ORIGINAL ARTICLE

Factors Affecting High School Students' Motivation and Career Interest in STEM Fields and Their Modeling

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Abstract: *This study aims to investigate the motivation and career interest in STEM fields of high school students enrolled in public schools in the districts of Kayseri in Turkey according to various factors, to ascertain the relationship between the two variables, and to present a model for the relationship between the variables. The causal-comparative research and correlation (relational) research designs, which are among the quantitative research designs, were used in this study, which involved 1,667 students from five high education institutions situated. The research employed the Career Interest Scale in STEM Fields and the Motivation Scale in STEM Fields to gather data. It has been found that students whose favorite and most successful course is about STEM have much higher motivation and career interest in STEM fields than the other pupils. According to the study, students who are considering majoring in one of the university's STEM fields have much higher motivation and career interest in STEM fields than other students do in general. Additionally, the connection between motivation and career interest in STEM fields was looked at. According to research, students' motivation in STEM fields accounts for 70% of changes in their career interests in those fields.*

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Introduction

WE are currently experiencing the Industry 4.0 transformation. Industry 4.0 makes it feasible to carry out a more effective and quicker production process while still producing goods of higher quality at lower costs. In this way, the nations' economies will evolve favorably over time, improving their competitiveness as well as their production efficiency. Because of this, catching Industry 4.0 is the most crucial requirement for a country to remain competitive and advance economically (BCG, 2019; Kuscu, 2018). Embracing Industry 4.0 requires keeping up with the times. The digital era, or Industry 4.0, is thought to have started in the twenty-first century. Technology has grown and advanced to astounding heights in our day and age. To succeed in the modern world, some talents have become crucial (Akgunduz, 2016; Beers, n.d.). They are referred to as 21st Century talents. Despite the fact that there are numerous categories for 21st century skills, it has become increasingly important to possess abilities like creativity and innovation, critical thinking and problem-solving, communication, cooperation, knowledge management, effective use of technology, career and life skills, and cultural awareness (Beers, n.d.). The talents that will be required the most in the future are also made public. The ability to solve complex problems, critical thinking and analysis, creativity, originality and initiative, leadership and social impact, technology use, monitoring and control, technology design and programming, flexibility, stress tolerance and flexibility, reasoning, problem-solving and reasoning, emotional intelligence, troubleshooting and user experience are the 15 skills that will be most in demand in 2025. Individuals in the workforce nowadays are also required to possess some talents in addition to these. The following are the top 10 abilities that employers are looking for in 2020: writing, strategy, python programming, mindfulness, meditation, gratitude, kindness, listening, algorithm, and grammar (World Economic Forum, 2020). People working nowadays are expected to possess these talents.

Today, it is impossible to handle real-world problems with knowledge based on a single subject due to the growing importance of Industry 4.0 technologies and an increase in knowledge. In order to solve a problem, one must therefore draw on knowledge from other fields and apply a variety of techniques. In order to combine information from other fields and to equip people with 21st century abilities, educational policies had to be revised. Education systems that prioritize interdisciplinary relationships over instruction centered around a single discipline have started to gain ground. STAEM (Science, Technology, Art, Engineering, and Mathematics) education provides the first instances of this (Yavuz, 2016). Today's educational strategy, known as STEM (Science, Technology, Engineering, and Mathematics) edu-

cation, offers an interdisciplinary integration of the disciplines of science, technology, engineering, and mathematics (Bybee, 2013).

STEM education gives people the skills they need to employ Industry 4.0 technology and prepares pupils for the future. In the end, it contributes to the nation's advancement in the field of competitiveness. With the goals and educational results of STEM education, all of these can be accomplished. For pupils, STEM education serves various functions. STEM literacy was broken down into 21st century skills, STEM employment preparedness, enthusiasm and participation, and the capacity to connect STEM disciplines. These are the goals of STEM education. The purposes of education and the results of that education are strongly tied to one another. As a result, the alignment of educational outcomes with objectives determines whether a program is successful. The outcomes of STEM education in this context include learning and success, 21st century abilities, selecting STEM courses, educational continuity and graduation rates, selecting a career in STEM, building a STEM identity, and the capacity to transfer knowledge across STEM fields (Honey et al., 2014). Studies on job interest, career motivation, and career choice, particularly in STEM sectors, have become more prevalent as a result of nations' desire to stand out in international competitiveness and the significance of STEM education.

Literature Review

Studies examining STEM interest and motivation in STEM disciplines can be found in the associated literature. When researches are analyzed, it becomes clear that interest and motivation are taken into account. As a result, it is impossible to draw a clear distinction between studies relating to STEM career interest and motivation. Robnett and Leaper (2012) looked into how gender, motivation, and friendship group traits affected high school students' interest in STEM careers. The study discovered that pupils' interest in STEM careers was predicted by group support and science passion. Christensen, Knezek, and Tyler-Wood (2015) looked at data indicating the STEM tendencies of high school students attending academies, as well as the causes of the stated interest in STEM. A high-quality motivational teacher, parental or family support, and student motivation are the elements determining kids' interest in STEM careers and fields. The aim of a study conducted by Bahar and Adiguzel (2016) was determined to examine the factors that affect the careers of American and Turkish high school students in STEM-related fields. According to the study, mother motivation for Turkish children and self-motivation for American students were the two most significant influences on STEM interest. Oliveros et al. (2016) evaluated the variables influencing students' decision to pursue STEM careers at three public universities in their study. Chittum, Jones, Akalin, and Schram (2017) looked at how an

after-school STEM program affected students' involvement and motivation. According to the study, it is crucial to focus on pupils' interests and motivations before the eighth grade if you want to maintain consistency in your STEM career aspirations. For the kids who were at this point in the research, Studio STEM was used. The application revealed that the Studio STEM participants' motivating attitudes about science and desire to graduate from college recovered faster than those of the non-participants. In a study by La-Force, Noble, and Blackwell (2017), the interests of high school students in problem-based learning and STEM jobs were investigated. The results of multivariate regression demonstrated that student performance in problem-based learning was related to both interest in pursuing a career in STEM and intrinsic passion for science. It was investigated whether programming experiences support better STEM enthusiasm among first-year female students in the study "Programming experience promotes higher STEM motivation among first-grade girls" conducted by Master, Cheryan, Moscatelli, and Meltzoff (2017). According to the study, girls who had expertise in programming displayed higher levels of self-efficacy and curiosity in technology than girls without such exposure. Rozek, Svoboda, Harackiewicz, Hulleman, and Hyde (2017) investigated how a parental motivational intervention affected kids' readiness for STEM coursework and interest in STEM careers. The study's findings demonstrated that a motivational intervention with parents had a significant impact on high school STEM readiness.

There are also some studies in the literature that include models based on the relationships between factors that affect STEM career interest and motivation. Generally; the relationships between variables such as self-efficacy, outcome expectation, environmental effects and STEM interest were modeled (Garriott et al., 2013; Bolds, 2017; Garriott et al., 2017; Turner et al., 2017; Sellami et al., 2017).

Importance and Purpose of the Research

The literature study revealed that there are several studies on high school students' careers in STEM disciplines, but there is a dearth of research with a large sample size that demonstrates the impact of various elements by combining the students' career interests and their motivation. It has been shown that there is a sizable vacuum in the pertinent literature, particularly for STEM areas, on motivation. Accordingly, it may be claimed that the study was an effort to fill a gap in the pertinent literature. The study is significant in this regard since it examines the relationships among numerous variables and presents a model for these variables, indicating the career interests and motivations of high school students in STEM areas.

Within the context of importance, the study's objectives are to identify the link between two variables, present a model for that relationship, and

investigate certain aspects that influence high school students' career interests and motivations in STEM disciplines.

Theoretical Framework

Social Cognitive Career Theory

The concept of career was used in the sense of professional development (Ozyurek, 2013). There are many career development theories, as can be seen by reviewing the literature on the subject. Some of them are the Occupational Chaos Theory, Social Cognitive Career Theory, Job Adaptation Theory, Personality Theory in Career Choice, and Cognitive Information Processing Approach (Niles & Harris-Bowlsbey, 2013). The notions suggested by the Social Cognitive Career Theory are not wholly original. But this theory applies the ideas of earlier theories to the world of work (Unsal, 2014). Lent, Brown, and Hackett provided an explanation of the Social Cognitive Career Theory in 1994. The three social cognitive systems that affect a person's professional development, according to the researchers, are self-efficacy beliefs, outcome expectations, and personal goals. The Social Cognitive Career Theory focuses on how these three systems and other elements, including a person's physical traits, environment, and behaviour, affect their career. In career development, the influences of personal traits like gender and ethnicity as well as contextual traits like career assistance were investigated. Lent et al. provided three models to explain how people develop their social cognitive careers on the basis of the mechanisms expressed as self-efficacy, result expectations, and personal goals. These have been grouped under the headings of interest model development, career choice model development, and performance model development (Lent et al., 1994).

Self-efficacy, result expectations, and interest are related to the model of interest development. The emergence of outcome expectations is a byproduct of self-efficacy. Contrarily, interest is a product of both self-efficacy and expectancy of the outcome. Additionally, experiences with learning have an indirect impact on interests (Lent et al., 1994). The areas that people are most interested in are those where they feel competent, which is to say, where their level of self-efficacy is high, and they anticipate the best results. In other words, people become disinterested in activities in which they define a low level of self-efficacy and their outcome expectations are negative (Unsal, 2014). High school students go through a process that is more suited for the development of the interest model of Social Cognitive Career Theory because this is the time when they are discovering their interests. This model was selected as the theoretical foundation in light of the research's potential professional applications.

ARCS Motivation Model

The concept of motivation was defined as incentive (Motivation, n.d.). The literature has a wide variety of motivational theories. They are split into two categories: content theories and process theories (Ulukus, 2016). Understanding the elements that motivate people to act is a key component of context theories of motivation. These theories are McClelland's accomplishment needs theory, Alderfer's V.I.G. theory, Herzberg's two-factor theory, and Maslow's hierarchy of needs theory (Sural Ozer & Topaloglu, 2008). Process theories are those that explain how people are motivated from the outside, for what reasons, and how they are motivated (Ulukus, 2016). These theories are expectancy value theory, equality theory, individual goals theory, behavior conditioning theory, and ARCS motivation theory (Kutu, 2011).

In 1984, Keller proposed the ARCS Motivation Model (Keller, 1984; cited in Keller, 2010). Four categories make up the ARCS Motivation Model: attention, relevance, confidence, and satisfaction (Keller, 2010). Given that it is a more recent theory and concentrates on both intrinsic and extrinsic drive, the ARCS motivation model was chosen as the normative framework for this investigation.

Method

Among the quantitative research designs used in this study were the causal-comparative research and correlation (relational) research designs. There are two aspects to the research. In the first section, many demographic factors were taken into consideration to analyze students' career goals and motivations for STEM areas. The causal-comparative research design, one of the quantitative research methods, was used to conduct this portion of the study. Investigating the causes that influence a phenomenon's outcomes is done through causal-comparative research (Sonmez & Alacapinar, 2011). For this reason, one or more categorical independent variables and one or more quantitative dependent variables are compared in causal-comparative research (Johnson & Christensen, 2014). Since demographic factors that influence students' career interests and motivations for STEM professions are evaluated in this section of the study, they are regarded as categorical independent variables. Students' motivations and career ambitions in STEM subjects were investigated as quantitative dependent variables. As a result, a causal-comparative research design was used to conduct this portion of the study.

The relationship between students' career interests and motivations for STEM areas, as well as the relationship between the sub-dimensions of these two variables, were looked at in the second phase of the study. One of the quantitative research types used in this study was the correlation research design. The link between one or more quantitative independent variables and

one or more quantitative dependent variables is explored in correlation research (Johnson & Christensen, 2014). This section of the study used a correlation research methodology to evaluate the relationship between students' motivation and their career interests in STEM disciplines.

Research Group

Since the motivation and interest in STEM careers will be examined in this study, a research group of students between the ages of 14 and 16 was chosen (Telman, 2006), which comprises children who have finished elementary school and are at the appropriate age to begin their career. Because people begin to identify their own interests and skills during their formative years in the 14–18 age range (Cakir, 2011). As a result, the demographic for the study was decided upon as being high school pupils in public schools of Kayseri's Kocasinan and Melikgazi districts in Türkiye. The study's sample was made up of 1667 high school students (573 boys and 1094 girls), who were chosen from this group using the proportionate stratified sampling method (Johnson & Christensen, 2014).

The formula proposed by Cochran (1962; cited in Balci, 2011) and frequently used in stratified sampling was used to determine the number of samples in the study. The calculation determined that 381 people would make up the sample size from a population of 47337 people in the research population, with a 1.96 confidence level and a 0.05 tolerance level. With a confidence level of 1.96 and a tolerance level of 0.05, it was decided that the study's sample size of 1667 participants was adequate. The proportions of the stratified variable in the universe are represented in the sampling in the same way using the proportional stratified sampling technique that was chosen for the research (Johnson & Christensen, 2014). "Institution type" was chosen as the stratification variable in this study. The stratification variables of the study are "Anatolian High School," "Anatolian Imam Hatip High School," and "Vocational and Technical Anatolian High School."

Data Collection Tools

Demographic Information Form, Career Interest Scale for STEM Fields (Kizilay et al., 2020) and Motivation Scale in STEM Fields (Kizilay et al., 2019) were used as data collection tools in the research. The Career Interest Scale in STEM Fields was developed for high school students. The scale comprises 20 items and is made up of three elements (interest, self-efficacy, and outcome expectancy), as well as mechanisms from the Social Cognitive Career Theory's interest development model. The total scale and its factors' Cronbach Alpha coefficient were shown to be higher than.90. According to Kizilay et al. (2020), the scale is a five-point Likert type. The 22-item Moti-

vation Scale in STEM Fields measures four ARCS Theory factors—attention, relevance, confidence, and satisfaction. The total scale and its factors' Cronbach Alpha coefficient were shown to be higher than.90. According to Kizilay et al. (2019), the scale is a five-point Likert type.

Analysis of Data

The calculated student scores were analyzed using the SPSS (Statistical Package for Social Sciences) 22.0 statistical package software and the AMOS (Analysis of Moment Structures) 24.0 package program.

It was first determined whether the data displayed a normal distribution during the analysis of the data gathered from the application. The examination of the data that was found to have a normal distribution used the independent groups t-test, one-way ANOVA, Pearson product-moment correlation coefficient, simple linear regression analysis, and path analysis. Also, the decision of whether students' answers are non-STEM fields was coded according to the STEM fields' classification of U.S. Bureau of Labor Statistics (URL-1) and Noonan (2017).

Results

The Impact of Gender on Career Interest in STEM Fields

The purpose of the independent groups' t-test was to determine whether there was a gender difference that was statistically significant in the career interests in STEM fields. The independent groups t-test was used to assess whether gender has a significant impact on career interest in STEM fields, and the results showed a significant difference between the mean scores of male and female students (Mean = 67.52 and Mean = 64.17, respectively). In favour of male students, this disparity was discovered (**Table 1**).

The Effect of Favorite Course on Career Interest in STEM Fields

A one-way ANOVA test was used to examine whether there was a significant difference in the career interests of the students participating in the study, according to their favourite courses. According to the test results, A significant difference was determined between the career interest averages of the students whose favourite course is STEM fields (Mean = 68.30), and

Table 1. T-test Results of Career Interest in STEM Fields in Terms of Gender.

Groups	N	Mean	S	sd	t	p
Male	573	67.52	11.62	1,665	5.727	0.000
Female	1,094	64.17	11.20			

Table 2. ANOVA Results of Career Interest for STEM Fields in Terms of Students' Favorite Courses.

Source of variance	Sum of squares	sd	Mean of squares	F	p	Significant difference
Between groups	13,434.125	2	6,717.062	54.482	0.000	1-3
Within groups	205,152.973	1,664	123.289			2-3
Total	218,587.097	1,666				

1-No favorite course
2-Courses from non-STEM fields
3- Courses from STEM fields

Table 3. ANOVA Results of Career Interest in STEM Fields in Terms of Students' Most Successful Course.

Source of variance	Sum of squares	sd	Mean of squares	F	p	Significant difference
Between groups	9,675.778	2	4,837.889	38.534	0.000	1-3
Within groups	208,911.320	1,664	125.548			2-3
Total	218,587.097	1,666				

1-No successful course
2-Courses from non-STEM fields
3- Courses from STEM fields

Table 4. ANOVA Results of Career Interest in STEM Fields in Terms of Students' Desired Major of the University.

Source of variance	Sum of squares	sd	Mean of squares	F	p	Significant difference
Between groups	12,122.378	3	4,040.793	32.547	0.000	1-4
Within groups	206,464.720	1,663	124.152			2-4
Total	218,587.097	1,666				3-4

1-There is no major in the university that he wants to choose
2-Undecided
3-Major from non-STEM fields
4-Major from STEM fields

the career interest averages of the students whose favourite course is non-STEM fields (Mean = 62.73), and career interest averages of the students whose do not like any course (Mean = 60.46). The results also showed that students who liked a STEM course the most had a higher career interest in STEM fields (**Table 2**).

The Effect of the Most Successful Course on Career Interest in STEM Fields

According to the courses in which they excelled, the research participants' career interest in STEM fields was compared using a one-way ANOVA test to see if there was a statistically significant difference. According to test results, students who were most successful in a STEM course had a score in career interest in STEM fields that averaged 68.16, whereas students who were most successful in a non-STEM course had a score career interest in STEM fields that averaged 63.29. Students who weren't successful in any course had much lower career interest in STEM fields point averages (Mean = 62.99) than those who did. The findings also indicated that pupils who excelled in a STEM course had a greater interest in a STEM-related career (**Table 3**).

The Effect of the Desired Major of the University on Career Interest in STEM Fields

The study's participants' career interests in STEM fields were compared to the departments they desired. They would major in a university a one-way ANOVA test to see if there was a statistically significant difference. The test findings showed a substantial difference between students who are considering selecting a department from a STEM majors at the university and the average points of other students in terms of their mean score of career interest in STEM fields. The findings indicated that students who are thinking about majoring in a STEM field have a greater interest in STEM careers (**Table 4**).

The Effect of Gender on Motivation in STEM Fields

The independent groups t-test was used to determine whether there was a statistically significant difference in motivation for STEM fields among the research participants based on gender. The independent groups t-test was used to establish whether gender has a significant impact on motivation towards STEM fields, and the results showed a significant difference between the mean scores of male and female students (Mean = 73.54 and Mean = 69.47, respectively) (**Table 5**).

Table 5. T-test Results of Students' Motivation in STEM Fields by Gender.

Groups	N	Mean	S	sd	t	p
Male	573	73.54	13.42	1,665	5.920	0.000
Female	1,094	69.47	13.30			

Table 6. ANOVA Results of Motivation in STEM Fields in Terms of Students' Favorite Courses.

Source of variance	Sum of squares	sd	Mean of squares	F	p	Significant difference
Between groups	17,988.798	2	8,994.399	52.607	0.000	1-3
Within groups	284,498.572	1,664	170.973			2-3
Total	302,487.369	1,666				

1-No favorite course
2-Courses from non-STEM fields
3- Courses from STEM fields

Table 7. ANOVA Results of Motivation in STEM Fields in Terms of Students' Most Successful Course.

Source of variance	Sum of squares	sd	Mean of squares	F	p	Significant difference
Between groups	15,741.756	2	7,870.878	45.675	0.000	1-3
Within groups	286,745.613	1,664	172.323			2-3
Total	302,487.369	1,666				

1-No successful course
2-Courses from non-STEM fields
3- Courses from STEM fields

Table 8. ANOVA Results of Motivation in STEM Fields in Terms of Students' Desired Major of the University.

Source of variance	Sum of squares	sd	Mean of squares	F	p	Significant difference
Between groups	20,946.830	3	6,982.277	41.243	0.000	1-4
Within groups	281,540.539	1,663	169.297			3-4
Total	302,487.369	1,666				

1-There is no major in the university that he wants to choose
2-Undecided
3-Major from non-STEM fields
4-Major from STEM fields

The Effect of Favorite Course on Motivation in STEM Fields

To determine whether there was a significant difference between the students who participated in the STEM research and their favourite courses, a one-way ANOVA test was utilized. A significant difference was found between the motivation point averages for STEM fields of students who enjoy a STEM lesson the most (Mean = 74.30), the motivation point averages for STEM fields of students who adore a non-STEM lesson the most (Mean = 67.91), and the motivation point averages for STEM fields of students who do not enjoy any of the lessons (Mean = 64.37). The findings also indicated that students were more inspired to pursue STEM fields when they enjoyed a STEM-related lesson the most (**Table 6**).

The Effect of the Most Successful Course on Motivation in STEM Fields

According to the courses in which they excelled; a one-way ANOVA test was conducted to determine whether there was a statistically significant difference in the motivation of the students for motivation in STEM fields. A significant difference was found between the motivation point averages for STEM fields of students who performed best in a STEM course (Mean = 74.49), and those of the students who performed best in a non-STEM course (Mean = 68.29). The findings also indicated that students who did well in a STEM course had greater motivation in STEM fields (**Table 7**).

The Effect of the Desired Major of the University on Motivation in STEM Fields

According to the university departments, they believed they would choose; a one-way ANOVA test was conducted to see whether there was a statistically significant difference in the motivation of the students participating in the research about the STEM fields. The average points of the other students and the students who are considering picking a STEM majors at the university had a substantial difference in their motivation scores for the STEM fields (Mean = 74.73), according to the test findings. The findings also indicated that kids who are thinking about majoring in a STEM degree in university are more motivated to pursue STEM fields (**Table 8**).

Table 9. The Relationship between the Sub-Dimensions of Career Interest in STEM Fields.

	Self-Efficacy	Outcome Expectation	Interest
Self-Efficacy	1.00		
Outcome Expectation	0.514	1.00	
Interest	0.659	0.669	1.00

Table 10. The Relationship between the Sub-Dimensions of Motivation in STEM Fields.

	Attention	Relevance	Confidence	Satisfaction
Attention	1.00			
Relevance	0.652	1.00		
Confidence	0.730	0.751	1.00	
Satisfaction	0.681	0.586	0.695	1.00

Table 11. Regression Findings on Motivation and Career Interest in STEM Fields.

Variable	B	Standard error	B	t	p
Constant	14.959	0.825	-	18.141	0.000
Motivation	0.711	0.011	0.836	62.170	0.000

R=0.836
R^2=0.699
$F_{(1-1665)}$=3,865.133
p=0.000

Findings Regarding the Sub-Dimensions of Career Interest in STEM Fields

To determine whether there is a correlation between high school students' career interest sub-dimensions for STEM fields, the Pearson product-moment correlation coefficient was determined. According to Sencan (2005), a correlation coefficient between 0.40 and 0.59 denotes a moderate associa-

tion, 0.60 to 0.80 denotes a strong relationship, and a number higher than 0.80 denotes a very strong relationship. **Table 9** displays the findings of the correlation between the career interest sub-dimensions for STEM fields. When **Table 9** is examined, it can be seen that there is a strong correlation between interest and outcome expectation, a strong correlation between interest and self-efficacy, and a moderate correlation between outcome expectation and self-efficacy.

Findings Regarding the Sub-Dimensions of Motivation in STEM Fields

To determine whether there is a correlation between high school students' motivation sub-dimensions for STEM fields, the Pearson product-moment correlation coefficient was determined. According to Sencan (2005), a correlation coefficient between 0.40 and 0.59 denotes a moderate association, 0.60 to 0.80 denotes a strong relationship, and a number higher than 0.80 denotes a very strong relationship. **Table 10** displays the findings of the correlation between the motivation sub-dimensions for STEM fields. There is a strong correlation between relevance and attention, confidence and attention, satisfaction and attention, confidence and relevance, and satisfaction and confidence, according to **Table 10**. Additionally, a moderate correlation between satisfaction and the relevance sub-dimensions was discovered.

Findings Related to the Relationship between Career Interest and Motivation for STEM Fields

In the study, the Pearson correlation coefficient was calculated to examine whether there is a relationship between high school students' career interests in STEM fields and their motivation towards STEM fields. The correlation coefficient in the study was found to be 0.836. This value showed that there was a high correlation between the variables.

Regression Findings on Motivation and Career Interest in STEM Fields

To assess whether motivation for STEM fields was a significant predictor of students' career interests in STEM fields, basic linear regression analysis was used in the study (**Table 11**).

A substantial association between motivation towards STEM fields and career interest was found as a result of the basic linear regression analysis carried out to ascertain how much the motivation towards STEM fields
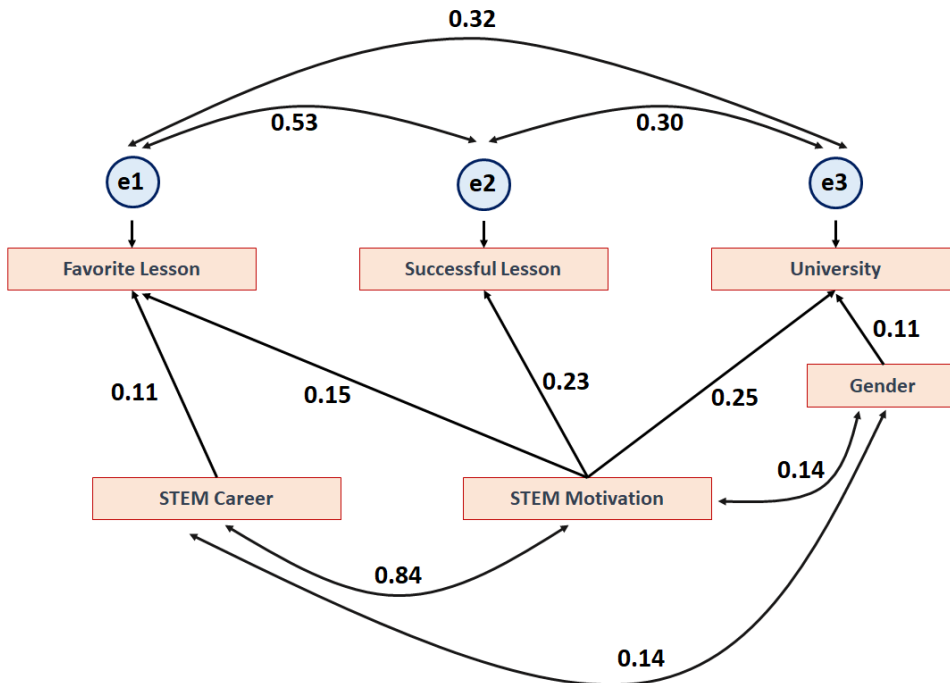
Figure 1. Path Diagram.

predicted the career interests of students towards STEM fields. It has been discovered that motivation for STEM fields is a highly important predictor of career interest in STEM fields. When the R2 value was looked at, it was discovered that motivation for STEM fields might account for 70% of the change in students' career interest in those fields. The motivation significance test confirmed that motivation was a significant predictor. The regression equation is provided below in accordance with the findings of the analysis of regression.

$$Career\ interest\ in\ STEM\ fields = (0.711 \times Motivation\ in\ STEM\ fields) + 14.959$$

Modeling Career Interest and Motivation in STEM Fields

Path analysis was used in the study to assess the strength and importance of some of the correlations between the variables (Meydan & Sesen, 2015). It was decided which model will be tested in the path analysis after looking at prior analyses and relevant literature. As a result, **Figure 1** contains the pro-

Table 12. Total and Direct Effect Values.			
Variables	Gender	Career Interest in STEM Fields	Motivation in STEM Fields
The department they considered choosing at the university	0.115	0.000	0.245
Most successful course	0.000	0.000	0.228
Favorite course	0.000	0.109	0.150

posed test model's path diagram. Here, the analysis was conducted after converting the students' gender, favourite course, most successful course, and departmental preference into two-category representative variables. Because categorical variables must be two-category variables in regression analyses in order to determine the correlation (Can, 2014).

The study's model's coefficients of fit were discovered to be consistent with the established limit values. The model's χ^2 / sd value was determined to be 1.799. The maximum value for χ^2 / sd that is permitted is 5. According to Ozdamar (2016), a number greater than 5 denotes mismatch. The CFI score was determined to be 0.999. According to Ozdamar (2016), a CFI value of more than 0.90 is acceptable.

According to the model, there is a connection between students' favourite STEM courses and their interest in careers in such disciplines. The students' favourite course, the most successful course, and the department they considered choosing at the university were a good association between the students' motivation for these fields. The students' preference for STEM-related fields at the university and the fact that they were male were found to be positively correlated. In addition, there are correlations between career interest in STEM disciplines and male gender as well as between motivation for STEM fields and being male. It has been found that there are favourable links between the most well-liked and successful course and the university department, which is one of the STEM fields. These associations, or pathways, were all statistically significant ($p < 0.05$). It was found that there were no indirect impacts between the variables when the findings were examined. The standardized total and direct effect values were found to be identical. **Table 12** provides the total and direct effect values between the variables.

According to **Table 12**, being male predicts choosing a STEM major at university. Career interest in STEM fields predicts that the most popular subject will be STEM fields. Motivation for STEM fields predicts choosing a department from STEM fields at university, the most successful course being one of the STEM fields, and the most popular class being one of the STEM fields. In addition, gender predicts career interest in STEM fields and motivation towards STEM fields.

Conclusion and Discussion

The study examined high school students' career interest and motivation in STEM fields in terms of many independent variables. The investigation done to establish if gender has a significant impact on high school students' interest in STEM careers produced results that showed that male students' interest was much higher than that of female students. The study found that male pupils were much more motivated than female students to pursue STEM fields. Gender perception can be described as a potential explanation for why female students' scores are much lower than male students in terms of the effect of gender on career interest and motivation towards STEM fields. Occupations outside of STEM fields are thought to be particularly suitable for female students. According to Gunindi Ersoz (2016), careers like teaching and nursing are thought to be particularly suitable, where female students would have time to care for their homes and children, are appropriate choices for them. The orientation of female students toward STEM disciplines is impacted by this circumstance. Results from a study with university students also showed that gender perception is a factor. According to the report, 27% of college students cited "appropriate for my gender" as a factor in their decision to study in a particular field. Gender compatibility was the primary factor, particularly for girl students, in selecting a department (Korkut-Owen et al., 2012).

Some studies produced outcomes that were comparable to those of this investigation when the pertinent literature was reviewed. Similar outcomes were observed in Zor's study (2006). According to the study, male pupils were more interested than female students in careers in science, mathematics, electricity, electronics, and computers. The study that involved high school students came to conclusions that were somewhat similar to those of the current study. According to Yelken's (2008) study, engineering is the field that male students believe they would most enjoy working in, while female students believe they would most enjoy teaching. Similar findings were made on university students by Dabney et al. (2012). In the study, there were four and a half times as many male university students who expressed interest in STEM careers as there were female students. Male high school students are more interested in STEM jobs than female pupils, according to a study by Robnett and Leaper (2012). Additionally, it was discovered that gender was a predictor of interest in STEM careers. The findings of a study done on high school pupils likewise came up with similar conclusions. Regarding how gender affects students' career aspirations, it has been shown that male students typically demonstrate a greater interest in engineering-related disciplines (Sadler et al., 2012). Boys were found to be much more interested in one of the STEM fields than girls were in another study with high school students (Lichtenberger & George-Jackson, 2013).

Similar findings were found in a study by Altay Kose and Yangin (2015) that looked at the interests of primary and secondary school pupils in scientific careers. In the study, it was found that male students were typically interested in careers in engineering and computers, whereas female students were typically interested in careers in medicine and psychology. According to a report by Welch et al. (2015), among middle school pupils, girls' interest in STEM was lower than boys' interest. In a study they did, Shin et al. (2017) found that male students had much stronger motivation for a future in science. According to Bolds' study (2017), the majority of high school pupils who selected to major in STEM fields at universities were men. Among middle school children, boys are generally more willing to pursue a career in STEM and exhibit more interest in STEM fields, according to a study by Christensen and Knezek (2017). Parallel to this study, Sahin et al. (2017) found that the 9th grade students' choice of STEM branches was influenced by their gender. According to the report, male pupils were more inclined to think about majoring in STEM fields at college. The gender of students in the 10th and 12th grades and their self-efficacy, anticipation of outcomes, and interest in STEM fields were also found to be significantly correlated by Turner et al. (2017). Male secondary school students showed greater interest in STEM jobs than female students, according to Alsup's (2015) study, however this difference was not statistically significant. Studies that reached different conclusions from this one are also included in the literature. A different outcome from this study was discovered in a survey of high school students, and it was shown that female students exhibited a considerably higher interest in STEM careers (Christensen et al., 2014). In contrast, Brown et al. (2016) found no appreciable differences in the STEM interests of male and female pupils in a study they did with sixth graders. In a study they did, Yerdelen et al. (2016) also demonstrated that secondary school pupils, both boys and girls, do not differ from one another in terms of their interest in any of the STEM professions.

According to the study, the students who enjoyed and excelled in STEM courses the most had a much higher level of career interest and motivation in STEM fields than the other students. According to the report, students who are thinking about majoring in one of the university's STEM subjects tend to have much higher career interests and motivations than other students. However, it was shown that there was a moderate impact of the department they chose on the students' interests and inclinations. It has been found that the department intend to major in at university of students can account for a small portion of the variation in career interest and motivation in STEM fields. In the study, Sahin et al. (2017) observed a comparable outcome. According to the study, there was a strong correlation between high school interests and future employment inclinations. Sari et al. (2018)'s arti-

cle revealed that the students' attitudes towards STEM disciplines, STEM career interests in STEM-related occupations significantly increased.

The study looked at the relationship between the sub-dimensions of career interest in STEM fields. In a different study with high school students, Garriott et al. (2017) discovered a favorable, substantial, and strong correlation between students' self-efficacy in math and science and their interest in those subjects. Similar to the research, Halim et al. (2018) discovered a favorable and substantial association between students' STEM self-efficacy and STEM job preferences. Another study, including high school students, found a direct correlation between interest in STEM careers and intrinsic coding interest, coding self-efficacy, and coders' perceptions (Jiang et al., 2022).

The study looked at the connection between the sub-dimensions of motivation in STEM fields. The sub-dimensions of relevance and attention, confidence and attention, satisfaction and attention, confidence and relevance, and satisfaction and confidence have all been found to be strongly correlated with one another. Additionally, a moderate correlation between satisfaction and the relevance sub-dimensions was discovered.

According to the study, there is a strong link between motivation and career interest in STEM fields. The study found a substantial correlation between career interest and motivation toward STEM fields. Motivation in STEM fields has been found to be an important predictor of career interest in STEM fields. In a study, it was discovered that high school graduates' motivating traits were significantly and favorably associated with their entry into STEM fields (Wang, 2013). Another study found that high school pupils' own motivation to pursue STEM subjects had the primary influence on their interests (Christensen et al., 2015). Another study that looked at the elements influencing high school students' interest in STEM career found that American students' intrinsic motivation was the most significant component (Bahar & Adiguzel, 2016). Evidence was found that fostering students' motivation has a positive impact on their willingness to choose a STEM field of study in a study whose main goal was to analyze the impact of the motivational design of mathematics, physics, and chemistry courses in high schools (Aeschlimann et al., 2016).

According to the study, motivation in STEM fields accounts for 70% of high school pupils' career interests towards those fields. According to the research's path analysis, several correlations between variables like gender, preferred and successful courses, motivation in STEM fields, and career interest were modeled. In a study conducted in the related literature, it was explored how several factors, including instructor influence and students' self-confidence, predict their interest in STEM (Sellami et al., 2017). The impacts of self-efficacy, result expectations, and parental support variables on interest in mathematics and science were modeled by Garriott et al. (2013).

Multiple model analyses were carried out by Aeschlimann et al. (2016) in a study looking at factors including STEM job choice, interest, and motivation for high school students. In the study by Bolds (2017), the connections between many variables, including self-efficacy in math and science, outcome expectations, curiosity, environmental support, and hurdles, were examined. According to Garriott et al. (2017), the path diagram contained elements including self-efficacy, interest, and goals. It was shown that self-efficacy significantly predicted interest. Similar to this study, Turner et al. (2017) modeled some factors. Relationships between variables like gender, parental support, career desire, STEM aptitude, and result expectations were modeled in the study. Gender substantially impacted efficacy, outcome expectation, and interest, according to the model.

Limitations and Future Directions

According to the study, male students showed much greater career interest in STEM fields than did female pupils. Activities for girls can be conducted at school and in classrooms to pique their interest. To pique the interest of female students in STEM fields, vocational tours might be planned in areas like engineering. It can be having looked at potential explanations for why female students' interest in STEM careers is lower than that of male students.

According to the study, male students were much more motivated to pursue STEM fields than female students. Activities for girls can be held at school and in classrooms to boost female students' motivation. In order to lessen the impact of the gender factor, it is possible to ensure that female students meet or visit women working in STEM fields, given the factors affecting students' motivation. It can be having looked at potential explanations for why female students' interest in STEM disciplines is lower than that of male students.

It was investigated how the sub-dimensions of career interest in STEM fields related to one another. The study looked at how the Motivation Scale in STEM Fields' sub-dimensions related to one another. It is possible to look at how each sub-dimension interacts with other variables.

The quantitative study of high school students' career interests and motivations for STEM fields is one of the limitations of this study. With the help of qualitative research to be conducted, high school students' career interests and motivations towards STEM fields can be revealed in all aspects.

The fact that the sample consisted of high school students in Kayseri, Turkey, is another limitation of this study. By carrying out a comparable study with students in other cities, it will be possible to draw more general conclusions about high school students in Turkey.

Other research may focus on examining various factors that influence kids' interest in STEM careers. By looking at students' motivation and ca-

reer interest in STEM fields with various variables, several path diagrams may be produced.

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