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A Research about the Placement of the Top Thousand Students in STEM Fields in Turkey between 2000 and 2014

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STEM (Science, Technology, Engineering and Mathematics), one of the mostly emphasized concepts in the world, is a paradigm that creates interdisciplinary learning and provides achievement of the outcomes of science, mathematics, engineering and technology while doing this. This research was carried out to investigate the STEM fields' placement of the top thousand students placed in science and mathematics fields in universities, the Student Selection and Placement Center (ÖSYM) university placement data as a basis. This is a quantitative research and descriptive analysis techniques have been used. In the study, which has examined university placement of 17135 students, it was determined that as the students' interest in STEM fields decreased between the years 2000-2014, the interest in faculties of medicine increased, that there is a major difference between male and female students in favor of the males, that the students were placed mostly in engineering departments among STEM fields and that placement in education faculties and fundamental sciences was rather low.

Keywords: STEM, STEM education, University STEM placement, STEM fields

INTRODUCTION

In the 21st century science and technology are developing at a very fast pace and this development requires people to acquire some skills. These skills called 21st century skills are collaboration, creativity, critical thinking, communication, problem solving, analytical and algorithmic thinking skills and similar skills (P21, 2015). The acquisition of these skills can be actualized through an interdisciplinary and applied paradigm such as STEM education. STEM education is not a separate lesson but a paradigm, where disciplines such as science and mathematics are blended with technology and engineering-based design applications. While making learning

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interdisciplinary, STEM education provides achievement of science, mathematics, and engineering and technology outcomes and thus, ensures education to become production-based learning. STEM education also provides opportunities for the global economic development (The National Academies, 2007). STEM education in K-12 encourages real life interdisciplinary knowledge and skills and it also prepares students for a knowledge-based economy (National Research Council, 2011).

State of the literature

- STEM education provides achievement of science, mathematics, engineering and technology outcomes and thus, ensures education to become production-based learning. STEM education also provides opportunities for the global economic development.
- While there are numerous researches related to STEM education in the USA, the researches in Turkey are rather limited.
- Major resources regarding STEM education are allocated, particularly in the USA and the curriculum is being amended for STEM areas. Also, studies for the orientation of girls towards STEM education are carried out. In recent years studies regarding STEM education have been increasing as well.

Contribution of this paper to the literature

- This article contributes to the literature in terms of STEM fields' placement of 17135 students ranking in the top thousand in Turkey between the years 2000-2014.
- This article contributes to the literature in terms of STEM fields' placement of male and female students in Turkey.
- This article contributes to the literature in terms of its suggestions regarding choice of careers in STEM fields in Turkey.

Today many countries are going through an economic crisis due to the increasing unemployment and rising national debts, the significance of work power is growing; therefore, in the world of the 21st century nations give more importance to investment for innovation and a sustainable economic development (Çorlu, Capraro & Capraro, 2014). Business Roundtable (2005) has stated that in the USA it is aimed that graduates in the fields of science, technology, engineering and mathematics will be doubled by 2015. The USA Department of Education states that the expected growth in STEM fields of work will increase by 14% between the years 2010-2020 (U.S. Department of Education, 2015). This is the reason why STEM education is considered very important in the world, particularly in the USA. STEM education supports problem solving in different disciplines and individual development in knowledge and skill acquisition. Therefore, the USA desires to actualize furthering their economic growth and sustaining their world-wide scientific and technologic leadership by the help of STEM education (Bybee, 2010). The budget for the years 2014, 2015 and 2016 spared by the Obama government for equipping students with STEM skills is approximately three billion dollars annually, adding up to nine billion dollars (Akgündüz et al., 2015).

The origin of the STEM concept comes from the 1900s and derives from the constructivism theory; however, the concept was first brought forward by Judith Ramaley, an executive of National Science Foundation (NSF), in 2001 (Voutour, 2015; Winonadailynews, 2011). The studies conducted by the USA, the biggest global power of the world, in order not to stay behind in the space race when the Soviet Union launched the space shuttle Sputnik in 1957 (Bybee, 2007) were the first ones in the field of STEM. As a result of the debates, it was put forward that if people would go to the space, existence of many scientists, technology experts, mathematicians and engineers would be required and thus, STEM education should have a national priority (Maness & Holtzin, 2015). These studies helped the USA to get ahead in the space race again and to maintain its leadership. However, the attempts of Japan as of the 1980s and China as of the 1990s to get to the foreground economically paved the way for various steps in the USA with regard to STEM education. One of these steps is the National Science Education Standards published by the National Research Council (NRC) in 1996. The aim of these standards is to provide directions for the states and schools about how the science instruction should be at the schools and to have the students experience inquiry-based teaching and learning in the classroom (National Research Council, 1996). Tapping America's Potential: The Education for Innovation Initiative (Business Roundtable, 2005) and Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future (The National Academies, 2007) reports, published in the US, have stated that more qualified STEM work power might be possible with education and orientation in STEM fields. Therefore, a requirement for curriculum change has become a current issue. As the significance of STEM education grew year by year, the curriculum called Next Generation Science Standards covering STEM was developed by Achieve Inc. in 2012 (Achieve, 2012). As stipulated that in the USA STEM work power will increase by 14% between the years 2010 – 2020, (US Department of Education, 2015) students and teachers are given school-based or out-of-school STEM education by the STEM concept schools, university departments, non-governmental organizations, STEM centers, science centers and museums (Akgündüz et al., 2015).

TURKEY AND STEM EDUCATION

Taking into account that in the USA the government, non-governmental organizations, scientific institutions, science centers, museums and schools are committed to STEM education and resources are transferred to this education, it may be envisaged that, in spite of the difficulties in the implementation, studies regarding STEM education will continue increasingly and that the teaching theories based on the implementations in the USA will become prevalent in near future. It has become an obligation for the USA and European countries to invest in STEM fields in order for them to have a say in the future. Within this scope many studies are conducted with regard to STEM by the US government, universities, non-governmental organizations scientific institutions and schools.

Raising an innovative, entrepreneurial, creatively-thinking generation at the schools that is interested in STEM fields becomes necessary in order to actualize particularly the studies carried out in the USA. In order to raise such a generation, we need an educational culture that assigns responsibilities to the students, that makes them think and also make mistakes, that equips them with technological knowledge such as computer programming from early ages on, that regards solidarity highly and that instills an enterprising spirit in them. It will not be possible to compete in the global economic system that will enter a more challenging course in the 21st century without forming an educational culture as stated above and without raising a generation that has gained an understanding of science, mathematics, engineering and computers and that generates products using the necessary skills in these fields (Akgündüz et al., 2015).

The science and technology program which is delivered by the Board of Education and Discipline (TTKB, 2004, 2005) is one of the important steps towards the integration of Turkish education system into European Union. This new science and technology education is constructivism and inquiry based, also aiming integration with other disciplines and also between the levels in its own discipline and is for improving 21st century skills, effective technology usage and problem solving skills. That is why this new science and technology education is constructing the basis of STEM education.

During the recent years, various undertakings and projects have conducted in Turkey about STEM education. Despite all of these undertakings and projects, the national and international exams and reports show that the scores of the students in science and mathematics fields are not good. YGS- Higher Education Entrance Exams (ÖSYM, 2015c), hold by the Student Selection and Placement Center (ÖSYM), and PISA-the Programme for International Student Assessment (OECD, 2015) can be count as examples of these exams and statistics.

When the results of the latest 6 years YSG exams are surveyed, it is clearly seen that the net scores average in science is 4,74 out of 40 questions and the average in mathematics is 7,8 out of 40 questions despite the modifications on the curriculum program and examination systems in Turkey (ÖSYM, 2015c). The PISA-the Programme for International Student Assessment exam, hold by OECD triennially, also shows that Turkey is listed at the end of the OECD countries as being under OECD averages in science and mathematics fields. It is found that the science score of Turkish students on PISA exam hold in 2012 is 463 (OECD average is 501) and their mathematics score is 448 (OECD average is 494) (OECD, 2015). Although it is not possible to reach a final judgment, the results both on national and international level show that Turkish students cannot become successful on science and mathematics which are the two important fields of STEM.

Although it is required to identify and guide the students on early ages who will be educated in STEM fields, this guidance is not provided enough for K-12 level students. It is believed that not providing the correct guidance during the transition to higher education ends up with the placement of the students, who have skills and talents on STEM fields, to different fields. Therefore, it is thought that this situation brings negative influences for the work force in STEM fields (Akgündüz, Ertepınar, Ger, Kaplan Sayı & Türk, 2015).

In Turkey the university placement exams for the students are carried out by the ÖSYM (ÖSYM, 2015b). It is the ÖSYM student placement data that demonstrate the tendency of the students for the fields they are placed. When the choices of the students placed at universities at the examinations of the ÖSYM are surveyed, it is observed that interest in fundamental sciences has decreased and that the quota in these fields have been reduced (Günay, Günay, Atatekin, 2013; ÖSYM, 2015c). Also, reasons such as scarcity of employment in fundamental sciences, the low status perception in the public and financial concerns prevent students from choosing these fields and cause lack of interest and keenness. Students were influenced by the jobs that they were interested in. Also their talents and abilities that they want to use and possible job opportunities after graduation have an impact on their choices (Cavas, Cakiroglu, Cavas & Ertepinar, 2011). When the STEM history and literature is considered, this situation causes a decrease in STEM work power. The individuals without the capacity of being a science person are assumed as qualified STEM work power just because of being graduated from these fields. Another negative situation appears is that female students do not prefer basic sciences especially engineering fields (Cavas et al., 2011) or they prefer these fields less than male students.

The motivation of students to STEM fields starting from young ages and having their undergraduate studies in STEM fields would pave the way for the raise of the STEM workforce of Turkey. Therefore, in this study it has been aimed that the distribution of placement of the top thousand students in the student placement examinations of ÖSYM between the years 2000-2014 in both Applied Science and Mathematics Departments (ASMD) and STEM fields in terms of faculty, department and gender are examined. In this study ASMD represent departments admitting students primarily based on their science and mathematics test scores.

METHOD

This research represents a quantitative research method. Quantitative research tries to reason the relations among the variables and seeks out and explains the reasons of these kinds of relations. In quantitative researches, researchers formed the general shapes of the steps agreed on extensively to become their guidance during their studies (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz ve Demirel, 2009).

The study group of this research consist of 17135 students, who were placed in ASMD of universities in the examinations organized by the ÖSYM and ranked in the top thousand in these examinations between the years 2000-2014 (ÖSYM, 2015a). ÖSYM shared the data of the top thousand students placed in ASMD between the years 2000-2014 in terms of gender, university, faculty and departments by years electronically. The number of the students ranking in the top thousand can change as the ranks may be shared. To give an example, the number of students ranking in the top thousand in 2007 was 1408 as two or more students received the same score. Data obtained from ÖSYM constituted the total population and the analysis of the research was conducted on the data of these individuals. STEM education is a significant model that provides scientific and technological development of a country. Thus, the reason for selecting the top thousand in ASMD is to specify whether the best-qualified students of the country with the highest scores prefer STEM fields. It is also important to determine whether qualified STEM work power is being raised.

In this study the following analyses regarding the data were performed:

- In the calculation of the gender distribution of the top thousand students placed in ASMD, the year and gender-based frequency and percentage were used.
- In the calculation of the faculty distribution of the top thousand students placed in ASMD, the year and faculty-based frequency and percentage were used. The faculties were divided into five groups as faculties of education, faculties of sciences, faculties of engineering and architecture, faculties of medicine and other faculties. All engineering and architecture departments, fundamental sciences (physics, chemistry, biology, mathematics, molecular biology and genetics etc.); science, technology, computer and mathematics education at the faculties of education (physics, chemistry, biology, science, computer and instructional technology and mathematics education) etc. have been considered as STEM fields. Since NSF (2015) and U.S. Immigration and Customs Enforcement ICE (2015) do not consider departments of faculties of medicine as a STEM field, these faculties were not taken as a STEM field in this research. Other departments which are not within STEM fields were collected under the title other faculties.
- In the calculation of the distribution of the top thousand students placed in STEM fields, the year-based frequency and percentage were used.
- In the calculation of the gender distribution of the top thousand students placed in STEM fields, the year and gender-based frequency and percentage were used.

RESULTS

The first question of the research inquiries about the distribution of the top thousand students placed in ASMD between the years 2000 – 2014 in terms of years and gender. In order to find an answer for that question the distribution of the top thousand students placed in ASMD in the examinations by ÖSYM between the years 2000 – 2014 as per year, number of candidates and gender were calculated (see Table 1)

Table 1. The year and gender-based frequency and percentage distribution of the top thousand students placed in ASMD

Year	Student	Male (f)	Male (%)	Female (f)	Female (%)
2000	1002	829	82,73%	173	17,27%
2001	1002	780	77,84%	222	22,16%
2002	1014	776	76,53%	238	23,47%
2003	1000	781	78,10%	219	21,90%
2004	1000	764	76,40%	236	23,60%
2005	1001	767	76,62%	234	23,38%
2006	1001	693	69,23%	308	30,77%
2007	1408	926	65,77%	482	34,23%
2008	1372	963	70,19%	409	29,81%
2009	1347	880	65,33%	467	34,67%
2010	1191	776	65,16%	415	34,84%
2011	1181	738	62,49%	443	37,51%
2012	1215	833	68,56%	382	31,44%
2013	1213	863	71,15%	350	28,85%
2014	1188	791	66,58%	397	33,42%
Total	17135	12160	71,51%	4975	28,49%

According to Table 1, 17135 students who were placed in ASMD between the years 2000-2014 were in the top thousand. Of these students, 12160 (71.51%) are males and 4975 (%28.49) are females. In Table 1 it is displayed that whereas there have been decreases in the percentage of the males in the top thousand placed in ASMD from 2000 to 2014, significant increases have occurred in the percentage of the females. This indicates that females ranking in the top thousand gradually show more interest in ASMD.

The second question of the research inquiries about the distribution of the top thousand students placed in ASMD in terms of years and faculties. In order to answer the question, the departments, where the top thousand placed in ASMD between the years 2000-2014 were examined on the basis of faculties. The faculties were divided into five groups. These are faculties of education, faculties of fundamental sciences, faculties of engineering and architecture, faculties of medicine and other faculties (see Table 2).

According to Table 2 that answers this question, while there have not been many changes in the number of the students in the top thousand, who were placed in faculties of fundamental sciences, faculties of education and other faculties, there have been rather fundamental changes in the placement in faculties of engineering and architecture and medicine. It has been specified that among the top thousand students placed in ASMD between the years 2000 - 2014, the number of students placed in faculties of education is 19 (0.11%), the number of students placed in fundamental science faculties is 294 (1.72%) and the number of students placed in engineering and architecture faculties is 8939 (52.17%). In 2000 829 students (82.73%) were placed in faculties of engineering and architecture; however, 63 (6.29%) were placed in faculties of medicine. In the following years placement in faculties of engineering and architecture decreased, but there was a high increase in the number of students placed in faculties of medicine. In 2010 the number of students placed in faculties of engineering (27.12%) was at the lowest level;

however, the number of students placed in faculties of medicine (71.20%), was at the maximum. As of 2014, the ratio of students placed in faculties of engineering was 38.13% and the ratio for those placed in faculties of medicine was 59.93%.

Table 2 displays that the top thousand students with high scores did not prefer education faculties, particularly fundamental sciences. This is important with regard to the teaching career and the prestige of fundamental sciences. Students with high scores neither choose education at education faculties and to become teachers nor do they choose fundamental sciences and desire to become scientists. A general evaluation demonstrates that, compared to the faculties with STEM fields, the prestige of the faculties of medicine is increasing gradually.

Table 2. The year and faculty-based frequency and percentage distribution of the top thousand students placed in ASMD

		Faculties of engineering and architecture	**Faculties of fundamental sciences**	**Faculties of education**	**Faculties of medicine**	**Other Faculties**	**Total**
2000	(f)	829	28	2	63	80	1002
	(%)	82,73%	2,79%	0,20%	6,29%	7,98%	100,00%
2001	(f)	821	29	0	65	87	1002
	(%)	81,94%	2,89%	0,00%	6,49%	8,68%	100,00%
2002	(f)	797	36	2	123	56	1014
	(%)	78,60%	3,55%	0,20%	12,13%	5,52%	100,00%
2003	(f)	758	25	1	169	47	1000
	(%)	75,80%	2,50%	0,10%	16,90%	4,70%	100,00%
2004	(f)	747	15	2	186	50	1000
	(%)	74,70%	1,50%	0,20%	18,60%	5,00%	100,00%
2005	(f)	684	24	1	268	24	1001
	(%)	68,33%	2,40%	0,10%	26,77%	2,40%	100,00%
2006	(f)	619	22	4	353	3	1001
	(%)	61,84%	2,20%	0,40%	35,26%	0,30%	100,00%
2007	(f)	666	35	3	638	66	1408
	(%)	47,30%	2,49%	0,21%	45,31%	4,69%	100,00%
2008	(f)	519	23	1	745	84	1372
	(%)	37,83%	1,68%	0,07%	54,30%	6,12%	100,00%
2009	(f)	458	18	0	839	32	1347
	(%)	34,00%	1,34%	0,00%	62,29%	2,38%	100,00%
2010	(f)	323	9	0	848	11	1191
	(%)	27,12%	0,76%	0,00%	71,20%	0,92%	100,00%
2011	(f)	360	12	3	795	11	1181
	(%)	30,48%	1,02%	0,25%	67,32%	0,93%	100,00%
2012	(f)	459	4	0	732	20	1215
	(%)	37,78%	0,33%	0,00%	60,25%	1,65%	100,00%
2013	(f)	453	7	0	724	29	1213
	(%)	37,35%	0,58%	0,00%	59,69%	2,39%	100,00%
2014	(f)	446	7	0	712	23	1188
	(%)	37,54%	0,59%	0,00%	59,93%	1,94%	100,00%
Total	(f)	8939	294	19	7260	623	17135
	(%)	52,17%	1,72%	0,11%	42,37%	3,64%	100,00%

An evaluation of the placement rates of the top thousand students placed in ASMD between the years 2000 – 2014 in STEM and non-STEM fields according to Table 3 indicates that 9252 (54.00%) of 17135 students were placed in STEM fields (faculties of education, faculties of fundamental sciences, faculties of engineering and architecture), 7883 (46.00%) students were placed in faculties of medicine and non-STEM fields (business, law, economics etc.). According to Table 3 it is observed that the majority of the students among the top thousand placed in STEM fields were placed in engineering and architecture faculties and that the number placed in education faculties and science faculties was minimal. This situation demonstrates that the majority of the students ranking in the top thousand placed in STEM fields inclined towards fields of engineering and architecture. It is also observed that between the years 2000 – 2014 students using their selection rights in ASMD showed deep interest in faculties of medicine. It was determined that students ranking in the top thousand and not preferring STEM fields particularly inclined towards faculties of medicine.

The third question of the research inquiries about the distribution of the top thousand students placed in STEM fields. In order to answer the question the years based frequency and percentage distribution of the top thousand students placed in STEM fields between the years 2000 – 2014 were examined (see Table 4).

An examination of Table 4 indicates that there is a decrease in the STEM fields' placement percentage rates of the top thousand students that won a place in ASMD from 2000 to 2014. STEM fields placement was 85.73% in 2000 and in 2010 it regressed to 27.88%, the lowest rate and after 2010 it increased slightly and was 38.13% in 2014. This demonstrates that the interest in STEM fields career choice among the high-scoring students in Turkey decreased considerably compared to

Table 3. The frequency and percentage distribution of the students placed in STEM departments among the top thousand students in ASMD between the years 2000-2014

Placement in STEM and non-STEM departments		(f)	(%)
Departments of STEM fields	Engineering and architecture faculties Faculties of fundamental sciences (STEM departments only) Faculties of education (STEM departments only)	9252	54,00%
Departments of non-STEM fields	Faculties of medicine Other faculties and departments	7883	46,00%
Total		17135	100%

Table 4. The year-based frequency and percentage distribution of the top thousand students placed in STEM fields

Year	Total Student	Student STEM placement (f)	Student STEM placement (%)
2000	1002	859	85,73%
2001	1002	850	84,83%
2002	1014	835	82,35%
2003	1000	784	78,40%
2004	1000	764	76,40%
2005	1001	709	70,83%
2006	1001	645	64,44%
2007	1408	704	50,00%
2008	1372	543	39,58%
2009	1347	476	35,34%
2010	1191	332	27,88%
2011	1181	375	31,75%
2012	1215	463	38,11%
2013	1213	460	37,92%
2014	1188	453	38,13%
Total	17135	9252	56,11%

year 2000. Figure 1 shows the decrease in STEM fields placement rates clearly.

It might be pointed out that the reason for the decline in the number of students placed in STEM fields in Table 2 and Figure 1 is that the top thousand students in ASMD prefer faculties of medicine instead of engineering and architecture faculties. It can also be suggested that this change arises from students' preferences for faculties of medicine as a priority. It is believed that the substantial rise in the number of the students placed in faculties of medicine (non-STEM) and the considerable decline in the number of students placed in engineering and architecture faculties (STEM) arises from reasons such as public perception, employment, higher wages etc.

The fourth question of the research inquiries about the gender distribution of the top thousand students placed in STEM fields. In order to answer the question the years and gender based frequency and percentage distribution of the top thousand students placed in STEM fields between the years 2000 – 2014 were examined (see Table 5).

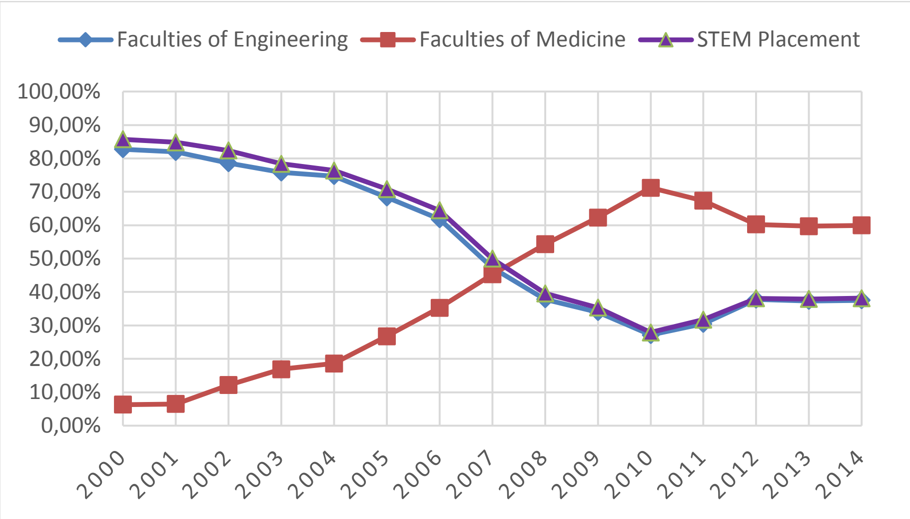

Figure 1. The year-based percentage distribution of the top thousand students placed in faculties of engineering and architecture, faculties of medicine and STEM fields between the years 2000-2014

Table 5. The year and gender-based frequency and percentage distribution of the top thousand students placed in STEM fields

Year	Male STEM placement (f)	Male STEM placement (%)	Female STEM placement (f)	Female STEM placement (%)
2000	729	84,87%	130	15,13%
2001	679	79,88%	171	20,12%
2002	662	79,28%	173	20,72%
2003	648	82,65%	136	17,35%
2004	621	81,28%	143	18,72%
2005	590	83,22%	119	16,78%
2006	509	78,91%	136	21,09%
2007	523	74,29%	181	25,71%
2008	440	81,03%	103	18,97%
2009	391	82,14%	85	17,86%
2010	274	82,53%	58	17,47%
2011	305	81,33%	70	18,67%
2012	380	82,07%	83	17,93%
2013	393	85,43%	67	14,57%
2014	369	81,46%	84	18,54%
Total	7513	81,36%	1739	18,64%

Table 5 demonstrates that 9252 students of the top thousand in ASMD were placed in STEM fields between the years 2000-2014 and 7513 (81,36%) of them were males and 1739 (18,64%) were females. According to Table 5, it has been determined that there is a substantial difference between the placement rates of STEM fields placement of males and females. This situation is clearly displayed in Figure 2.

Figure 2 shows that males in the top thousand incline towards STEM fields and females prefer them less. It is believed that this arises from the public perception. Therefore, this perception needs to be changed and female students should be lead into STEM fields.

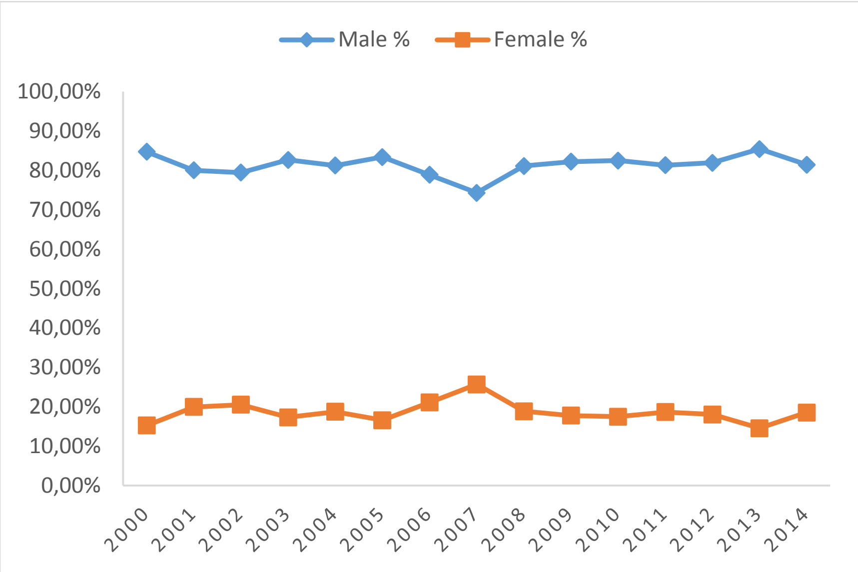

Figure 2. The year and gender-based percentage distribution of the top thousand students placed in STEM fields

CONCLUSION, DISCUSSION AND RECOMMENDATIONS

It was determined that the majority of the students placed in both ASMD and STEM fields were males, but that in the recent years there has been a considerable increase in the number of females. It is observed that there was a major decline in the number of students in the top thousand placed in STEM fields between the years 2000 – 2014 and it is believed that this situation arises from the fact that the students prefer faculties of medicine instead of pursuing a STEM career. The report "Science Education Now: A Renewed Pedagogy for the Future of Europe" published by the European Commission indicates that in recent years interest in science and mathematics fields has decreased and therefore precautions need to be taken (Rocard, Csermely, Jorde, Lenzen, Henriksson & Hemmo, 2007). In Turkey this situation also reveals the fact that the students particularly in the top thousand with the highest scores of the country, move away from pursuing a STEM career, the same urgent measures need to be taken to prevent this and STEM careers should be encouraged. Based on the conclusions that career choices were influenced by the guidance units, this study recommends that guidance teachers should provide students a wide range of career information about all the available careers so that they can be able to explore widely before making their choices (Cavas et al., 2011).

Special promotions might be offered for the top thousand or high-ranking students in the ÖSYM examinations placed by ASMD scores to prefer STEM fields instead of faculties of medicine. For example, guarantees for employment with high salaries and scholarships could be provided for the students who prefer fundamental sciences (physics, chemistry, biology, molecular biology and genetics) instead of faculties of medicine. These people could be assigned to positions at public or private research centers to be established upon their graduation.

Upon evaluating the data on the faculties the students were placed in STEM fields, it was determined that the engineering faculties were preferred predominantly and that the number of the students placed in faculties for education faculties and fundamental science faculties was very low. It is significant for the scientific and technological future of the country that the top thousand students in the university placement examinations by ÖSYM are encouraged to prefer faculties of engineering in STEM fields instead of faculties of medicine and also to prefer fundamental sciences to meet the country's demand for scientists. The top-ranking students with high scores not preferring fundamental sciences can cause lack of STEM work power in the country and can also impede the potential for raising scientists. One of the results obtained with this research is that the majority of the students placed in STEM fields are males. Cavas et al. (2011) assume that the female students do not prefer engineering and science studies because of experiencing negative affects arise from their families, friends and future workmates. There is also the same problem in countries such as the USA that attach great significance to STEM and essential projects regarding this issue are prepared and actualized. "Supporting women STEM students and researchers is not only an essential part of America's strategy to out-innovate, out-educate, and out-build the rest of the world; it is also important to women themselves" (White House, 2015). As there are substantial differences between male and female students in STEM fields placement ratios, studies on this issue should be conducted in Turkey as well and the gender inequality should be reduced. In addition, female students should be encouraged to prefer STEM fields, particularly fields such as fundamental sciences and engineering. "In the case that Turkey actualizes this, the country can take the opportunity to raise a creative and liberal generation with an entrepreneurial spirit, that can solve problems and that regards cooperation highly rather than individuals with diplomas only" (Akgündüz et al., 2015).

STEM is an issue of major importance for the whole world and also for Turkey. The "Tapping America's Potential: The Education for Innovation Initiative" (Business Roundtable, 2005) and "Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future" reports (The National Academies, 2007) published in the USA, the "The Turkish STEM Work Power Report" (TÜSİAD, 2014), the "STEM Education Turkey Report" (Akgündüz et al., 2015) and the "The Report of STEM Education Workshop: An Assessment on STEM Education In Turkey" (Akgündüz, Ertepınar, Ger, Kaplan Sayı & Türk, 2015) published in Turkey, call attention to the issues that an increase in the quality of the work power in STEM fields is required, that therefore various measures need to be taken at schools and also they also point out to the priorities in education. As has been stated in all these reports, it is crucial for our country that guidance to encourage students from early ages on towards STEM fields is provided at schools, that institutions such as the Ministry of Education and the Council of Higher Education prepare an action plan in cooperation and put it into effect; in short, that a mobilization in STEM fields is declared.

Whereas there are a large number of studies regarding integrated STEM education and STEM workforce in the USA, very few studies could be found in Turkey (Cavas et al., 2011; Şahin, Ayar & Adıgüzel, 2014; Çorlu, Capraro & Capraro, 2014; TÜSİAD, 2014; Akgündüz et al., 2015; Akgündüz, Ertepınar, Ger, Kaplan Sayı & Türk, 2015). It is of considerable importance that the number and variety of studies regarding integrated STEM education increase in Turkey. This research was carried out with the data of the top thousand students in ASMD and it is possible to be conducted with a higher sampling in order to achieve more effective results.

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