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### How is mathematics popularized as the basis of engineering education?

Nuri Erdem<sup>\*1</sup>, Battal Yıldırım<sup>2</sup>

<sup>1</sup> Engineering Faculty, Department of Geomatic Engineering, Osmaniye Korkut Ata University, Osmaniye, Türkiye

<sup>2</sup> Şehit Mehmet Karacatilki Anatolian Imam Hatip High School, Math Teacher, Osmaniye, Türkiye

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#### Abstract

Mathematics in engineering is very large areas of use. In fact, it is so much that engineering is the profession that uses mathematics the most. Especially survey engineering is an engineering field that uses mathematical knowledge so much since it has already entered the field of Applied Mathematics as a branch of Science. As a science fiction, mathematics, which has been active in all periods of human history, is a "very lovely" by some of today's students and a "never loving" one for some. In this study; a questioner has been conducted on the questionnaire "How is Mathematics endeared?" with approximately 445 students at different grade levels in different schools who teach different types of education in Osmaniye province and 20 mathematics teachers who work in these schools participated. The answers are analyzed and interpreted with Excel graphs, and it is aimed to contribute to ingratiate and liking of the mathematics course in this way. After all; with this study, awareness about mathematics has been formed in teachers and students, negative factors that decrease mathematics success have been determined, everyone has offered suggestions for solution of the problem and it has been reached that mathematics can be ingratiate and liked when appropriate methods and techniques are used.

#### 1. Introduction

There is a historical background that is matched to the history of mankind, science fiction mathematics. It is a fact that it is always used by people, even when it is not known when, where it is shaped and how it is used. Today, every person knows and uses the word "mathematics". Mathematics in our age; it can be likened to a magnificent multi-story building with beautiful architecture and acoustics. Many scholars have contributed to the construction of this building. Most of these scientists have gained an international character, representing the whole world, out of a nationality. Some of those are Euclid, El-Harezmi, Ömer Hayyam, Ebu Reyhan Biruni, Archimet, Ebu Ali İbn-i Sina (Avisenna), Nasireddin Tusi, Ebul Fazl Tebrizi, Ebul Vefa, A. Cauchy, G. Leibniz, Leonard Euler, Friedrich Gauss, Nils Abel, Evarista Galois, Ramanajuan. These great people continue to be a model for anyone interested in science today (Nasibov and Kaçar, 2005). Leonardo Da Vinci, a famous painter and scientist, said about the metamorphic: "no research can be worthy of taking the name of Science after math has been proved."

The famous mathematician Einstein said that prejudice is difficult to break down atomic atoms. This prejudice is the duty of the educators to destroy, as well

as the duties of the students and the parents in this regard. Many of the people who succeed in mathematics are mathematics-loving people. When the popularity of mathematics is gained, mathematical success is also achieved. A person with good mathematics can think rationally, fluently and rationally. This opens the door to success in other areas and increases the overall level of success in life (URL\_1).

In primary and secondary schools, many students find it difficult, uncomfortable and boring to learn mathematics (Sedighian and Sedighian, 1996). Therefore, students do not want to learn mathematics. Studies conducted in Turkey and in various countries; demonstrates that there are many factors that negatively affect students' math learning and math thinking. Some of those; teachers' lack of field knowledge, inability to use effective teaching techniques, low level of students' readiness, interaction with the student's environment, learning environment (Fuys, et al., 1988; Messick and Reynolds, 1992; Wentzel, 1997; Freitas and Jameson, 2006; Yalçinkaya and Özkan, 2012).

New alternative teaching methods are being developed instead of methods that have been going on for years in mathematics teaching and can no longer yield. Accordingly, in mathematics education in Turkey; there are being made studies on alternative learning

#### \* Corresponding Author

\* nurierdem@osmaniye.edu.tr, <http://orcid.org/0000-0002-1850-4616>  
battalkerem@hotmail.com, <http://orcid.org/0000-0003-4161-5434>

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methods and techniques such as computer assisted instruction, collaborative learning, probing based learning, drama and games learning, concept mapping learning, visual learning, full learning model and problem-solving method (Yalçınkaya and Özkan, 2012).

The map is an example of a bird's eye view of all or part of the earth, drawn on a plane with special signs, scaled down by the mathematical methods according to the desired scale. Because the map is the most important way to transmit geographical information, we know from the works that thinkers (especially ancient Greek) and mathematicians are dealing with the purpose of knowing the world. For example, Miletus Anaksimandros, who observed and described the progress of the Great Menderes River Delta in Turkey, speaks more about geographical relations (Çobanoğlu, 2016).

## 2. Method

This study has emerged from the movement of "Why mathematics achievement in Turkey is not at the desired level?" question. The ideas of students and mathematics teachers, both sides of mathematics teaching, are

considered to contribute more to mathematics success by increasing the liking of mathematics lessons.

Firstly, a preliminary study was carried out with the student group to work with, and directed the students and mathematics teachers in Osmaniye Şehit Mehmet Karacatilki AİHL to ask "How is Mathematics endeared?". A questionnaire form was prepared by organizing answers. The survey was conducted with 526 students from different levels (1st, 2nd, 3rd and 4th grade students) in different high schools in Osmaniye province (Imam Hatip, Anatolia, Science, Social Sciences etc.) and 20 mathematics teachers who participated in these schools. However, some of the students did not answer some questions. The answers are analyzed and interpreted with Excel graphs, and it is aimed to contribute to the endearing and liking of the mathematics course in this way.

### 2.1. Questionnaire Study Applied to Students

The suggestions/thoughts used in the questionnaire study applied to students and the answers are given in Table 1.

**Table 1.** The suggestions/thoughts used in the questionnaire study applied to students and their answers

No.	Suggestions / Thoughts	Answers						Total
		Agree	Rate (%)	Partially	Rate (%)	Disagree	Rate (%)	
1	I already like mathematics.	236	52.8	160	35.8	51	11.4	447
2	I don't think it's possible to like mathematics.	32	7.2	95	21.3	319	71.5	446
3	It is wrong to try to make everyone like math. I think everyone should learn the lesson he likes.	239	53.5	122	27.3	86	19.2	447
4	Mathematics can be liked by giving more responsibility and ensuring student attendance.	135	30.3	141	31.7	169	38.0	445
5	Mathematics can be liked if it is explained by being related to real life and being more concrete.	287	65.1	118	26.8	36	8.2	441
6	Mathematics can be liked if the student is taught directly in private lesson format.	168	37.8	174	39.2	102	23.0	444
7	Mathematics can be liked by adding more activity, music and games according to age groups.	286	64.6	101	22.8	56	12.6	443
8	Mathematics can be liked if the reason of putting curriculum of the mathematics course is explained nicely.	181	40.7	176	39.6	88	19.8	445
9	Mathematics can be liked if explanatory explanations of the areas in which mathematics are used are arranged.	269	60.3	106	23.8	71	15.9	446
10	Referring to the history of the formulas in mathematics and explaining the mathematics related to the history can make him like.	100	22.6	136	30.8	206	46.6	442
11	Mathematics can be liked by telling the events and the miracles in the natural world.	233	53.0	128	29.1	79	18.0	440
12	Mathematics can be liked if teachers are able to reach the teachers more easily if the students can't solve them.	320	72.1	92	20.7	32	7.2	444
13	Mathematics can be liked by creating competition among students and organizing entertaining math competitions.	254	57.0	120	26.9	72	16.1	446
14	Teachers should be encouraged to tell fun lessons and to give students self-confidence for math lessons. This is the only way math can be liked.	335	75.8	84	19.0	23	5.2	442
15	Mathematics is learned when studied very regularly, and it is liked when it is learned.	303	68.2	104	23.4	37	8.3	444
16	A student in secondary education should have good mathematical background in elementary school to like mathematics.	323	72.4	79	17.7	44	9.9	446
17	Studies should be carried out to ensure that students are patient by saving them from the perception that mathematics is difficult and that they can't do it.	397	75.5	41	7.8	88	16.7	526

## 2.2. Questionnaire study applied to teachers

The suggestions/thoughts used in the questionnaire study applied to teachers and the answers are given in Table 2.

## 3. Conclusions and Recommendations

In this study, it is aimed to contribute to endear and liking of mathematics course. While searching for an answer to the question "How is Mathematics endeared?", awareness about mathematics was formed in the teachers and students, negative factors reducing the mathematics success were determined, everyone thought about their deficiencies and empathized and made suggestions for solution of the problem. It was concluded that mathematics can be endeared and liked when appropriate methods and techniques are used. For this, firstly;

- When teaching mathematics, not only theoretical courses should be taught, but also practical activities should be used.

- Students' expectations should be taken into consideration while teaching mathematics.
- Such researches should be done constantly and the obstacles in front of the math loving and the student should be detected and this obstacle should be removed.
- Students should be informed about mathematical study techniques.
- Methods and techniques used in mathematics lessons should be diversified.
- Mathematics teachers should research and update themselves according to changing and developing conditions.
- We need to think about ways to make the curiosity in the students act and want them to explore the mysterious world of mathematics.
- In fact, the growing conditions and psychological conditions of today's young people are also important factors affecting teaching mathematics. According to our observations, today's young people often give up quickly when they see it hard. However, mathematics needs to be patient and to work steadily and regularly.

**Table 2.** The suggestions/thoughts used in the questionnaire study applied to teachers and their answers

No.	Suggestions / Thoughts	Answers						Total
		Agree	Rate (%)	Partially	Rate (%)	Disagree	Rate (%)	
1	I do not think it's possible to like mathematics.	0	0	1	5	19	95	20
2	It is wrong to try to endear mathematics to everyone. I think everybody learn the lesson they like.	3	15	10	50	7	35	20
3	Mathematics can be liked by giving more responsibility and ensuring student participation.	8	40	9	45	3	15	20
4	Mathematics can be liked if it is explained by being associated with real life and being more concrete.	17	85	1	5	2	10	20
5	Mathematics can be liked if the student is taught directly in a private lesson format.	7	35	12	60	1	5	20
6	More activity in mathematics can be endeared by adding games according to music and age groups.	14	70	4	20	2	10	20
7	Mathematics can be liked if the reason for putting curriculum is explained well.	9	45	11	55	0	0	20
8	If introductory trips are organized in the areas where mathematics is used, mathematics can be liked.	15	75	5	25	0	0	20
9	The history of the formulas in mathematics is mentioned and the description of mathematics in connection with the history allows liking mathematics.	7	35	11	55	2	10	20
10	Mathematics can be liked by telling the events and miracles in the nature to be connected with mathematics.	16	80	3	15	1	5	20
11	Mathematics can be liked if teachers are provided with more convenient access to questions that students can't solve.	12	60	8	40	0	0	20
12	Mathematics can be endeared by creating competition among students and organizing entertaining math competitions.	13	65	6	30	1	5	20
13	Mathematics can be liked by teaching funny lessons to teachers and providing them with self-confidence in solving mathematics lessons.	15	75	4	20	1	5	20
14	Mathematics is learned if studied very regularly, and it is liked as well.	19	95	0	0	1	5	20
15	In order for a pupil in secondary education to like mathematics, he must have a good mathematical background in primary education.	18	90	1	5	1	5	20
16	Students should be aware of the difficulty of mathematics, and I should not be able to do, so that they can be patient.	19	95	0	0	1	5	20

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