

# Add-on Subjects in Science Special Program-Science Engineering and Technology: Its Impact in Choosing a Career in STEM

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**Abstract:** Science, Technology, Engineering, and Mathematics (STEM) are everywhere in the world around us. Many Filipino learners are interested in pursuing careers in science, technology, engineering, and mathematics (STEM). However, there are still several critical gaps to address in this regard, as industries continue to report that they could not find individuals with the skills required for today's advanced workplaces. There are so many conflicting issues for high school graduates in choosing their careers and many related studies were conducted to identify such issues. Common studies include different factors like demographic factors, peer influence, teacher, environment, and others. However, few studies were conducted focusing on the curriculum the learner is undertaking. This encourages the researcher to determine what aspects of the add-on subjects of the Special Science Program (SSP) specifically the Science Technology and Engineering (STE) curriculum influence the STE learner to pursue STEM careers. The primary data were lifted from the interview conducted with the Grade 11 STEM students who were previously STE learners in the Junior High School determining what specific factors influence them in choosing STEM. Science Technology Engineering (STE) students approach their career decision-making from different standpoints and experiences. Considering how STE add-on subjects influence the STE learner in pursuing a STEM career, the subject matter emerged as a dominantly influential element over teaching strategy as found in this study. By comprehending students' perspectives on career decision-making, curriculum implementers need to enhance the content of the subject matter so that 21st-century skills and scientific and technological innovations be included.

**Keywords—** *Impact, STEM, Add-on Subject, Special Science Program.*

## 1. INTRODUCTION

Science, Technology, Engineering, and Mathematics (STEM) are everywhere in the world around us. Just as science speaks to a part of our lives, technology is continuously expanding into every aspect of our lives. Engineering talks about designs of roads and bridges, but now it focuses on the challenges of changing global weather and environmentally friendly homes. Mathematics is in every occupation and every activity we do in our lives (Engineering for Kids, 2021). STEM education should provide students with a well-rounded foundation of skills to help them understand a wide range of concepts and thrive in many industries. Engineering for Kids Program (2021) suggested that exposure to STEM activities at an early age is essential and continuously exposes them and allows them to explore STEM-related concepts. They believe that through this procedure students will develop a passion and hopefully pursue jobs in the STEM field. Creating a curriculum that is STEM-based should have real-life situations to help the student learn. Integrate multiple classes to provide opportunities to see how concepts relate to life to hopefully spark a passion for a future career in a STEM field. STEM activities must have hands-on and mind-on lessons for the student. Making math and science both fun and interesting helps the student to do much more than just learn. A survey conducted by ACT and Emerson Electric Co. both observed that Ninety-one (91%) percent of Filipino respondents are

interested in pursuing careers in science, technology, engineering, and mathematics (STEM), and 80 percent felt encouraged to do so. But even as the survey found that younger people across the globe are three times more likely to be encouraged to pursue STEM careers than their elders, there are still several critical gaps to address in this regard, as industries continue to report that they could not find individuals with the skills required for today's advanced workplaces. Graves, J.A., (2013) reiterates what Edie Fraser says that educators' problem is for learners to engage in learning. He further explains that students once they reach the high school level lose 80 percent of their interest in STEM. He challenged the educators to keep the students on track and continue nurturing this STEM skill in them. There are so many conflicting issues for high school graduates in choosing their careers and many related studies were conducted to identify such issues. Common studies include different factors like demographic factors, peer influence, teacher, environment, and others. However, few studies were conducted focusing on the curriculum the learner is undertaking. This encourages the researcher to determine what aspects of the add-on subjects of the Special Science Program (SSP) specifically the Science Technology and Engineering (STE) curriculum influence the STE learner to pursue STEM careers.

## 2. OBJECTIVES OF THE STUDY

The purpose of this study was to determine what aspects of the add-on subjects in the Science, Technology, and Engineering (STE) Program influence the student in choosing a career in STEM. More specifically, this study was designed to answer the following research question.

1. How do add-on subjects in the STE curriculum influence the STE students in choosing a career in STEM?
2. What are the issues encountered by the students while enrolled in STEM?

### 3. MATERIALS AND METHODS

In this part, the research design is presented as suitable for the conduct of this study. Further, this presents the research locale, the description of participants, and the sampling technique employed in identifying respondents. Moreover, this chapter also contains details about the data-gathering procedure, research instruments, and the statistical tools employed in the treatment of data.

#### 3.1 Research Design

This study utilized the narrative inquiry approach under a qualitative method of research. As Creswell (2013) stated, "Qualitative research is conducted because a problem or issue needs to be explored ... it needs to identify variables that cannot be easily measured or hear silenced voices". Qualitative research considers several approaches, Butina (2015) points out that in the narrative inquiry approach, the story of an individual becomes the raw data in the research. The narrative of human experience, lifestyle, identity, culture, and history helps you better understand people what do, how they think, and how they feel about a certain issue.

Hence, a narrative story of a few STE students was enough to better understand the influence of their add-on subjects in selecting STEM strands in their senior high school year.

#### 3.2 Locale of the study

This study was conducted among Grade 11 STEM students of Eastern Samar National Comprehensive High School, Borongan City, Eastern Samar enrolled for SY 2021-2022.

#### 3.3 Participants of the Study

The target participants of this study were the Grade 11 STEM students who underwent the Science, Technology, and Engineering curriculum offered by the Special Science Program of the junior high school in ESNCHS. Only Ten (10) participants were purposively selected that are enrolled in Grade 11 STEM class who were STE students in their Grade 10 in ESNCHS and were allowed to answer the online questionnaire in a Google Form.

#### 3.4 Sampling Method

The purposive sampling method was utilized to draw up the sample participants who could provide adequate information for the study. Respondents were selected based on their characteristics and the objective of the study.

#### 3.5 Research Instrument

The researchers utilized an in-depth interview

instrument through a Google form to gather data for the study.

#### 3.6 Data Gathering Procedure

The researchers secured approval from the school principal through a formal letter. Consent from the respondents was secured by the researchers and upon approval, the interview followed. Advisers of the selected Grade 11 STEM students were oriented on how to explain to the selected students the questioner. The researchers used a Google form to solicit data from the students. The participants were assured that their identities would remain confidential, and the data gathered was used solely for the study.

#### 3.7 Data Analysis

The primary source of the data was lifted from the summary provided by the Google form where the participants answered the interview questions. The data collected was further analyzed using Orange – a computer-assisted application, a qualitative coding method which is a Computer Assisted Qualitative Data Analysis Software (CAQDAS). The results were given in a summarization after proper categorization, themes, and connections were analyzed. In addition, verbatim quotes were provided as validity to support the analysis.

#### 3.8 Ethical Considerations

This study followed the appropriate research ethics guidelines. The researchers sought consent via Messenger Chat from the participants through their adviser, to use their given data. The participants were assured that the data collected were kept confidential and could not be used in any legal actions against them. To safeguard their anonymity, pseudonyms were used when names were mentioned in the evidence.

### 4. RESULTS AND DISCUSSION

The results of the research are presented in a written report format by Butina (2015). Written findings are organized and presented by theme based on the order in which the research questions were stated. Each theme is given a brief overview and then supported with several narrative quotes. The themes generated are mainly limited to the perceptions of the participants and no other pieces of evidence were explored to further validate the responses.

#### *Influence of add-on subjects in STE curriculum to STE students in choosing a career in STEM*

The participants were asked how add-on subjects in the STE curriculum influenced them in choosing their careers in STEM. The teacher's teaching strategy and subject matter were the uncovered themes.

#### *Subject Matter*

Most of the participants consider the subject matter and the lesson taught in the add-on subject influences them most in choosing a career in STEM. A similar study was conducted by Means, et.al. (2016) that students attending secondary high schools with inclusive STEM, in other words taking special subjects related to science, technology, engineering, and mathematics subjects were likely to choose science-related careers in their college years. According to the article in Engineering for Kids (2021), Students must be exposed to

STEM and provide them opportunities to explore STEM-related concepts so they develop their passion for it.

Participant 4: *“Having the background knowledge from my previous years, I decided to go with a strand almost similar to it.”* - (STE 4)

Participant 5: *“It gave me advanced knowledge and developed my interest in life and environment.”* - (STE 5)

Participant 1: *“I find the chosen add-ons enjoying learning and making me think outside the box.”* - (STE 1)

Participant 2: *“I find the lessons interesting.”* - (STE 2)

Participant 7: *“It enlightened me to venture into other subjects that are related to the add-on subjects that I like. And it influenced me in finding the career or course I want when I go to college, which is related to the STEM strand.”* - (STE 7)

Participant 9: *“Most of the subjects are related mostly to the subjects we had before as an STE student. Some lessons are already familiar in subjects like gen math and pre-calculus. Stock knowledge comes when the lesson is gained already.”* - (STE 9)

Participant 8: *“There are unnecessary subjects added especially when you are not interested in it. I think the school should focus more on what the students think they love and will help them with their future career instead of requiring students to study in a specific subject they're not passionate about.”* - (STE 8)

### **Teacher teaching strategy**

Some of the participants agreed that the teaching strategy of the teachers handling the add-on subjects of the STE curriculum influences them in one way or another in choosing STEM as their career. Anderton (2019) believes that if the teaching method used is interesting it holds their attention and makes learning enjoyable. “Teachers are required to be fully prepared before any classroom activities so that students’ time will be wisely spent, and learning will take place”, says Ejiwale (2012). Furthermore, Ejiwale (2012) points out that The National Research Council (2010) noted that in STEM learning, the ability to command teaching strategies needed to illuminate STEM for learners is as important as teachers knowing the variety of ways in which learners develop STEM knowledge and skills. Accordingly, such ability will help in preparing learners with the tools necessary to cope with STEM programs.

Participant 4: *“The teachers from the subjects were understanding.”* - (STE 4)

Participant 6: *“For me, it was the teacher and his/her teaching strategies that made the lessons more interesting, and as time went by, I just learned to like the subjects as well because of this.”* - (STE 6)

Participant 8: *“The way they explain the topic with ease makes it bearable to comprehend and understand.”* - (STE 8)

Participant 9: *“Because I learned most of the topics clearly if the teacher is good at teaching the lessons by using their strategic teaching.”* - (STE 9)

Participant 10: *“Because it helped me learn faster and understand the lesson.”* - (STE 10)

Many research studies consider the teacher as the most influential factor in the success of the learner. With the onset of COVID-19, face-to-face classes became impossible, so distance learning was considered as an alternative mode of learning. This poses an issue for the STE students upon their enrolment in the Senior High School. Due to poor internet connectivity, most public senior high schools within the locality could not afford the online classes. Learning modality is simply modular distancing learning where most of the learners have difficulty coping with the lesson.

To quote participant (STE 9), *“This distance learning is the major issue. Some lessons are difficult and need a further explanation but somehow can be learned through the access of YouTube. Second, is the lack of teachers’ accommodation due to some subject teachers are not as active online as others, it’s difficult when we must pass requirements when we don’t know whom to send.”*

Another participant, STE 7 also pointed out that *“considering that we are currently facing the pandemic right now the issues I have was the lack of knowledge regarding the lessons and the difficulties in understanding and answering the activities in every lesson.”*

### **5. CONCLUSION AND RECOMMENDATION**

Science, Technology, and Engineering students approach their career decision-making from different standpoints and experiences. Considering how STE add-on subjects influence the STE learner in pursuing a STEM career, the subject matter emerged as a dominantly influential element over teaching strategy as found in this study. By comprehending students’ perspectives on career decision-making, curriculum implementers need to enhance the content of the subject matter so that the 21st-century skills, scientific and technological innovations are included, and STEM educators must acquire the skill of out-of-the-box teaching methods so that our STEM students could face the challenges of both globalization and a knowledge-based economy.

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