysis, 4 models were produced. In the first model, Mathematics Grade 3 achievement grade explains 42.8% of the variance (F1,168)=125.499, p<.05). Mathematics 3rd grade achievement grade significantly affects General Achievement (β=.65, p<.05). In the second model, Mathematics 1st grade achievement grades were added. Grades in Mathematics Grade 3 (β=.40, p<.05) and Grade 1 (β=.38, p<.05) were variables that significantly shaped overall achievement. Both together explained 50.9% of the variance (F2,167)=125.499, p<.05). Grade 1 Math achievement

grades contributed an additional 8.1% to the variance. In the third model, Grade 3 (β=.37, p<.05) and Grade 1 mathematics achievement grades (β=.36, p<.05) as well as Mathematics maturity scores (β=.16, p<.05) were added to the equation. All three variables explained 53.1% of the variance (F3,166)=125.499, p<.05). Mathematics maturity score contributed 2.2% to the variance. In the fourth model, males contributed to the model. The total variance in the fourth model is 57.8%. The contribution of gender (males) to the model is 4.7% (F4,165)=125.499, p<.05). Gender (male) is also an important variable in shaping students' overall achievement scores (β=-.23, p<.05). It was observed that the scores of males were negative. Therefore, those of the male gender show lower achievement in general achievement.

CONCLUSION, DISCUSSION AND RECOMANDITION

The study found that there is a significant relationship between the achievement in mathematics course and graduation maturity exam achievement of students studying in the last grades of high school in Kosovo. The variable of students' mathematics achievement grades in high school will have a significant effect on their mathematics maturity scores and graduation maturity scores. When the related studies in the literature are examined, it is possible to find studies that moderately support the findings of the research. Among the results obtained in the study, the average mathematics achievement grades of the students in the 1st grade of high school were higher than the achievement grades in other grades, which is similar to the result of Ma and Xu (2004) that mathematics achievement decreases from the 1st to the last grade of high school, and the general achievement averages of the students in the grades they studied were higher in 1st grade mathematics, 2nd grade mathematics and 2nd grade mathematics. Grade 1 mathematics, Grade 2 mathematics, and Grade 3 mathematics achievement averages is similar to Gelanko's (2023) achievement path model study, which supports that increasing achievement in high school is directly related to middle school general achievement and mathematics achievement-grade point averages. Çiçek (2017)'s study showing that high school graduates' success in mathematics in the YGS exam is directly related to the duration of their attendance to the classroom, which supports the necessity for students to take tutoring or mathematics tutoring in addition to school education as a result of the fact that students had difficulty in the mathematics questions of the same exam, which lowered their mathematics maturity scores below the average, while the students' graduation maturity score averages were obtained at an average level.

In the results of the relationship between students' 1st, 2nd and 3rd grade mathematics achievement grades, general achievement status, graduation maturity score averages and mathematics maturity score averages, it was found that there was a lesser relationship between 1st grade mathematics achievement grade and mathematics maturity score, and between mathematics maturity score and graduation maturity score variables, while there was a positive moderate relationship between other variables. This result shows that the mathematics subjects that the students studied in the first year of high school were not given weight in the mathematics maturity exam test, so the relationship between the variables is low. It is seen in Table 5 that especially the 2nd and 3rd grade mathematics achievement grades of the students predict the graduation maturity exam scores, which is an indication that the mathematics questions asked in the graduation maturity exam test mainly cover the 2nd and 3rd grade subjects, and there is no study supporting this result in the literature.

Another important finding of the study was that 3rd grade mathematics achievement grades were predictive and significantly shaped the mathematics maturity scores of the students. However, the finding that the gender and age variables of the students were not predictive was not supported by the finding that the gender factor, which emerged in some studies, was an effective factor in senior high school students (Çakmak 2007; Aydın 2016).

The other important finding of the study revealed that the mathematics achievement grades of the students in each of the three years of high school were more effective in predicting the graduation

maturity exam scores they took in their senior year than the 2nd grade mathematics and 3rd grade mathematics achievement grades. This means that students with good mathematics achievement in 2nd and 3rd grade are also successful in the graduation maturity exam. Therefore, the fact that the students especially considered learning in the mathematics course, that they cared about the mathematics achievement grade, all of these were effective in the central exam they took. As a matter of fact, it is clear that mathematics achievement grade is an important variable in graduation maturity exams.

Finally, the fact that the 3rd grade mathematics achievement averages significantly predicted the overall achievement of the students is in parallel with the opinion of Uyar and Canpolat (2023) in the literature that the overall grade point averages of high school students are significant in the exams they take, while the effectiveness of the gender variable was found to be significant in increasing the graduation maturity exam scores of female students with higher overall achievement compared to male students.

In line with the findings obtained from the study:

- In cooperation with teachers and parents, high school students can gain the habit of studying mathematics subjects outside of class to increase success in central exams,
- Ensuring that high school seniors support their parents in a conscious way with the complexity of adolescence, graduation and academic progress,
- Enhancing efforts to identify the causes of low achievement in centralized exams across Kosovo,

The study is limited to high school students studying in Turkish, and suggestions can be made such as conducting a comparable study by including students from different backgrounds studying in high school.

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Notes

The main participants in the research are Science High School students.

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