Original Research Article
STEM Exposure and STEM Career Aspirations to Senior High School Students in Davao Doctors College, Inc.

ABSTRACT

This study aimed to determine STEM exposure and STEM career aspirations to senior high school student in Davao Doctors College, Inc. It specifically looked into the level of STEM exposure in terms of personal, environmental, and behavioral. It also aimed to determine the level of STEM career aspiration of SHS student in Davao Doctors College, Inc. Furthermore, this study aimed to find if there is a significant relationship between STEM exposure and STEM career aspirations.This study employed a quantitative research design specifically a descriptive-correlational method. This was conducted in Davao Doctors College, Inc., Inc., in November 2023.The respondents of this study were 266 of grade 12 senior high school STEM students in Davao Doctors College, Inc. The research instruments used were an adapted survey questionnaire.The results showed that the overall mean score of the STEM exposure to senior high school students was described as high (3.85) and STEM career aspirations was described as high (4.15). The relationship between the two variables was significant (R= .7596). This suggest that exposure to STEM influence students' aspirations toward STEM careers.

Keywords: STEM exposure, STEM career aspirations, personal, environmental, behavioral

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1. INTRODUCTION

Being exposed to STEM education has been shown to have a benefit on students' interest in STEM and their pursuit of STEM-related careers, however, many students studying science, technology, engineering, and mathematics (STEM) are feeling confused about what careers they should choose. Moreover, according to Luo et al. (2021), exposure to STEM subjects could have a negative effect on students' aspirations to push toward careers in STEM fields. This statement indicates that the initial introduction to STEM disciplines may, at times, hinder rather than enhance students' long-term interest in STEM career paths.

In Australia, Holmes et. al (2017) stated that students' career interests and their preferences for future career activities could potentially hinder their intentions of pursuing a STEM career. This statement suggests that students might be less willing to consider STEM careers if they lack genuine interest in these fields and cannot envision themselves engaging in related activities in their future careers.

In Philippines, a research conducted by Rafanan (2020) highlighted that when students are introduced to STEM subjects, it may limit their choices for future careers. It tends to lead them toward the belief that they are primarily suited for STEM fields. In addition, Blotnicky et

al. (2018), stated that as students mature, their enthusiasm for STEM careers tends to diminish. This implies that merely introducing students to STEM careers may not be sufficient to sustain their enthusiasm for pursuing such careers in the long term.

In Davao Doctors College, Inc., researchers have observed that many senior high school STEM students at Davao Doctors College, Inc. are unsure about what careers they want. Instead of being excited and sure about pursuing STEM (science, technology, engineering, and mathematics) careers, many students seem confused and unclear about their choices. Furthermore, researchers found out that despite studying STEM subjects in senior high school, many of them are choosing careers outside of STEM fields, underscoring the diverse factors that play a role in shaping their career decisions. Moreover, the link between STEM exposure and STEM career aspirations has been the subject of several national and international studies, but the association between the two variables has received far less attention especially in the Philippines. Since there were no studies on this subject, the researcher proposed this study to determine and evaluate the relationship between STEM exposure and career aspirations to senior high school students at Davao Doctors College, Inc.

1.1 Review Related Literature

1.1.1 STEM exposure

Exposure is an act of being subjected to or experiencing something(Roberts et al., 2018). Students' exposure to STEM can be achieved through different means, such as engaging in short-term STEM summer experiences or other long-term informal STEM programs. These programs offer students real-world STEM research experiences to boost their interest in the field. Moreover, Exposure to STEM fosters essential skills and knowledge for success in our technology-driven world(Waters & Orange, 2022). These competencies empower individuals for personal growth and societal progress in today's complex world.

According toKuchynka et al. (2021), more advanced students, with previous exposure to high school science courses, may enter the program with heightened STEM self-efficacy and future intentions.Mistopouluo and Pavlatou (2021), stated that students in demanding STEM courses and exposed to STEM activities tend to cultivate an interest in STEM.

In education, the choice to pursue a STEM strand is significantly influenced by environmental factors. This introduction explores how family backgrounds, community influences, educational settings, and societal pressures shape students' decisions to engage with STEM subjects and careers, crucial for understanding the journey of future scientists, engineers, and innovators(Abe &Chikoko, 2020).
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Students who are particularly interested in STEM subjects are more likely to have strong intentions toward integrating their STEM knowledge and skills(Ku et al., 2022). School environment and culture of STEM education can also impact students' interest, self-concept, and sense of connectedness to these disciplines(Murphy & Kelp, 2023).

1.1.2 STEM career aspirations

According to Gross-Spector and Cinamon (2018), career aspirations involve psychological or physical actions such as research, self-awareness, and understanding university learning environments. Moreover, Almuraie et al. (2021)emphasize the urgent need for innovative solutions to address global concerns like energy, climate, environment, and health is increasingly driving recognition of STEM subjects in educational and policy circles. It's

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important to note that STEM occupations lack a common definition, highlighting their interdisciplinary nature(Hallinen, 2023).

On the other hand, it entails parental support, parenting style, and parent-child attachment(Bhatt et al., 2017). Moreover, informal learning settings boost students' understanding of and excitement for STEM subjects as well as their propensity to choose a STEM career(Kitchen et al., 2018).

1.2 Statement of the Problem

The purpose of this study is to determine the significant relationship between the STEM exposure and STEM career aspirations.

Specifically, this study aimed to answer the following questions:

1. What is the level of STEM exposure of SHS student in Davao Doctors College, Inc. in terms of:
    1.1. Personal;
    1.2. Environmental; and
    1.3. Behavioral?
2. What is the level of STEM career aspiration of SHS student in Davao Doctors College, Inc.?
3. Is there a significant relationship between STEM exposure and STEM career aspiration of SHS student in Davao Doctors College, Inc.?

1.3 Null Hypothesis

H_0: There is no significant relationship between STEM exposure and STEM career aspirations of SHS student in Davao Doctors College, Inc.

1.4Scope and Delimitation

The focus of this research was on STEM exposure which are (personal, environmental, and behavioral) and STEM career aspirations among senior high school students. This study focuses on examining the relationship between exposure to STEM education and the students' interest in and aspirations towards pursuing STEM careers. The study sought to explore the extent of STEM exposure that students had in senior high school, including their involvement in STEM-related activities, events, and experiences. The data collection would be restricted to the senior high school STEM students of Davao Doctors College, Inc. Inc. because of the guidelines that the researchers are obligated to follow. Survey questionnaires would be used to collect data since they will provide us with comprehensive responses that will aid in our research. The current Grade 12 senior high school STEM students in the current academic year, 2023-2024, are the subject of this study.

1.5 Conceptual Framework

The independent variable for this study is STEM Exposure and it has the following indicators: Personal, Environmental, and Behavioral. The dependent variable for this study is STEM Career Aspirations.

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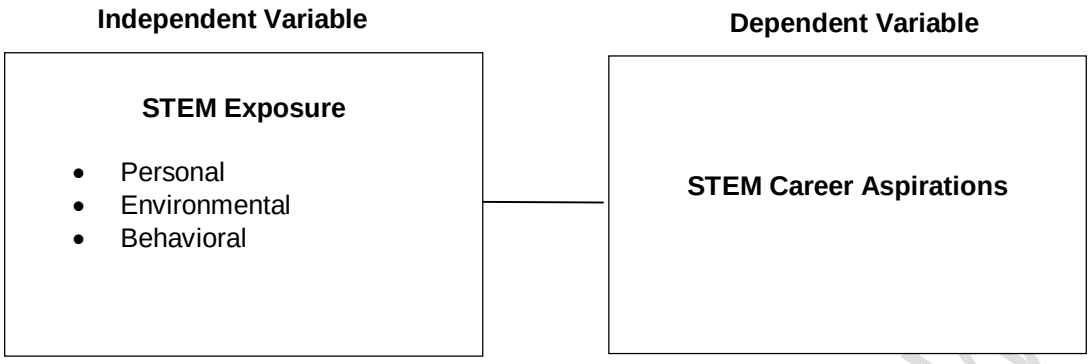

Fig.1. Conceptual Framework for STEM Exposure and STEM Career Aspirations

2. METHODOLOGY

2.1 Theoretical Framework

This study is anchored in *Ecological Systems Theory* by Urie Bronfenbenner (1992), this theory explains human development by examining the influence of interconnected environmental factors on the driving forces that directly shape psychological growth. Applying this to STEM exposure and STEM career aspirations of senior high school students involves considering how these different systems interact and influence the students' experiences and choices. It helps illuminate the complex interplay between different environments and their impact on an individual's interest and pursuit of STEM fields, making this theory ideal for our study.

This study is supported by Social Cognitive Career Theory (SCCT) by Lent et al. (1996) that offers a helpful framework for understanding the pivotal role of attitudes, interests, and involvement in students' choices to pursue STEM fields. SCCT emphasizes that academic and career decisions result from the interplay of personal (e.g., self-efficacy), environmental (e.g., support and obstacles), and behavioral (e.g., goal achievement). This idea can be applied to our study since the students' exposure to STEM can affect their desire to major in a STEM field, which in turn affects their actual choice of STEM-related careers. Personal, environmental, and behavioral factors will serve as the indicators for our independent variable, which is STEM Exposure

2.2 Research Design

This study utilized a quantitative research approach with a focus of descriptive-correlational methodology. Descriptive studies aim to explain and analyze the characteristics, behaviors, and attributes of a specific phenomenon or population without manipulating variables, focusing on what happened and how or why. Therefore, tools for observation and surveys are frequently employed to collect data (Gall et al., 2007). In correlational studies, researchers measure how modifications to a single variable correspond with changes in another to evaluate their relationship. Correlational research studies examine the connection between independent and dependent variables, however in these studies, the influence of the independent variable is observed without actively altering or controlling the independent variable (Jhangiani et al., 2019). The descriptive-correlational approach is appropriate for this study as it aims to investigate the connection between STEM exposure and STEM career aspirations among senior high school students.

2.3 Research Respondents

The participants were selected using a random sampling method to ensure every member of the population had an equal and independent chance of being chosen (Witte & Witte, 2017). Using Slovin's formula, a sample size of 266 out of 853 Grade 12 senior high school STEM students for the academic year 2023-2024 was determined. This sample size is sufficient to perform the statistical analyses required to address the study's research questions.

2.4 Research Instruments

To gather data on the independent variable, STEM exposure, the study adapted the "Large-scale Survey of K-12 Students about STEM" byWiebe and Faber (2013).In evaluating the STEM exposure, the respondents utilized the following in rating the questionnaire: 5 as very high; as high; 3 as moderate; 2 as low; and 1 as very low. The Likert scale was utilized to analyze the result.

For the dependent variables which are STEM career aspirations, this study adapted The Development of STEM Career Interest Survey byKier et al. (2014).In evaluating STEM career aspirations, the respondents utilized the following in rating the questionnaire: 5 as very high; 4 as high; 3 as moderate; 2 as low and 1 as very low. The Likert scale was used to analyze the result.

In summary, the research instrument comprised a total of 42 questions. The first section, pertaining to the independent variable, consists of 21 questions, while the second section, related to the dependent variable, also contains 21 questions. After that, specialists such as research advisor thoroughly checked and assess the questionnaire to make sure it's valid. Then, we conducted a trial run to ensure it's dependable.

2.5 Data Collection

The data gathering began with obtaining consent from the school principal and Grade 12 supervisor of Senior High School. Once permissions were secured, the researchers then prepared a set of survey questions, which was then evaluated and validated by the experts to ensure alignment with its objectives and appropriateness to the research context. When all necessary approvals from the different offices were done, the researchers scheduled the study for November 2023. The researchers then distributed the validated and reliable questionnaires using Google Forms to the Grade 12 STEM students. Lastly, the researchers arranged, presented, and conducted appropriate analysis on the survey questionnaires after they had been gathered and compiled**.**

2.6 Data Analysis

In this study, the researchers utilized Microsoft Excel and SPSS for statistical calculations and processing data, ensuring the accuracy and efficient analysis of the collected data.

Mean. The mean is often used to represent the "average" of a data set (Hurley & Tenny, 2023).This tool will be used to determine the STEM Exposure and Career Aspirations among Senior High School Students at Davao Doctors' College

The Pearson Product Moment Correlation Coefficient. This, often referred to as Pearson's r, is a statistical measure employed to quantify the strength and direction of the linear relationship between two variables (Chee, 2015). This statistical analysis was utilized to

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investigate the significant relationship between STEM Exposure and Career Aspirations among Senior High School Students at Davao Doctors' College, Inc

3. RESULTS AND DISCUSSION

3.1 Level of STEM Exposure of SHS Students in Davao Doctors College, Inc.

Table 1. Level of STEM exposure of SHS student in Davao Doctors College, Inc.

STEM exposure	Mean	Description
Personal	3.81	High
Environmental	4.04	High
Behavioral	3.70	High
Overall	3.85	High

Table 1 presents the level of STEM exposure of SHS students in Davao Doctors College, Inc. As reported on the table, there are 3 indicators for the variable which are personal, environmental, and behavioral. The succeeding discussion provides a comprehensive analysis of the results of the data gathered. Through simple mean statistical analysis, the highest and lowest indicator mean are discussed

Table 1 shows that the overall mean for this variable is 3.85, which can be described as high. This means that the STEM exposure to STEM related activities and programs is satisfactory.This outcome implies a high level of success in initiatives aimed at fostering engagement with science, technology, engineering, and mathematics. Exposure to STEM (Science, Technology, Engineering, and Mathematics) initiatives and activities has proven to wield a substantial and positive influence on students' career choices within STEM domains (Yoel & Dori, 2021).

Further, the highest mean among the indicators is 4.04 for environmental. This can be described as high which means that the student showed that the STEM exposure to STEM related activities and programs is satisfactory. This also means that environments that connect theoretical knowledge to practical, real-life situations help students see the relevance and impact of STEM in various fields. This connection can ignite a passion for STEM and motivate students to explore these subjects further. This is in line with Social Cognitive Career Theory (SCCT), that states that the exposure to supportive family, peers, and role models in STEM-related activities enhances students' engagement and passion for STEM by connecting theoretical knowledge to practical, real-life applications, ultimately fostering motivation and exploration in these fields (Lent et al., 1996).

3.2Level of STEM Career Aspiration of SHS Students in Davao Doctors College, Inc.

Table 2. Level of level of STEM career aspirations of SHS student in Davao Doctors College, Inc.

STEM career aspirations	Mean	Description
STEM career aspirations	4.15	High

Table 2 presents the STEM career aspirations of Senior High School students in Davao Doctors College, Inc. For this variable there were no indicators, therefore this table only discussed the mean for the variable itself.

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Furthermore, Table 2 shows that the overall mean for this variable is 4.15, this can be described as high. This means that the students have a significant interest in STEM careers. A high mean score implies a positive trend in the students' aspirations, indicating that STEM careers are widely regarded as attractive and desirable among this group. In the study of Blotnicky et al. (2018), students who showed a higher interest in technical and scientific subjects were more inclined to think about pursuing careers in STEM fields. Moreover, Rosenzweig (2023), suggest that exposing students to diverse STEM careers and improving their access to knowledge about STEM careers can enhance their interest in pursuing careers in science, technology, engineering, and mathematics.

3.3 The Relationship between STEM exposure and STEM career aspirations of SHS student in Davao Doctors College, Inc.

Table 3. The Relationship between STEM exposure and STEM career aspirationsof SHS student in Davao Doctors College, Inc.

R	Interpretation	Decision
.7596	Significant	RejectH_0

***Significant at .05 level*

As presented in Table 3, there is a direct relationship (R= .7596) between STEM exposure and STEM career aspirations in Davao Doctors College, Inc. Hence, the null hypothesis, which states there is no significant relationship between STEM exposure and STEM career aspirations at Davao Doctors College, is rejected. This indicates a significant relationship between STEM exposure and STEM career aspirations at Davao Doctors College, Inc. Several studies have investigated the factors influencing students' interest in pursuing STEM careers, including personal, environmental, and behavioral factors. While exposure to STEM careers is a significant predictor of their career aspirations and enhances students' interest in pursuing STEM careers (Blotnicky et al., 2018).

4. CONCLUSION AND RECOMMENDATIONS

4.1 CONCLUSION

The study reveals that students at Davao Doctors College, Inc. have satisfactory exposure to STEM-related activities and programs, particularly in Science, Technology, Engineering, and Mathematics. They actively participate in extracurricular activities and receive support from their families, fostering a positive learning environment and long-term commitment to STEM fields. However, they lack role models in STEM fields. Behaviorally, students set ambitious STEM goals but do not regularly read or listen to STEM content. Despite their interest in STEM careers, they do not envision entrepreneurship within the field. The study concludes that there is a significant relationship between STEM exposure and STEM career aspirations.

4.2 RECOMMENDATIONS

Davao Doctors College, Inc. We recommend the school to examine additional factors beyond the current study to thoroughly understand the root causes of the identified problem. Considering additional variables and contextual elements will contribute to a more effective solution for the school and its stakeholders. Additionally, Davao Doctors College, Inc. should initiate an industry internship program for STEM (Science, Technology, Engineering, and

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Mathematics) students to bridge the gap between classroom learning and practical application.

Teachers. Should adapt their teaching methods and classroom approaches by acknowledging the impact of STEM exposure on students' career aspirations. Understanding how Science, Technology, Engineering, and Math (STEM) subjects influence students enables educators to inspire and better prepare them for future STEM careers. To achieve this, teachers can tailor their techniques, making learning more engaging and relevant while fostering a positive environment that nurtures interest in STEM fields.

Students.Should commence their career exploration journey by acknowledging uncertainty and understanding that it's normal to feel confused about the future. To begin, they should identify their passions, strengths, and values—determining what truly excites and motivates them. Additionally, actively participating in STEM-focused internships and extracurricular activities is crucial. These experiences not only offer hands-on exposure but also provide invaluable insights into the diverse and dynamic landscape of STEM disciplines.

Future Researchers.We recommend that they consider conducting a follow-up study at Davao Doctors College, Inc. with the aim of replicating the existing research using a new group of students while maintaining the same variables. Additionally, future researchers may explore factors not addressed in the initial study to uncover new dimensions influencing the outcomes, contributing to a more comprehensive comprehension of STEM exposure and STEM career aspirations.

Consent

As per international standard or university standard, Principal's written consent has been collected and preserved by the author(s).

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Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1. Grammarly was used to ensure coherence across paragraphs; and

2.QuillBot was used to rephrase certain phrases.

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