Determination of the STEM Career Interests of Middle School Students

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Abstract

The aim of this research is to determine the middle school students' interest in STEM (Science, Technology, Engineering and Mathematics) field. Descriptive survey model, which is one of the quantitative researches, was used. A scale named ‘’The Development of the STEM Career Interest Survey (STEM-CIS)’’ was applied to the middle school students who were studying in public schools in two different central districts of Ankara. 271 (51.7%) female and 253 (48.3%) male student attended to the research. The reliability coefficient of this questionnaire was calculated as 0.902. The findings show that self-efficacy, personal goals, expectation of results, interest in science, contextual support and individual inputs are effective in STEM career interests of middle school students. STEM career interest has been found to be disproportionate to gender, but it is proportional to class level. In order for students to develop their career plans, the content which is specific to the STEM fields can be combined with the course content itself.

Keywords: STEM, Career, Interest, STEM Career, Middle School

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INTRODUCTION

STEM is the abbreviation which was created by combining the first letters of science, technology, engineering and mathematics (Tsupros, Kohler & Hallinen, 2009). The general definition of STEM is that it is an interdisciplinary approach which connects the academic content with the real-world situations in science, technology, engineering and mathematics, integrates this content into school, community, business and global initiatives, and enhances a new economic competitiveness through STEM literacy (Tsupros et al. 2009).

STEM education program is not only an approach which is based on learning by exploring and discovering, but it is also a dynamic and fluent commodity discipline which is based on the teachers' combined education in the fields of science, technology, engineering and mathematics. (Brown, Brown, Reardon & Merrill, 2011). STEM education process is more about integrating these four areas into education as a single discipline rather than just being a combination of these four areas within the curriculum. STEM learning experiences lead to some holistic and exploratory developments and applications in the fields of science, technology, mathematics and engineering (Dubetz & Wilson, 2013).

One of the most important purposes of STEM education is to encourage students to lead their careers in science, technology, mathematics and engineering. STEM education emphasizes a multidisciplinary approach to better prepare students for STEM disciplines and to increase the number of students who will choose STEM as a profession in the future. This shows that the STEM abbreviation is much more than the nomenclature of these four integrated disciplines (Ostler, 2012).

Educators, businessmen, managers and community members need self-educated individuals in STEM areas (Craig, Thomas, Hou, & Mathur, 2011). Researches show that while the need for the individuals to work in this field increases, the number of individuals interested in these fields decreases. Many students lose their interest in science and mathematics when they reach the level of middle school (Museus, Palmer, Davis & Maramba, 2011; Turner & Ireson, 2010). Unfortunately, many students who have the ability to become an engineer do not pursue a career in engineering either because they do not know what engineers actually do or because they think they do not have the skills and interest to become an engineer (NAE, 2009; NRC, 2009). Some conclusions can be reached by looking at the "Measuring, Selection and Placement Center (OSYM)" placement rates in ''STEM education in Turkey'' report (2015). From the STEM placements of OSYM between 2000-2014, it can be concluded that the rate of males making their choice in science, mathematics, engineering and technology is four times higher than that of females'.

Our need for STEM education can be explained by the following items:

1) In the globalizing world, individuals, who is going to work in STEM fields, should be given some education first. This need should be taken into account both for the development of the business world and for information and technology applications to be developed in the country.

2) The number of women to be educated in these fields should be increased. The male dominance in these fields can be overcome by a number of educational approaches which will eliminate the gender inequality. A report released by Turkish Industry & Business Association (TUSIAD) in 2017 indicates that in Turkey, about 3.5 millions of nearly 34 million Turkish people will be employed in the STEM fields by 2023, the requirement for STEM employment will come close to 1 million between 2016 and 2023, and the employment rate should be approximately 31% for the university graduates and postgraduates. The report also shows that Turkey will be the world's 12th largest economy in 2030 and the 11st in 2050 in terms of the purchasing power parity, therefore there will be a need for a more qualified workforce in the STEM fields (TUSIAD, 2017). When the literature is examined, it is seen that the studies conducted in STEM generally focus on gender, career and racial issues. Within the framework of the thesis topic, career-related studies on STEM have been included in this section. On the other hand, there is apparently no study in STEM career field carried

out throughout the country. It is seen that some different studies are carried out as to the STEM career abroad.

In a study conducted by Bishop (2015) showed that students, who were educated within the framework of a STEM program, wanted to lead a STEM career more than the other students who did not receive any STEM education. Huelskamp (2010), on the other hand, stated that he had the middle school students watch the experiences of STEM professionals through videos, which had a positive impact on the students' attitude towards the STEM fields. He stated that role models are effective in orienting students to STEM fields. On the other side, Wagstaff (2014) examined the students' selecting the STEM career fields through scientific self-efficacy. Methodically, he used socio-cognitive career theory. Lark (2015) states that there is a relationship between students' interest in STEM and their innovative skills, recommends that students' interest in STEM fields should be examined. Schneider, Broda, Judy and Burkander (2013) have pointed out that there is a positive relationship between students' attitudes towards mathematics and their STEM career plans. Kutch (2011) has observed a positive effect on the attitude and the career choice of the experimental group receiving STEM education. The subjects of STEM fields should be presented to the students in order to engage their attention to STEM fields (Gülhan & Şahin, 2016). When STEM related studies are examined, it is observed that the importance and popularity of STEM education has been increasing in recent years. In this context, countries are trying to include STEM education in their education programs. On the other hand, it is observed that the studies conducted are aimed at examining the STEM fields and their integration processes. The aim of this research is to find an answer to the question ''How interested are middle school students in the STEM career?'. Within the framework of this question, some answers are also sought for the following sub-questions:

How are the middle school students interested in science?

How are the middle school students interested in technology?

How are the middle school students interested in mathematics?

How are the middle school students interested in engineering?

How do the middle school students' interest in STEM areas differentiate by gender?

How do the middle school students' interest in STEM fields differentiate according to their grade/class?

METHOD

Descriptive survey model, which is one of the quantitative research methods, was preferred to be used. The universe of this research consists of the middle school students who have been receiving education in Ankara, Turkey.

Population

According to the data published by the Ankara Directorate of National Education in 2016-2017 academic year, there are 250.406 students attending a middle school in the center of Ankara. The population of the research consists of 271 (51.7%) female and 253 (48.3%) male students. In the determination of sample size according to a fixed sampling, the rate is to be determined as n / N = 1% and it is considered to be enough to use 1% of the universe (Arikan, 2004).

Measurement Tool

"The Development of the STEM Career Interest Survey (STEM-CIS)", which is a scale developed by Kier, Blanchard, Osborne and Albert (2014), has been used as the data collection tool in the study. The original scale consists of 4 dimensions: science (11 items), technology (11 items), mathematics (11 items), engineering (11 items). The scale was adapted to Turkish by Unlu, Dökme and Unlu (2016). The scale was decided to be used after getting the approval of the authors of its original version and Turkish version by an e-mail. It was deemed appropriate to exclude these items by language specialists with the idea that the 11th question of each sub-dimension is not suitable for Turkish, may cause confusion and not serve the purpose of measurement. The Scale was designed as a 5-Point Likert. As for the numbers; 5 means ''Completely Agree'', 4 means ''Agree'', 3 means ''Unstable'', 2 means ''Disagree'' and 1 means ''Completely Disagree''. The scale consists of 40 items and 4 sub-dimensions. The highest score to get on this scale is 200 and the lowest score is 40.

Table 1. The Relationship Between the Items and Socio-Cognitive Theory

1st dimension	Socio-cognitive theory	2nd dimension	Socio-cognitive theory	3rd dimension	Socio-cognitive theory	4th dimension	Socio-cognitive theory
S1	Self-efficacy	T1	Self-efficacy	E1	Self-efficacy	M1	Self-efficacy
S2	Self-efficacy	T2	Self-efficacy	E2	Self-efficacy	M2	Self-efficacy
S3	Personal goals	T3	Personal goals	E3	Personal goals	M3	Personal goals
S4	Personal goals	T4	Personal goals	E4	Personal goals	M4	Personal goals
S5	Expectation of result	T5	Expectation of result	E5	Expectation of result	M5	Expectation of result
S6	Expectation of result	T6	Expectation of result	E6	Expectation of result	M6	Expectation of result
S7	Interest in science	T7	Interest in technology	E7	Interest in engineering	M7	Interest in math's
S8	Interest in science	T8	Interest in technology	E8	Interest in engineering	M8	Interest in math's
S9	Contextual support	T9	Contextual support	E9	Contextual support	M9	Contextual support
S10	Individual inputs	T10	Individual inputs	E10	Individual inputs	M10	Individual inputs
S11	Contextual support	T11	Contextual support	E11	Contextual support	M11	Contextual support

The dimensions of science, technology, engineering and mathematics were formed depending upon the socio-cognitive career development model, which was developed by Lent, Brown & Hackett (1994) (Table 1.). According to the model developed by Lent et al. (1994), individual inputs (participation, gender, race-ethnicity, health status) consist of positive or negative environments in the past, learning experiences, expectation of competence, expectation of result, interests, choice objectives, choice behavior and performance areas. Self-efficacy, for example, is an individual's belief in his or her capacity to analyze personal goals and decisions. Personal goals express the learner's expectations. Navarro, Flores, Worthington (2007) concluded that students' expectation of results in science and mathematics is related to self-efficacy. Rennie, Fehrer, Dierking, and Falk, (2003) stated that interest in STEM is effective in choosing a profession. Contextual support means that there are some individuals working in this field and they support him / her (Lent & et al., 1994).

Reliability and Validity

Reliability coefficient (Cronbach's Alpha) values of each sub-dimension were reviewed in order to calculate the reliability coefficients of this scale. In Turkish version, on the other hand, STEM career interest (STEM-CIS) survey measurement reliability was 0.93. Reliability was calculated 0.86 for science sub-dimension, 0.88 for technology sub-dimension, 0.94 for engineering sub-dimension and 0.90 for mathematics sub-dimension. At the end of the analysis, a scale consisting of 40 items and four sub-dimensions (science, mathematics, engineering and technology) was obtained. The scale was reviewed by a science specialist in order to determine the suitability of the study. Then, it was pre-applied to 20 students at 8th grade, 20 students at 7th grade, 20 students at 6th grade and 20 students at 5th grade; however, it was observed that 5th grade students had difficulty in understanding the relationship between the profession and field. Therefore, the scale was applied to 6th, 7th and 8th grade students. Cronbach Alpha internal consistency coefficient was calculated as 0.923 in order to determine its reliability. Reliability coefficient was calculated as 0,798 in science dimension, 0,854 in technology dimension, 0,910 in engineering dimension and 0,856 in mathematics dimension.

Data Analyses

The data obtained were first subjected to normality test. Skewness and kurtosis coefficients were calculated. Skewness coefficient was calculated as -0.105 and kurtosis coefficient as 1,123. Tabachnick and Fidell (2013) stated that the values between + 1.5 and -1.5 is sufficient for normal distribution of the data. Item averages, t-test and ANOVA were used in the analysis of the data.

RESULTS

In this section, you can see the findings related to the sub-problems of the research.

Findings Related to Sub-problem: ‘’How interested are the middle school students in the field of science?”

Table 2. Average and Standard Deviation of Middle School Students' Interest in Science According to STEM Career Interest Scale

	N	X	SD
Science averages	524	3.84	0.59

Table 2 shows the average and standard deviation of middle school students' interest in the field of science. The survey was applied to 524 middle school students. The average of the science field was calculated as 3.84 and the standard deviation was calculated as 0.59. The item averages in science were evaluated according to the averages used in the field of science. Items that were above average of 3.84 were considered positive and those that were below were considered negative.

Table 3. Average and Standard Deviation of the Middle School Students' Interest in the Items of Science According to STEM Career Interest Scale

No	Items	N	X	SD
S1	I can get good scores in science.	524	4.26	0.79
S2	I complete my assignments in science.	524	4.47	0.70
S3	Engaging in science is one of my future plans.	524	3.33	1.15
S4	I will study more for Science lessons.	524	4.37	0.80
S5	If my scores are high in Science, it will help me in my future life.	524	4.26	0.94
S6	If I choose a Science-related job, my parents will be glad.	524	4.00	0.99
S7	I am interested in science fields.	524	3.47	1.20
S8	I enjoy attending Science lessons.	524	4.29	0.89
S9	There are some professionals for me to take as an example in Science.	524	3.48	1.24
S10	I feel comfortable when I speak to the professionals in Science.	524	3.71	1.10

Table 3 shows that the average and standard deviation of middle school students' interest in science-related items according to STEM career interest scale. Table 2 shows that the average of science is 3.84. It is observed that S1, S2, S4, S5, S6 and S8 are above average. Middle school students believe that they can get good grades from the science course. Participant students stated that they were able to complete their assignments of science and they had made more effort for the science courses. They also stated that getting good grades in science course would help them in their professional life. They told that their families would be pleased if they chose a profession related to the field of science. Participant students stated that they liked the science classes. The items as coded ''S3, S7, S9 and S10'' are found to be below the average of science items. Therefore, it is understood that the students gave some negative answers to these items. There is no science in the future career plans of the participating students. The students are not interested in science professions. In addition, there are not any professional working in science-related fields for them to see as an example. Students stated that they did not feel comfortable talking to the professionals working in the field of science.

Findings Related to the Sub-problem: "How interested are the middle school students in technology?"

Table 4. Average and Standard Deviation of the Middle School Students' Interest in the Field of Technology According to STEM Career Interest Scale

	N	X	SD
Technology averages	524	3.73	0.70

Table 4 shows that the average and standard deviation of middle school students' interest in the field of technology. The questionnaire was applied to 524 middle school students. The average deviation of science was found to be 3.73 and its standard deviation was 0.70. The item averages in the field of science were evaluated according to the averages in the field of technology. The items above the average of 3.73 were considered to be positive and the items below were evaluated as negative.

Table 5. Average and Standard Deviation of the Middle School Students' Interest Regarding the Items of Technology According to STEM Career Interest Scale

No	Items	N	X	SD
T1	I do well in technology activities.	524	4.16	0.98
T2	I can learn new technologies.	524	4.35	0.91
T3	Engaging in technology is one of my future plans.	524	3.49	1.23
T4	If I learn technology, it will help me in my school life.	524	4.16	0.98
T5	If I learn technology well, I can think about working in this field.	524	3.81	1.10
T6	If I choose a technology-related job, my parents will be glad.	524	3.76	1.07
T7	I enjoy using technology while I am studying on my assignments.	524	4.11	1.03
T8	I am interested in technology-related jobs.	524	3.51	1.21
T9	There are some technology professionals for me to take as an example.	524	3.25	1.27
T10	I feel comfortable when I speak to the professionals in technology.	524	3.67	1.13

Table 5 shows that the average and standard deviation of middle school students' interest in technology-related items according to the STEM career interest scale. Table 4 shows that the average of technology is 3.73. It is seen that the items T1, T2, T4, T5, T6 and T7 are above the average. The participant students stated that they could do well in the activities related to technology and easily adapt to new technologies. Students stated that the new technologies they learned would help them in the school, and if they knew more about technology, then they could make a career plan in technology. They stated that their families would be pleased if he made a career in technology. In addition, the students stated that they liked to use technology for their school assignments. Items coded as T3, T8, T9 and T10 appear to be below the average. It is observed that there is not any technology-related profession within the students' future career plans. It is apparent that the participant students are not interested in the professions requiring the knowledge of technology and that there is not any professional working in this field for the students to take as an example. The students stated that they did not feel comfortable with the people who worked in technology-related fields.

Findings Related to the Sub-problem: ''How Interested are the Middle School Students in Engineering?"

Table 6. Average and Standard Deviation of Middle School Students' Interest in Engineering According to the STEM Career Interest Scale

	N	X	SD
Engineering averages	524	3.36	0.85

Table 6 shows that the average and standard deviation of middle school students' interest in the field of technology. The questionnaire was applied to 524 middle school students. The average deviation of the science field was calculated as 3.36 and its standard as 0.85. The item averages in the field of science were evaluated according to the averages in the field of technology. The items above the average of 3.36 were considered positive and the items below were considered negative.

Table 7. Average and Standard Deviation of the Middle School Students' Interest in the Items of Engineering According to the STEM Career Interest Scale

No	Items	N	X	SD
E1	I do well in engineering activities.	524	3.49	1.14
E2	I can complete my engineering assignments.	524	3.54	1.13
E3	Engineering i one of my future plans.	524	3.10	1.24
E4	I give importance in engineering subjects at school.	524	3.16	1.17
E5	If I know more about engineering, I can choose it as a profession in the future.	524	3.60	1.24
E6	If I choose engineering as a profession, my parents will be glad.	524	3.90	1.10
E7	I am interested in engineering-related jobs.	524	3.19	1.23
E8	I enjoy engineering activities.	524	3.48	1.18
E9	There are some engineering professionals for me to take as an example.	524	3.12	1.33
E10	I feel comfortable when I speak to the professionals in engineering.	524	3.62	1.15

Table 7 shows that the average and standard deviation of middle school students' interest in the items of engineering according to STEM career interest scale. Table 6 shows that the average of engineering is 3.36. The items E1, E2, E5, E6, E8 and E10 were found to be above average. The participant students stated that they could do well in engineering-related activities and complete the activities in this field. Students stated that if they knew a lot about the field of engineering, they could make their career plans in this field and their families would be pleased if they chose an engineering department. The participant students stated that they liked engineering activities and that they felt comfortable talking to people in the field. The items E3, E4, E7 and E9 appear to be below the average. It shows that there is no engineering in the students' future career plans. The students stated that there were nobody working in this field for the them to take as an example.

Findings Related to the Sub-problem: ''How interested are middle school students in mathematics?"

Table 8. Average and Standard Deviation of the Middle School Students' Interest in Mathematics According to STEM Career Interest Scale

	N	X	SD
Mathematics averages	524	3.84	0.58

Table 8 shows the average and standard deviation of middle school students' interest in mathematics. The questionnaire was applied to 524 middle school students. The average deviation of the science field was calculated as 3.84 and its standard deviation as 0.58. The averages of the items in the field of science were evaluated according to the averages in the field of technology. The given items above the average of 3.84 were considered positive and those below were considered negative.

Table 9. Average and Standard Deviation of the Middle School Students' Interest Regarding the Items of Mathematics According to Career Interest Scale

No	Items	N	X	SD
M1	I can get high scores in mathematics.	524	4.26	0.93
M2	I can complete my mathematic assignments.	524	4.45	0.81
M3	Engaging in mathematic is one of my future plans.	524	3.61	1.19
M4	I will study more in mathematic lessons.	524	4.49	0.81
M5	If I get high scores in mathematics, it will be good for my future life.	524	4.28	1.00
M6	If I choose a mathematics -related job, my parents will be glad.	524	4.19	0.95
M7	I am interested in mathematics lessons.	524	3.66	1.16
M8	I enjoy my mathematics class.	524	4.27	1.01
M9	There are some mathematics professionals for me to take as an example.	524	3.70	1.19
M10	I feel comfortable when I speak to the professionals in mathematics	524	3.78	1.11

Table 9 shows that the average and standard deviation of middle school students' interest in the items of engineering according to STEM career interest scale. Table 8 shows that the average of engineering is 3.84. Items coded as M1, M2, M4, M5 and M8 were found to be above the average. Participant students stated that they could get good grades in mathematics and completed their mathematics assignments. They believed that if their grades in mathematics increased, it would contribute to their future career. Items coded as M3, M6, M7, M9 and M10 are below average. Students stated that mathematics was not in their future career plans and that their families would not be pleased to make a career in this field. The participants stated that they were not interested in mathematics -related professions and that they did not know anybody to take as an example.

Findings Related to Sub-Problem: ‘’How do middle school students' interest in STEM fields differentiate by gender?’’

Table 10. Evaluation of the Middle School Students' Interest in The STEM Fields According to Their Gender

	Gender	N	X	SD	t	Sig
Science	female	271	3.92	0.53	0.01	p<0.05
	male	253	3.75	0.63		
Technology	female	271	3.63	0.64	0.01	p<0.05
	male	253	3.83	0.74		
Engineering	female	271	3.19	0.79	0.00	p<0.01
	male	253	3.53	0.88		
Mathematics	female	271	3.92	0.53	0.01	p<0.05
	male	253	3.75	0.63		
STEM	female	271	3.69	0.49	0.16	p>0.05
	male	253	3.75	0.57		

Table 10 shows that the differentiation of middle school students' interest in the STEM fields with their gender. It is observed that t-value of science on the STEM career scale is $p < 0.05$. When we look at the boys and girls, it is observed that there is a meaningful difference in the field of science for female students. It is seen that the t-value of technology dimension in STEM career scale is $p < 0.01$. This value shows that there is a meaningful difference in the field of technology for male students. It is observed that t-value of engineering on STEM career scale is $p < 0.05$. This value shows that there is a meaningful difference in the field of engineering for male students. The t-value of mathematics on the STEM career scale has been found to be $p < 0.05$. Considering the students interests, this value shows that there is a meaningful difference in the field of mathematics for female students It is observed that t-value is p> 0.05 for all dimensions of the STEM career scale. It is apparent that there is no meaningful difference between male and female students for all STEM fields.

Findings Related to Sub-Problem: "How do the middle school students' interest in STEM fields differ according to grade?"

Table 11. Participation, Average and Standard Deviation of the Middle School Students According to their Grades

No	Class	N	X	SD
1	6th grade	94	3.67	0.52
2	7th grade	265	3.67	0.53
3	8th grade	165	3.83	0.53

Table 11 shows how the middle school students' interests in the STEM fields differentiate according to their grades. 94 students from 6th-grade took part in the survey. The average deviation was calculated as 3.67 and the standard deviation as 0.52. There were 265 7th-grade students took part in the survey. The average deviation was 3.67 and the standard deviation was 0.53. There were 165 8th-grade students took part to survey. The average was 3.83 and the standard deviation was 0.53.

Table 12. ANOVA Table of The Change Depending on the Grades of the Middle School Students and Their Interest in The Fields of STEM

	Sum of Squares	df	Mean Square	F	Sig.	Differentiation of groups
Between Groups	2.676	2	1.338			
Within Groups	147.516	521	0.283	4.726	0.009	1-3 2-3
Total	150.193	523				

Table 12 shows that how middle school students' interest in STEM fields differentiate depending on their grades. It is observed that there is a meaningful difference between 6th, 7th and 8th grade students in terms of their STEM career interests. It can be stated that as the students' grades increase, their interest in making a STEM career also increases.

CONCLUSIONS, DISCUSSIONS AND SUGGESTIONS

In the study, which aims to determine STEM career interests of middle school students, findings obtained in the dimensions of self-efficacy, personal goals, expectation of results, interest in science, contextual support and individual inputs were evaluated through socio-cognitive embedded theory. It has been observed that the first and second items are above average in the dimensions of science, technology, engineering and mathematics. These items show a positive correlation between students' self-efficacy in terms of the STEM fields. This result is similar to the study results of Navarro, Flores, Worthington (2007), which shows that an individual's making a career plan in the STEM fields depends on students' awareness of talent and capacity.

It has been understood that participant students are below the average in the third item of the STEM career interest survey. This result can be interpreted as that the middle school students do not have any personal goal in the STEM fields. This can be thought to be the result of the fact that the middle school students have not yet made any career choice. It is suggested that opportunities should be created for students to make their career plans.

Participant students' positive responses in the fourth and fifth items indicate that getting good grades in science, technology, engineering and mathematics is important for their career choices. They stated that if they chose a career in the STEM fields, their families would be pleased with it. However, it is another remarkable result that the students are not interested in any STEM field apart from technology. In the individual inputs section, it is stated that there is not any professional for the students to take as an example in the STEM fields. The inclusion of such a person in science practices positively contributes to the students' attitude towards the STEM fields (Dönmez, 2018). Students told that they did not feel comfortable talking to the professionals of STEM fields apart from the engineers. Huelskamp (2010) states that transferring the experiences of STEM professionals through videos contributes to the orientation of students in these fields.

Many studies on STEM have focused on the gender factor. In STEM career areas, men and women are not equally represented (NSF, 2007). The reason for this is the gender stereotypes depicted in the media about STEM careers and the students' perceptions of themselves considering STEM success and its occupational-gender relevance (Steinke, et al., 2007). In this study, it is seen that the interest of girls in science and mathematics is a meaningful difference compared to the interests of boys.

In the fields of engineering and technology, it is seen that the interests of boys show a meaningful difference when compared to the interests of girls. As Hirsch et al. (2007) also states that many girl students do not know much about the engineering field, and many are thought to be more interested in leading their careers on the way to serve for the society. However, there was no meaningful relationship between gender and STEM career interests. Students must be presented with a holistic approach in order to pursue a career in STEM. In order to help them plan their careers within STEM fields, a content which is specific to these fields can be presented to the students. The people working in the STEM fields can be provided with some specific information on this field.

Another finding obtained at the end of the research shows that as the age group increases at the middle school level, STEM career interests. For this reason, it is necessary to include applications regarding knowledge and skills in STEM fields starting from preschool period. Studies have also indicated that middle school students have an unclear view about engineering (Compeau, 2016) and science (Masnick et al. 2010) yet these are critical years in which to build STEM interest. The grades 7 through 9 years (12–15-year-olds) are the key time period for influencing STEM career interest and for building this self-efficacy with respect to mathematics and science. Thus, it is during the junior high (middle) school age that a student's beliefs about competency and interests begin to solidify (Simpkins et al. 2006).

Findings show that self-efficacy, personal goals, expectation of results, interest in science, contextual support and individual inputs are effective in STEM career interests of middle school students. STEM career interest has been found to be disproportionate to gender, but it is proportional to class level. In order for students to develop their career plans, the content which is specific to the STEM fields can be combined with the course content itself. People, who are working in the STEM fields, can be provided with the specific knowledge. This research is limited with 523 middle-school students district of Ankara, Turkey. Researchers can conduct scientific reaches in different countries, different regions and different grade levels to identify or compare STEM career interest. The effect of variables other than gender and grade level on STEM career interest can be identified.

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