

STEM Integrated English Lessons

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Received: April 1, 2021

Accepted: July 15, 2021

Published: July 28, 2021

Abstract

Many people today hear the term "STEM" but are unaware of its true meaning. STEM stands for Science, Technology, Engineering, and Mathematics (David, 2014a), but it has a broader meaning. Due to changes in society, technology, and economic conditions, many new business lines will emerge. These new job opportunities will require creative, collaborative, communicative, critical thinkers. These are the main 21st century skills that STEM education aims to improve (OECD, 2009a). However, English is an important science and technology lingua franca. Individually, students must improve their language skills. This study combines STEM and English language learning. The practice included STEM and English language learning activities. It was for 11th graders. The participants in this study took a pre- and post-test. A set of questionnaires was also distributed to assess students' perceptions of learning English and STEM knowledge. The pre-test revealed that the students had no interest in learning English in high school and no knowledge of STEM. The post-test indicated that STEM could make the students enjoy learning English. It has been seen that the study was successful to bring two disciplines. Thus, the study recommends that EFL teachers incorporate STEM into their classroom practices because it has been shown to increase students' interest in learning.

Keywords: English language teaching; STEM; Student interest

To cite this article: Ozturk, O. (2021). STEM integrated English lessons. *SALEE: Study of Applied Linguistics and English Education*, 2(2), 119-136. https://doi.org/10.35961/salee.v2i02.248

1. Introduction

STEM education is an interdisciplinary approach to learning in which individuals combine various disciplines and apply the knowledge they have gained on a daily basis, which motivates them to study and learn in depth. It is a method of education that contributes to the development of 21st-century life skills by allowing students to associate with life. (Yildirim & Selvi, 2016) The term "STEM education" refers to the teaching and learning of science, technology, engineering, and mathematics; it typically encompasses educational activities at all grade levels, from pre-school to post-doctoral, and in both formal and informal classroom settings (Gonzalez, & Kuenzi, 2012). According to the OECD report published in 2009, the changing nature of society and economy necessitates that educational systems equip young people with new skills and competencies that enable them to benefit from emerging new forms of socialisation and actively contribute to economic development in a knowledge-based economy. These skills and competencies are frequently referred to as 21st century skills and competencies to emphasize their relevance to emerging models of economic and social development rather than to those of the previous century, which were suited to an industrial mode of production. (21st Century Skills and Competences for New Millennium Learners in OECD Countries / READ Online, 2009b) In the United States, school-based factors that contribute to traditionally underrepresented students' success in K-12 STEM education must include parental involvement and support, bilingual education availability, culturally relevant pedagogy, early exposure to STEM fields, interest in STEM careers, self-efficacy in STEM subjects, and STEM-related educational opportunities (Museus, Palmer, Davis, & Maramba, 2011). Indeed, these same factors have a positive effect on the entire student population, ensuring that 21st Century Workforce Skills such as global awareness, creativity and innovation, critical thinking and problem solving, communication and collaboration, information literacy, media literacy, and technology literacy, as well as life and career skills such as productivity and accountability, leadership entrepreneurship, are acquired.

On the other hand, the importance of English in reaching scientific facts is a must that cannot be ignored. It is the lingua franca of reaching the information. Many of the studies and research are in English. To understand them, all of them are possible if one has a good knowledge of English language. This is because the teachers start teaching English at the very beginner level of students, at pre-school level in some private schools and 2nd graders in public schools in Turkey. Younger students have fun while they are learning English because there are lots of joy, games, songs and many enjoyable activities.

However, it was seen that high school students, especially when they come to the 11th class and when they are so close to choosing their future jobs, start to withdraw themselves from studying English and focus only on the selected subjects at school. As there is an university entrance exam in Turkey, where you need to take two sessions and solve lots of test questions from main courses like Turkish, Geography, History, Religious Education, Philosophy and beside them their field lessons such as Physics, Biology, Chemistry, Mathematics, the high school students are mainly focus on these lessons. Then, they will choose in which programme they will study and in which university. This is all about their future career and so it is understandable that they give importance to their exam studies. However, when they ignore learning English, they will have a bigger problem that they need

to study a preparatory class in the first year of their university. They start from scratch but it will be more difficult to learn English at that point because they have forgotten lots of things and the trainers at faculties think that they know English. While the demand for individuals with sufficient knowledge in these areas increased, the current educational system was unable to produce such individuals (Yildirim & Selvi, 2015). STEM education activities are implemented differently in different types of schools in Turkey. Only a small percentage of students enrolled in specialized schools have access to STEM education at the international level (Corlu, Capraro, & Capraro, 2014). Additionally, there are education projects supported by the Turkish Scientific and Technological Research Council (TUBITAK) that aim to strengthen STEM education with activities for students and teachers (Baran, Canbazoglu Bilici, Mesutoglu & Ocak, 2016). This work aimed to create an awareness of the importance of English and taking it when necessary.

Another point is, the adolescents had been unaware of STEM. They do not even know what it is. The curriculum in each district was aligned to the Next Generation Science Standards, a set of common science standards adopted by states that emphasize scientific inquiry along with engineering and design, and prioritize experimentation over memorization. The study notes that conducting experiments in teams forces ELL students to communicate, allowing them to practice their problem-solving and English-language skills at the same time. (Mitchel, 2017)

A shift is needed in how science, technology, engineering, and mathematics (STEM) subjects are taught to students in grades K-12 who are learning English, says a new report from the National Academies of Sciences, Engineering, and Medicine. Educators should recognize the assets that English learners (ELs) bring to the classroom and understand that student performance is affected significantly by access to adequate program models and instruction. Opening avenues to success in STEM for the nation's ELs offers opportunities to students and their families, and confers benefits to society, the report says. (Mitchel, 2018)

And this study was born due to these factors. The students who were in 11th grade worked on the project. There were 40 students in the class and only 5 of them were eager to participate in the project at the beginning. Yet, they saw the project's activities were enjoyable and useful for their other subjects, the number of the participants reached 20 in a very short time. The other 5 were not so successful at their other lessons, either but through the end of the project, they were there to participate in coding the robot activity. The most satisfying thing was that the robot was designed by two female students and this provided gender equality. 10 of the participants were boys and 10 of them were girls in the project.

1.1. Research Question

- 1. How much do highschool students know about STEM subjects?
- 2. What are the perceptions of highschool students towards learning English?

1.2. Theoretical Framework

STEM was originally called Science, Mathematics, Engineering and Technology, SMET and was an initiative created by the National Science Foundation (NSF). This initiative aimed to train the students to have critical thinking skills and to solve problems creatively. It was used for some marketplace employment and later in the 1950s it turned into STEM and

started to be used for educational purposes where young people were trained to be more qualified to be employed.

STEM is an abbreviation for the terms:

- a. Science is the systematic pursuit and application of knowledge and understanding of the natural and social worlds through an evidence-based methodology. (*Our Definition of Science*, 2020);
- b. Technology is the branch of knowledge concerned with the development and application of technical means, as well as their interaction with life, society, and the environment, incorporating subjects such as industrial arts, engineering, applied science, and pure science. (*Definition of Technology | Dictionary. Com*, n.d.)
- c. Engineering is the art or science of putting pure science knowledge, such as physics or chemistry, to practical use, such as in the construction of engines, bridges, buildings, mines, ships, and chemical plants. (*Definition of Engineering / Dictionary.Com*, n.d.)
- d. Mathematics is the systematic treatment of magnitude, the relationships between figures and forms, and the relationships between symbolic quantities. (*Definition of Mathematics | Dictionary.Com*, n.d.)

According to Zollman (2012), the overarching goals of STEM are to meet societal and individual needs in order to create a fulfilled citizenry. STEM-literate students position the country to be a global leader in an increasingly global economy (Hughes, 2010).

However, STEM is not a field only for one field of study; but it is for several activities in which different kinds of subjects exist. It is a new way of learning combined with an interdisciplinary approach. That's why some time ago there came an 'A' to STEM and it has been STEAM. A is for Art and art subjects have been included in the STEM field activities. By seeing this, we consider that there can be more for STEM.

1.2.1 CLIL Methodology

Another method which is similar in some respects to STEM teaching is CLIL (Content and Language Integrated Learning); however, they have some differences with regard to the implementation in the current study. CLIL is a comprehensive terminology that encompasses both learning a foreign language while studying a content-based subject like physics or geography and learning a foreign language while studying a content-based subject. (CLIL; n.d.) It was created by David Marsh in 1994 with several objectives as follows:

- To make educational improvements.
- To create the conditions necessary for students to perform at an appropriate level academically in CLIL subjects.
- To increase students' proficiency in both their native language and the target language, while giving equal weight to each.
- To foster cross-cultural understanding.
- To foster social and cognitive abilities. (Coyle, Hood, & Marsh, 2010).

Kelly & Knowles define integrated STEM education as a method of teaching the STEM content of two or more STEM domains through the use of STEM practices in an authentic context with the goal of connecting these subjects and thereby enhancing student

learning. (Kelly & Knowles, 2016) Wang, Moore, Roehrig and Park state that STEM integration is a type of curriculum integration in the classroom. Curriculum integration is a difficult concept to grasp, as it entails more than simply grouping together disparate subject areas. (Wang, Moore, Roehrig & Park, 2011)

STEM integration is different from CLIL because the main point is we integrated real STEM activities into English lessons rather than the focus on language acquisition. This study aims to make improved 21st century skills of students; to create the necessary conditions for students to be creative, innovative and problem solvers with an improved critical thinking capacity; to provide opportunities to make them develop their design thinking abilities and present their products; to increase students' interest in English language learning and learn using it to making researches and have them science literacy. We mentioned Climate Change and taught some vocabulary but we made coding activities and even a robot as well. In this respect, our activities were mainly focused on STEM activities. We wanted them to be aware of the importance of STEM related subjects for our world of the future. The future jobs will mainly consist of STEM related ones as the futurists predict. We used English as the means of STEM education, and we used STEM as a means of education of English. We combined both activities and presented a new method. At the end of the project it was seen that with more studies related to STEM, English language learners became more successful in both fields. They wanted to learn more about STEM and some of them even chose STEM related jobs for their future. For the project's activities video: https://youtu.be/LarPEngX9vY

This study was conducted in 2017 and till then any other relevant study hadn't been recognized. Thus, the study is an innovative one by bringing STEM and English together. It is aimed to break out new methods of teaching and develop the present curriculum through combining STEM activities and English subjects. In addition to this, the project aims to support the teenagers with generating, contributing to their country both economically and socially and gaining 21st century skills and the key competences. We prepared many different activities related to STEM activities for English lessons. We taught English language structural points through STEM subjects. We used relative clauses to make the students know about some famous scientists and made them use Relative Clauses to introduce them.

2. Process

11/A class was chosen of which the students chose the scientific lessons most as elective courses. A 15 questions- pre-test was applied to evaluate their interest in English and STEM activities. It was seen that they were not interested in learning English at high school, they thought that they could learn it after entering the university which was a compulsory thing to have a good job in the future, and they had no idea about STEM or related subjects.

In the Deep Space activity, new vocabulary on space was comprehended. I.e. rocket, science, physics, chemistry, biology etc. The names of the planets, general information about the Solar System using Present Simple Tense. We did a brainstorm activity on the history of space travel. Past time space activities videos were shown.

https://www.youtube.com/watch?v=PLcE3AI9wwE

We attended an online conference which was organized by the Bilime Yolculuk Project (translation) by Bolu District Ministry of Education with Dr. Umut YILDIZ from NASA. He gave information about NASA missions and his duties there. The students asked some questions and Mr. Yıldız answered them.

In the Particle Physics activity the students attended an e-conference which was organized by Bilime Yolculuk Project by Bolu District Ministry of Education with Dr. Bora AKGUN from CERN and he gave information about CERN mission and his duty. They asked their questions and Mr. Akgun answered their questions.

In the Coding activity, the students coded some English vocabulary games with Scratch. One of them was about a fish and fisher, and one of them was about a Yes/ No Game on which the students must answer the questions. Hour Of Code activity was organized on 7th December 2017. And also we designed and programmed a robot which has sensors for movement and a camera on it. It was assumed to be used for military service such as bomb searching. www.hourofcode.com

In the Global Warming- Renewable Energy activity, new vocabulary was studied about Global Warming. I.e. global warming, climate change, blanket, atmosphere etc. The differences between Global Warming and Climate Change was explained. Comparatives of Adjectives were shown. I.e. hotter, colder, better, worse, thicker, thinner etc. Which regions are hotter, which ones have cleaner air etc. There was a project-based activity where they built their model buildings and prepared some posters to raise awareness to Global Warming. We prepared a design contest where they can use waste materials such as toilet paper rolls. They were free to choose the materials and design buildings or some other stuff for a contribution to save the world and retain a sustainable environment. They built their model buildings and prepared some posters to raise awareness of Global Warming.

In the Augmented Reality activity, videos were shown about the topic.

https://www.youtube.com/watch?v=RDvBowg3ed8

https://www.youtube.com/watch?v=T_yzHNLhZGk

Aurasma, Quiver and scnAR programmes were introduced. They experienced creating an Aura using a video and picture. They used their mobile phones to create images. They created some flashcards for vocabulary about Planets. When they showed the photo of the planet, there appeared an informative video about it.

In the Nanotechnology activity, some terms were introduced as new vocabulary. Some videos and presentations were shown. Students made some projects as assignments about the topic. The main question was where nanotechnology can be used, what novel inventions will be done in the future using nanotechnology. There was again a project-based activity where the students created some new products. For example one of the students designed a Nanojacket for military purposes. This jacket changes its colour according to the area and weather conditions in which it is worn. It keeps the person who wears it warm and cool according to the temperature. It sends signals to the emergency physicians if the person gets some medical issues such as arrhythmia or hypothermia.

In the SCIENTIX Project/ STEM Discovery Week activity, the SCIENTIX project was introduced. In STEM Discovery Week, 23rd- 29th April 2018, an exhibition was organized where all of the assignments were exhibited.

In the Famous Scientists activity, a game was created. In this game students were asked to find the right scientist. They were given envelopes on which there were question marks and when they opened the envelope they tried to solve the puzzle. When they solved the puzzle there appeared a scientist's photo at a young age. This was a clue for the answer. At the back of the puzzle they found a number and they needed to find the envelope which had this number. In this envelope, there was a scrambled sentence about the scientist. They had to unscramble the sentence which covered the topic of Relative Clause. This was the second clue for the answer. When they did it, they had to find who the scientist was. It was a really fun game because the students were in a competition. They eagerly communicated with each other.

3. Method

This chapter will discuss the methodology used in this study. The first section focuses on the questionnaire and discusses the data collection procedures. It will describe how they were developed and discuss some of the important factors that influenced their development. The second section provides some general demographic information on the participants who took part in the study. The final section in this chapter will outline the method used to analyse the data.

4. Findings and Discussion

The participants were asked 2 questions to collect some general demographic information. The results of the first question show that 10 respondents answered female (50%), 10 selected male (50%) The results for this question are listed in table 1.

Table 1: Frequency distribution of general question 1

Question: How do you define your gender?	Frequency (f)	Percentage (%)
Female	20	50
Male	20	50
Total	50	100%

Table 2 shows the frequency distribution for the second question. All participants (100%) selected '11th' to specify their grades.

Question: What grade are you in?	v o	
9 th	0	00
10 th	0	0
11 th	20	100
12 th	0	0

Table 2: Frequency distribution for general question 2

This segment discusses the outcomes of the level of knowledge regarding STEM concerning the first research question. It consists of eight questions where the participants choose replies as "Yes", "No" or "Maybe".

The first question's findings, as shown in Table-3, indicate that the majority of the participants haven't heard of the term "STEM" before (16 participants, 80%). The remaining participants selected the 'Maybe" response alternative (4, 20 %). None of the participants responded, "Yes" (0 %).

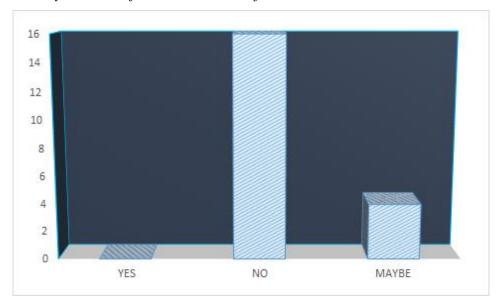
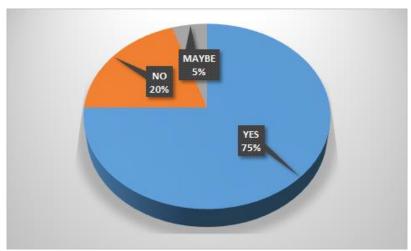


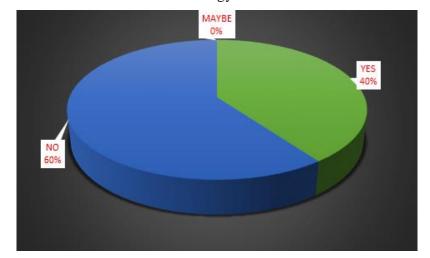
Table 3: Have you heard of the term STEM before?

The results of the second question which were illustrated in graph 1 shows that over half of the participants (15 participants, 75%) know that S in STEM is for Science. 4 (20%) participants think that it is not for Science and 1 (5%) participants chose the "Maybe" option.



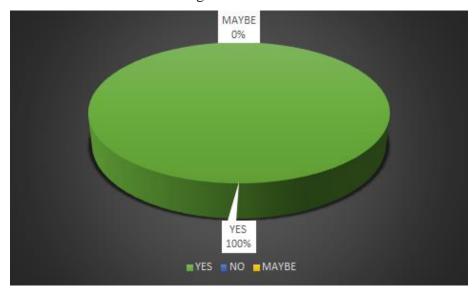
Graph 1: S in STEM is used for Science.

The third question was asking if T for Technology. The results of this question were illustrated in Graph 2. Less than half of the participants (8 participants, 40%) chose the 'Yes' option. 12 (60%) participants chose 'No' and no one chose 'Maybe' options. This shows that most students do not know what STEM is.



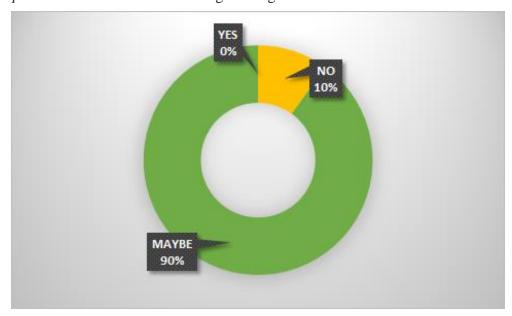
Graph 2: T in STEM is used for Technology

The fourth question was asking if E is for English. The results of this question were illustrated in Graph 3. The data from the questionnaire revealed that all of the participants surveyed (20 of the respondents, 100%) reported that E is for English. These results show that the participants have no idea about the STEM methods.



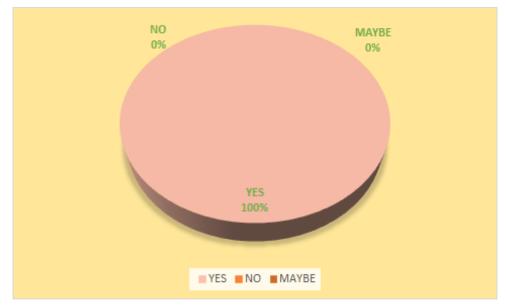
Graph 3: E in STEM is used for English

The fifth question was asking if E is for Engineering and this time most participants chose (18, 90%) replied as 'Maybe' and only 2 (10%) of them said "No". This result shows us that most of the participants were not really sure if STEM is about English or something else. The results of this question were illustrated in Graph 4.



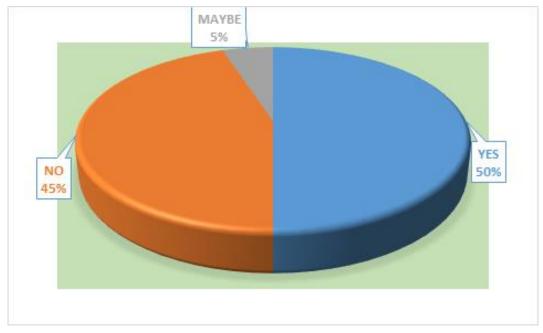
Graph 4: E in STEM is used for Engineering.

The results of the sixth question which was asking if M is for Mathematics, they all replied as "Yes".



Graph 5: M in STEM is used for Mathematics.

For the last question, I am interested in learning what STEM is, half of the students (10, 50%) replied as "Yes" and only one of the participants replied as "Maybe" (5%) and the rest of the students (9, 45%) didn't prefer to learn about STEM. Graph 6: I am interested in learning what STEM is.



These results show that most of the students do not have an idea about what STEM is. In the third section, five scale-questions could help provide an answer to the second research question which is asking for the perceptions of highschool students towards learning English. The respondents were asked six statements. In this section the results for the analysis of the third set of scale questions are described. The results of the third section indicates a negative perception of students toward English learning.

Statement 1: English is one of my favourite subjects at school: Only a little percentage of the students (2, 10%) agreed with the statement saying English was their favourite subject at school and most of them (18, 90%) disagreed with the statement.

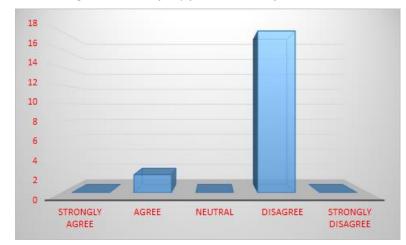


Table 4: English is one of my favourite subjects at school

Statement 2: English is one of the most difficult subjects at school: 2 (10%) students agreed with the sentence, 10 (50%) of them strongly disagreed and 8 (40%) of the students were Neutral about the statement. From these results we can see that most of the participants do not see English as the most difficult subject at school.

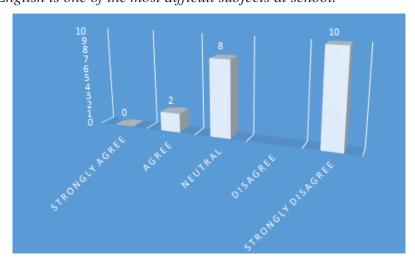


Table 5: English is one of the most difficult subjects at school.

Statement 3: I can search for information in English: A high percentage of the participants (19, 95%) of the responses "strongly disagree", only 1 (5%) of them agreed with the statement. We can clearly see that most of the learners do not trust their English knowledge when it is about searching for information.

20
18
16
14
12
10
8
6
4
2
0
Strongly agree Agree Neutral Disagree Strongly disagree

Table 6. I can search for information in English.

Statement 4: I get low marks in English: Among the respondents, a very high percentage of the target population (15 participants, 75%) indicated that they get low marks in English; only a limited part of the learners surveyed 5 (25%) of them think the opposite.

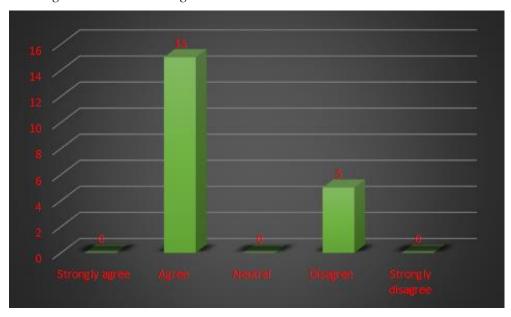


Table 7. I get low marks in English.

Statement 5: I think I can learn English easier with some project-based activities.: Only 2 (10%) of the learners strongly disagreed with the statement. Also, a significant percentage of them 18 (90%) agreed with the statement.

 STRONGLY DISAGREE
 2

 DISAGREE
 0

 NEUTRAL
 0

 AGREE
 18

 STRONGLY AGREE
 0

 0
 5
 10
 15
 20

Table 8. I think I can learn English easier with some project-based activities.

From all of these results we can easily say that most of the EFL students in Turkey do not know about STEM subjects and they really need a form of training which includes all of this information and more. In addition to this, most of the students have some negative feelings towards English subjects but they would like if there is another way of learning it.

To assess and evaluate the study, a posttest was conducted with the same participant students. For this evaluation, qualitative data were collected. Two participant students answered the interview questions voluntarily.

K.S. (17): When the teacher first came to class with the idea of a project on STEM I thought that year was going to be a hard one to endure because there was an English teacher who wanted to teach us about Science. I, personally, always liked English and was good at it. However, it was not this year's job as we were studying for our university entrance exam for the following year. She wanted us to talk about space and told her what we knew about space travel. We had limited information about these topics and as one can predict, we said only 'it is possible one day, but not today'. We assumed that she was talking about going to Mars. Then she asked if we knew NASA. That was the moment I got a bit excited. What was happening? When she said we would talk to a NASA worker we couldn't believe that was going to happen. But he was there. He was directly talking to us. Weekes after, the English lesson became more attractive for all of us because every week we did something new and much related to our subjects. Sometimes it was Physics and sometimes it was Geography. We designed models of buildings, nano-outfits, we coded mobile phone games and we programmed a robot. Well, at first we thought that it was a toy bought from ebay but it wasn't. Every piece of it was brought together by us, programmed in the computer day by day and to see it moving was invaluable. I will never forget my STEM 'E' for English experience.

D.T. (17): I had always hated English and I was never good at speaking or even reading it. But, after our project, I have come to understand the importance of it and the first thing to do in my summer holiday is to go to a course for improving my English. And one more thing, I have chosen my future job thanks to my teacher. I had never thought of being in the science field as I was not very successful at science but now I know what I want. I want to be an engineer.

4. Conclusion

The findings indicate that the majority of the 20 participating high school students did not have a clear idea about STEM or related subjects, or the importance of these subjects regarding their future careers. The second section of the pre-tests showed that the students' way of thinking about English was very pessimistic and they found studying, understanding and using English as too difficult. According to the findings, the interview which was conducted for a post-test purpose clearly demonstrated that in the course of the project process, the students had fun, they were astonished by the new knowledge that they gained, and they were interested in making research and discussing their findings. When the project ended, they answered the questions in a positive manner in the post-test. It was seen that they loved English more and their marks became higher and STEM was not so complicated as well. With this regard, one can see that this project has changed the views of the students.

As Stohlmann, Moore & Roehrig (2012) suggest and this research finds, strategic implementation of STEM education is necessary for increased integration to be effective. But integrated education gives students the opportunity to learn more relevant and encouraging experiences, supports the use of critical thinking skills at a higher level, improves problemsolving abilities and improves retention. The researcher, as the conductor of the project, was anxious at first because she didn't know whether the project activities would work or not, as the students had really bad attitudes towards English and they hadn't heard about STEM before. But, as the project started, it was seen that they started to enjoy and become great investigators. After seeing the improvement of the students, the study proved its necessity.

White (2014) states in his research that integrative and/or collaborative STEM education is a viable endeavor for introducing elementary and secondary students to STEM concepts. And the researcher aims to integrate STEM concepts via English teaching. However, this study was conducted by highschool students, it would presumably be appropriate with the younger students. For this reason, the researcher provides some future implication modification ideas for the readers in the Conclusion and Suggestions section of this research paper.

Another study (Margot & Ketler, 2019) included empirical articles that addressed research questions and were published in an English-language scholarly journal between 2000 and 2016. Primary studies enrolled preK-12 teachers as participants. 25 articles were included in the analysis after they were evaluated for quality. The data were analyzed thematically in order to identify recurring themes. While teachers value STEM education, they identified barriers such as pedagogical challenges, curriculum challenges, structural challenges, student concerns, assessment concerns, and a lack of teacher support. Teachers identified several supports that would help them implement STEM education more effectively: collaboration with peers, high-quality curriculum, district support, prior experiences, and effective professional development.

The current study, as a project, was chosen by the European Schoolnet as one of the top 30 activities out of 800 across Europe. The European Schoolnet presented it throughout Europe and at the 23rd Science Projects Workshop in June 2018 in Brussels. It is possible to work on it as an Erasmus+ project. There are numerous activities available online, and in many countries, it can be a life-long learning activity.

The project was presented at the ETZ (Educational Technologies Summit) in Ankara in December 2018. Additionally, it was recognized as one of the most successful STEM projects in Azerbaijan by the Committee on 'STEM in Azerbaijan.'

Teachers should provide role models for our students, particularly the younger ones. At this point, the best candidates would be well-known and unsung scientists from our own countries. Making videos about them, reading texts about them, and perhaps even virtual meetings with these people would be fantastic and memorable experiences for students of all levels and ages.

As previously stated, STEM education and English are two critical subjects for our future generations. STEM education is a method that motivates students to engage in direct learning, helps them achieve their goals, and ensures that they apply their knowledge to new and different problems (Yıldırım, 2013). Projects, studies, and classroom activities, such as the one presented here, are excellent ways to integrate these subjects into a variety of different types of school subjects. This study affected not only the lives of the participant students, but also those of the teacher.

The project was implemented with one class only. We worked with 11th grade students who are interested in Science education. Hence it can be adapted for other grades. For example the project activities can be changed with easier ones and implement them with lower classes. There can be more game activities which younger students will have more fun with.

In this section, the researcher provides some suggestions for EFL teachers for the future implementations with a younger age group. For the Deep Space activity, younger students can be introduced to the names of the planets and some basic features of our Solar System. There are numerous song and story videos available on online video platforms such as YouTube, which can be used to create some warm-up activities. Atoms, elements, and some basic vocabulary can be taught during the Particle Physics activity. Online video resources may be beneficial for younger students. For the Coding activity, certain online tools or websites are child-friendly. While Scratch is an excellent tool for young coders, Kodu Game Lab is another option.

Numerous enhancements and adaptations could be made to the Global Warming-Renewable Energy activity for young learners. They are extremely inquisitive about our world. They genuinely care about the environment in which we live, the animals, and the weather. There are numerous story and song activities available online. Teachers would be wise to prepare some flashcards for young learners and use them as materials for their vocabulary teaching activities or for some simple grammar structures such as tenses in the Augmented Reality activity. Creating AR materials may be challenging for these students.

In the Nanotechnology activity, some informative but beginner-level English videos may be more appropriate. Additionally, because young learners are extremely creative, teachers can develop some design-based activities related to the topic. Teachers of all levels of students from all over the world are invited to participate in the SCIENTIX Project/ STEM Discovery Week activity. They need only to conduct a similar project and apply when the time is right.

Due to the fact that teachers may hold a variety of different licenses and backgrounds, it is critical for schools to provide support and opportunities for collaboration. The school management should assist the teachers. Partnering with a local university or a nearby school, attending professional development, utilizing relevant training, and encouraging open communication can all help teachers feel supported in their efforts to be successful. The study is groundbreaking in its field, innovative, and novel. It is adaptable to learners of any level and age. The EFL teachers are responsible for developing new activities, modifying existing ones, and adding to the project, as they are the best experts on their students' needs and interests.

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