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Identifying Reasons Influencing Undergraduate STEM and Non-STEM Students' Enrolment in Science

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***Abstract* – This study investigated students' interest in science, and students' reasons for enrolling in undergraduate science courses. Data were collected from 571 STEM and non-STEM students enrolled in undergraduate programs at a metropolitan university in Australia. The total sample for this study contained 299 males (52.3%) and 272 females (47.6%). The data analysed using thematic to determine how to determine what motivate student to enrol in their perspective courses. An open-ended question was used to ascertain the factors influencing students' enrolment in science subjects. The results of this study reveal that students' aspiration to pursue career in science are strongly related to academic interest and student engagement. A number of themes are discussed. Overall, the basic results showed that on average students' motivation to study science is high among university students.**

***Keywords* – STEM, Science, Education, Students' Motivation, Interest in Science, Undergraduate Students, Career Aspiration.**

I. INTRODUCTION

Cultivating graduates in science and science-related occupations has become an important concern in many countries world-wide, including Australia. In a globalised world, innovation in science and technology is important for the Australian economy, quality of life and national security. To maintain its economic competitiveness, Australia must invest in research and innovation and grow a large talented workforce in science. However, despite an increase in the number of students attending university, Australia has one of the lowest rates of graduates in science among OECD countries (OECD, 2017). Given the shortfall in enrolment for degree programmes in STEM subjects (Marginson, Tytler, Freeman, & Roberts, 2013), the promotion of enrolment in STEM subject is vital.

While most Australians agree that science is critically important to economic prosperity, not enough students are entering the science disciplines to satisfy present and future workforce demands. Thus, there has been a general concern that Australia faces a shortage of science graduates (European Commission, 2004; OECD, 2008; 2016; Tytler, 2007; Osborne & Dillon, 2008). There is a growing demand for science-oriented people who understand science and can make decisions about science-based technology.

A progressive decline in student enrolments in the sciences at the tertiary level has entered a spiral of decline in many "developed" countries (Vedder-Weiss & Fortus, 2011), including Australia (OECD, 2017). Recent study indicates that many capable high school students are opting out science - related careers in favour of other

preferences (Ferrini - Mundy, 2013). Thus, there exists a need to attract greater number of students to study science to ensure economic and social equity as well as to maximize the potential for scientific innovation.

In Australia, the situation has sparked extensive research into students' choices of science subjects (Tytler, 2007; Bøe, Henriksen, Lyons, & Schreiner, 2011). Science education in Australia is characterized as being in a state of crisis (Tytler, 2007), and the continuous decline in the number of students pursuing science-related careers is concerning. According to the Trends in International Mathematics and Science Study (TIMSS, 2015), Australian students are slipping behind in science and mathematics literacy. As students' motivation is a critical contributor to student persistence (Simon, Aulls, Dedic, Hubbard, & Hall, 2015), a better understanding of students' motivation in science is essential to improving the number of science graduates and science literacy.

Science literacy is widely considered as indispensable in modern developed and technological countries (deBoer, 2000). An important component of science literacy is science interest (i.e., building or maintaining an intrinsic attachment to science content). Students' motivation to study science subjects among undergraduate students are major factors in students' choice of science-related career goals (Keshishian, Brocavich, Boone, & Pal, 2010). According to the recent findings by the Program for International Student Assessment (PISA), Australian students' scientific literacy has declined by 17 points since 2006, equivalent to seven months of schooling, with nine points of the decline in the last three years (OECD, 2016).

One of the most important on-going questions in science education is how to maximise students' motivation to study science subjects and enhance their interests and performance in a world of rapid scientific and technological change. Motivation has been shown to positively influence study strategy, academic performance, adjustment and well-being in student domains (Vansteenkiste, Zhou, Lens, & Soenens, 2005). Motivation to study science and the pursuit of science-related career are influenced by factors long preceding tertiary education. As the PISA findings reveal, students' motivation and students' attitudes toward science are therefore particularly relevant in science education (OECD, 2016). The central claim of this study is that the more we know about students' motivational tendencies in terms of the goals and outcomes they prefer and pursue in academic context, the better we understand their classroom behaviour.

Motivation to study science plays an important role in students' aspiration to pursue a career in science. Students' motivation is "the process whereby goal-directed activity is instigated and sustained" and affects whether students engage or disengage in classroom activity (Pintrich, & Schunk, 2002, p. 5). The primary function of motivation is to direct behaviour to facilitate pursuit and achievement of desired outcomes (Bipp, Steinmayr, & Spinath, 2012). Understanding motivation is critical for reforming school curriculum, increasing learning, and improving career aspirations of students (Wigfield & Eccles, 2002).

It would, therefore, be important to have a good understanding of what motivates students to decide to study science at university and obtain a degree in science-based field. This could be expected to relate to motivation for their study prior to university and during their degree. Motivation to study science plays an important role in students' aspiration to pursue career in science-based fields. Given the importance of science literacy to securing and sustaining many jobs, to understanding key health concepts to enhance quality of life, and to increasing public engagement in societal decision-making (Hallman, 2017), it is concerning if the number of students studying science in Australia continues to decline.

The aims of this study were : first, to uncover the reasons that motivate undergraduate STEM and non-STEM

students to enrol in science subjects. Second, to explore whether students' career aspirations were based on their interest in and enjoyment of science, which they found to be closely related to their surroundings.

Previous research has focused on students' choice of major, even though a major does not directly map onto career choice. "For example, many students major in biology or chemistry as a path to becoming a doctor rather than a biologist or chemist. Some students major in mathematics or science on their way to the business world, career in finance or as entrepreneurs. Engineering sometimes provides a background for those who want careers as patent lawyers. By not considering students' ultimate career goals, tracking only college major tends to inflate the number of students who are counted as planning to enter the science, technology, engineering and mathematics (STEM) workforce" (Sadler, Sonnert, Hazari & Tai, 2012, p. 412). Hence it is important to consider students' ultimate career goals, not just what students are studying. This study explores undergraduate students' reasoning to enrol in science, while studying STEM and non-STEM programmes simultaneously.

Specifically, the research questions addressed by this paper are:

(1) What reasons seem to influence students' enrolment in science?

(2) How is students' interest in science related to future career aspirations?

II. METHOD

The present study was carried out in the context of the Australian higher education system. The data for this study were collected as part of a larger study at the start of the semester in the academic year 2018 through the administration of a survey questionnaire which included an open-ended question. The open-ended question was designed to explore important reasons influencing undergraduate STEM and non-STEM student's enrolment in science.

The purpose of the open-ended question was to obtain a more detailed account of the reasons underlying students' responses that may be related to students' motivation to study science. The question was designed to provide students with the opportunity to state their motivational reasoning for enrolling in science and science-based subjects. The data enabled the researcher to more deeply explore individual responses. It also provided descriptive quotes that help communicate interpretations from the research.

The open-ended question which consisted of three parts asks students to rank and explain three reasons – in order of importance (most important, second most important and third most important). The question allows the students to freely indicate the reasons why they were enrolled in a science subjects and thus obtain broad information. Written scenarios were developed from the students' responses by the researcher. The open-ended responses provided richer descriptions of the experiences and helped to identify aspect of the study situation.

Participants

The main purpose of this study is to investigate students' motivation in science in relation to their STEM career aspirations. An adequate sample for factor analysis must include five respondents per variable and a minimum sample size of 200 (Gorsuch, 1983; 1997). Most students were from a Caucasian/Australian ethnic background and from a variety of socioeconomic backgrounds. The sample composed of males and females.

All participants were first year undergraduate university students enrolled in STEM and non-STEM (e.g., hea-

-lth sciences and medical sciences) bachelor's degree programmes at a metropolitan publicly-funded mid-sized Australian university. A total of 571 students participated in the study with a response rate of 82%. The sample contained 299 males (52.3%) and 272 females (47.6%). All participants gave informed consent prior to completing the questionnaire.

All participants were enrolled in science subjects. They generally have strong high school backgrounds in the sciences and many intended to enter medicine, health sciences, biomedical science, IT and engineering. Information on participants' socioeconomic status and ethnic backgrounds were not obtained. The first part of the questionnaire (open-ended question) gathers demographic information about the participants' background, including gender, age and major program the student is enrolled in. The open-ended question asks "Please explain the most important reason (s) why you are enrolled in a science subject (s)" prompts responses concerning students' motivation to enrol in their science. All participants were given pseudonyms.

Before administering the questionnaire, the participants were briefed by the researcher about the study and what they were required to do. The research was approved by UTS Human Ethics Committee Under: UTS HREC ETH18-3058. Students' participation in the study was voluntary. The information elicited was anonymous, no invasive techniques were used, and the purpose was purely educational.

Students were selected because of the importance of the transition from high school to university education and because students in this age group have more educational alternatives than they have experience previously at school. It is argued that the "first university year is critical not only for how much students learn but also for laying the foundation on which their subsequent academic success and persistence rest" (Reason, Terenzini, & Domingo, 2006, p. 150). In addition, "the undergraduate years represent a crucial time when career decisions are made" (Adamuti-Trache & Andres, 2012, p. 1562).

III. Data Analysis

A thematic data analytical framework (Braun & Clarke, 2006) was used to analyse and structure the data. The thematic analytical approach requires the researcher to read, transcribe and become familiar with data and develop analytical data codes. Writing the analysis is not a product, but a continuous process (Braun & Clarke, 2006).

The data from the open-ended question were analysed, organized thematically, and stored and managed using the software *NVivo*® (Qualitative Solution Research [QSR] International, Pty Ltd, 2016). *NVivo* 12 software aids analysis by coding data according to a classification scheme that allows easy identification, indexing, or retrieval of data that had been assigned the same code during analysis (Auld et al., 2007, p. 37).

The *NVivo* 12 software was chosen over other software packages primarily because it is relatively simple to use, it is possible to import documents directly from a word processing package and code these documents easily. The program was used for organizing, coding and reliability-checking the data. The motivation for the use of the program was to allow sophisticated qualitative coding with increased flexibility and objectivity and to support a relatively unguided exploration (Bazeley & Jackson, 2013).

The data (responses) were examined for common themes relating to reasons of motivation to enrol in science. Responses were coded and analysed according to the guidelines set forth by Miles and Huberman (1994), who

suggested that the data need to be cleaned, chunked into smaller meaningful pieces and arranged into specific themes before it could be used for analysis. Queries designed to find portions of text that could answer particular research questions were developed and then used to search for and sort the coded transcript segments for further analysis.

To identify themes, a series of reading of the student responses which resulted in the generation of 'open coding', as described by Corbin and Strauss (2008) to find conditions among the participants. Themes are the result of several influences. The frequency that codes achieved was recorded. Then, codes were gradually grouped in relation to each other such that they developed through these connections between codes. A coding scheme was developed using actual words used by the participants to identify key themes in the discussions. Coding in this context, is the process through which data are conceptualized through the generation of codes, categories and themes (Charmaz, 2006; Corbin & Strauss, 2008).

Coding makes resilient links between data and ideas, links that can be traced back to find where particular idea came from and what data are coded there, to justify and account for the interpretation of the ideas (Morse & Richards, 2002). This process allowed thorough interrogation of the data and enabled the researcher to verify the accuracy and internal consistency of the coding system, to combine similar codes when redundancies occurred (e.g. *job* with *career*), to reduce the number of first-level codes by collapsing related categories, and to remove codes assigned to passages that were tangential to the study.

The first stage of the coding process involved data reduction. To reduce the data for the coding process, an initial read through the responses was undertaken, specifically seeking references to interest in science, career in science, enjoyment of science, teacher impact, etc. To complete the search for appropriate excerpts, the *NVivo* 12 Query function was used to search the responses for words commonly used in the relevant responses including: interest, prerequisite, career, job, enjoyment, parents, peers and teacher. Five major themes were identified for the study. The themes included Interest in science, Career aspirations, Prerequisite, Enjoyment, and Knowledge (curiosity).

The second step of data analysis is coding when the data are examined, and the information contained in each student's response and the whole dataset were organised. A simple and straightforward coding structure was used to ensure high level reliability. A start list of codes was developed to mirror the study's theoretical framework and guiding questions, and first-level codes were added for other variables emerged from the data as warranted. For example, first-level codes were created to represent Interest in science, Career aspirations, Prerequisite, Enjoyment of science, and Knowledge as factors that may influence students' choice.

Any section of a response could remain not coded or could be coded to more than one node. Coding to more than one node allows for concurrent examination of different themes, which is the main advantage of *Nvivo* 12 over other coding methods for our research questions. Using *Nvivo* 12 nodes and tree nodes as a tool, the data were analysed to identify key themes.

The generation of themes involves shifting to and interpretation of the issue under investigation. It requires testing the explanation both with the data and with the theory relevant to the study. This step is crucial to linking the results with what is known about people in other settings. The identification of themes, not categories, is the litmus test of a study that produces stronger evidence (Green, Willis, Hughes, Small et al., 2007).

Asking students about their important reasons to enrol in science may be an efficient means to assess STEM and non-STEM students' motivation to study science at university. Coding and recoding of the data resulted in five themes: Interest in science, Prerequisite (individual goal setting), Career aspirations, Enjoyment of science, and science as Knowledge. The five themes were consistently identified as being factors influencing students' motivation to study science.

In answering the open-ended question, students gave different reasons for enrolling in science subjects. Some were interested in science, some choosing science as a career, many are interested in science to improve their knowledge and career prospects, some were required to do science as a prerequisite for medicine, and some were enjoying science. The results are organized into five themes, with each theme containing selected quotes as illustrations of the various patterns found in the themes to display a variety of students. Each theme is addressed separately and presented with a selection of quotations drawn from the responses so that the voices the students are presented.

Fig. 1. These are the most frequent words from 571 responses. Certain generic words – study, subjects, money, school, topic, and subject – are dropped from the cloud.

Interest in Science

Students had clearly expressed interest in science as their main reason while simultaneously pursuing a STEM or non-STEM programmes, such as engineering or medical science. Many students describe their interest in science by stating that science relates to their daily activities which mean different thing for every student. By acquiring specific scientific skills, students become more competitive relative to their future career aspirations. Sophie who was studying medical science enrolled in science to fulfil her interest.

Science is interesting, and I like learning about the universe. I like doing experiments, and I would like to have a science career, immunologist, pathologist (Sophie, Medical Science).

School-based experiences were often related to demonstrations by the school teacher or school subject. As Jess who is studying IT responded:

[Science] sounds interesting and will lead to intriguing career options. They may be of interest to me. I enjoyed chemistry in school. I have always been willing to do experiments in relation to science ever since year 5. (Jess, Information Technology).

I have always found science interesting and wanted to continue doing science (Nathan, Science).

For Nathan the second most important reason was "Encouraged by my parents". Nathan parents are scientists, who encouraged Nathan to pursue a science-related career. Ralph referred to his goal to be an engineer and saw science as integral to his engineering degree.

> Because I want to be a mechanical engineer, so science is important to be an engineer. It is an integral part of my engineering degree and I must do science to complete this subject. It is necessary for my future career. (Ralph, Engineering).
>
> I am interested in science and how the world works. Science gives explanation of reasons why things works. To get further knowledge so that I can teach others (Stef, Science Education).
>
> I am more interested in science than any other subjects, therefore chose to do biology and as part of my degree. I feel like I understand most sciences really well, good at it. (Ashleigh, Education).
>
> I found science subjects (Physics & Chemistry) the most exciting & interesting while I was at school. This made me interested in science and in learning more about science, so I decided I would study at university. I was most successful in science subjects at school (in comparison with other subjects). This came from both a talent for science and an interest in science. I felt there is a good reason to study science at university. Science is very broad and can lead to many career options. (Emily, Bachelor of Science).
>
> I would like to become a wildlife biologist, as this field of interest has always excited me. I love learning more about how the world works. Understanding science concepts make me appreciate events and observations that occur in my daily life and in the media. Science is fun and enjoyable. I think it is amazing how interconnected the various disciplines are. It is great when I can connect materials from different science subjects. (Elizabeth, Biological Science).

B. *Prerequisite - Individual Goal Setting*

Motivation towards a career in medicine affects students' choice to enrol in science because science is a prerequisite for medical programme students. Each student set themselves a target. For example, goal setting was particularly notable among the science students. Responses are coded to this node if students state that they enrolled in science because it is a requirement to pursue a programme of study, such as medicine. The health science students quoted had clearly taken a career and financial considerations into question when choosing to enrol in science. The quotes contain several reasons that permeate the bulk of the data. Responses included:

> I want to be a doctor and the pre-med subjects I am enrolled in requires science subjects. 2. I like to learn about human and biology. It interests me more than another subject. (Naomi, Clinical Sciences).
>
> I had to do science as an undergrad subject as prerequisite to medicine. I like to help people with more problem (Liana, Clinical Science).
>
> I am enrolled in a science subjects as I would like to gain entry to a physiotherapy program. As a prerequisite. (Rebecca, B Health Science).
>
> I need science as a prerequisite to Nutrition and Dietetics, 2. Prerequisite, 3. Science is enjoyable when I understand the concepts. (Ann, Health Science).

It is an integral part of my engineering degree and I must do science to complete this subject. It is necessary for my future career. (Thomas, B Engineering).

I am enrolled in a science subjects as I would like to gain entry to a physiotherapy program. As a prerequisite (Anonymous, Health Sciences).

Prerequisite to medical science. It is important to everything and everyone's future. I enjoyed science in school (Chaya, Medical Science).

C. *Career Opportunities*

While the career theme referred to any motivation related to future career aspirations, some students went beyond that to allow career prospects to influence their choices. Responses are coded to this node if students state that they are doing science because they aspire to pursue a science-related career. In reflecting on the reasons that influence their choice of study, career aspirations are present in most of the student narratives. In many cases, including science showing relevance to a future career was a good way to stimulate interest. The career and interest facets often reinforced each other. In general terms, students expected to pursue a career in their chosen field which will open up a range of different opportunities. It is argued that identifying with science is highly predictive of science career intentions (Hazari, et al., 2017).

The most important reason for me to be enrolled in science subjects is to further my education and career opportunities in an area that I am interested in and enjoy. I need to further my skill so that I can teach my children good study habits and the importance of good education. I want to be a role model for my kids. I have always enjoyed science. I have a huge curiosity and am fascinated with forensic (Melanie, Biomedical Science).

I wanted a career change and specifically in an area I am interested (environment). Having a science degree will aid in my job prospects and give me an understanding of how and why things work. I wanted a career change and specifically in an area I am interested (environment). Having a science degree will aid in my job prospects and give me an understanding of how and why things work (Damian, Biodiversity Conservation).

I preferred the science-IT subjects because it has more open structure than the bachelor of IT. I got to choose what direction I take and avoid the business classes (Dana, Science -IT).

I really enjoy maths and science and find them so much easier to understand than other subjects I wish to make a career where I can use my skills (Dean, B Science).

Often career prospects were reinforced by intrinsic interest in science and academic achievement, and high-performing students are more likely to pursue STEM-related careers (French, Homer, Popovici, & Robins, 2015).

I am studying medicine which is a very hand on form of science. I feel that the world is in a slight crisis at current times when people can die of a common flue or diarrhoea in unfortunate countries. I am driven to use science to help those less fortunate than me. Science is practical, hands on solutions to major problems which, for me, makes it so appealing as a career. Other careers may not be as rewarding. The idea that through research, I could discover a new treatment that would revolutionise medical research. Science is exiting. (Nina, Medical Science).

> It is the most enjoyable and interesting subject. 2. It was one of my strongest subjects, 3. Career and prospects. (Jasper, Civil Engineering).
>
> I enjoyed science in Year 12 and I wanted to better understand how it works, 2. I have considered medicine and science will help me with my career (Ebony, Medical Science).

My parent owned a gym while I was growing up. So, I've always been surrounded by the Health industry. While in high school I became interested in Natural medicine. I have always wanted a career in science/Health. I decided to continue my passion for health and science. I believe that this would create a solid understanding of science at higher level, so that I can have a great job to provide for my daughter. I enjoy making people feel better and I believe of the success Natural medicine has had to the human body (Rebecca, Science).

D. *Enjoyment of Science*

Responses coded to this node if students state that they enjoy doing science or science is fun.

> Science was the subject I most enjoyed at school. Therefore, thought why not study science at university. Because science opens many doors and there are many careers that can be obtained by learning science (Loreen, Biodiversity Conservation).
>
> My Year 12 science teacher was very passionate about science and made it very enjoyable and appealing to continue with at university. I like to understand how things work and why things happen. I enjoy seeing creative uses of science in everyday life. (Zoe, Bachelor of Science).
>
> Science was very enjoyable in high school. Having an excellent teacher and a good class to help explore new topics. Science is a less popular topic and more scientists are needed so there are lots of different career paths. I enjoy science and maths (Jamila, Bachelor of Science).
>
> It is very much related to my degree and I believe I will benefit from science degree. It is enjoyable for me, as I always enjoyed it at school. I find the materials interesting. I enjoy challenging myself with new information and ways of using this information. (Keelan, Engineering).

Elyse describes how she and her parent enjoy science, and she wants to pass her knowledge to others by becoming a science teacher.

> I have always enjoyed studying science and I wanted to learn more. I want to be able to pass on knowledge of science. My family is very science-oriented. It is very interesting (Elyse, Science Education).
>
> Science is something that I enjoy. It comes naturally to me, particularly Biology and Life Sciences. I find the fascinating. I am considering a career in Health Sciences. Therefore, studying tertiary level science means that I receive the qualifications necessary to achieve this goal. The world needs more people who are familiar with the science (Soraya, Health Education).
>
> I really enjoy maths and science and find them so much easier to understand than other subjects I wish to make a career where I can use my skills (Anonymous, Science).

E. *Knowledge*

This theme refers to the participants' belief that science is important to learn. Almost all students stated that t-

-hey are interested in science because they perceived science knowledge as something that gives access to understanding the world. Students stated that they like the challenge and believe that science is a useful subject to learn but requires hard work and consistent efforts to learn about science.

> I have always found science the most interesting subject as it is always changing and makes new discoveries, 2. [Science] is very broad with what you can chose to study, 3. To broaden my scientific knowledge (Danielle, Science).

> To learn the basic aspects of science and expand my knowledge about the world. 2. To gain a science degree so I [can] get a job in science-based area. 3. To be able to make a substantial difference to the world using science knowledge. (Megan, Science Education).

For Megan, science provides knowledge that makes her more competent in understanding her life and the world surrounding her. For example, Rowan, who majors in engineering revealed that he enrolled in science:

> To have the analytical and problem-solving skills that will make me an asset to any engineering firm, and so I can look at the world in a way that rationalises everything into what can and what cannot be explained. To acquire technical skills and know-how when applying solutions to problems in my target profession. (Rowan, Engineering).

> Science is the basis of the world around us and it is important to have fundamental knowledge. [Science] opens more career opportunities. And I enjoy it (Jacinda, Science).

> I have a great interest in science, particularly relating to environment, which is why I chose the subjects I have chosen. I would like to learn more about the world around me and understand how systems and processes work. I wanted to experience a different type of education to what I already had (David, Biodiversity Conservation).

> I always wanted to be able to answer every question and solve every problem. Science gives me the knowledge to be able to do this. My brother also studied science and I wanted to show him up. I was good at science at high school, and I enjoyed it a lot more than other subjects. I was driven towards science from early age and from my parents (Alex, Biotechnology).

Taken together, the findings suggest that it would indeed be remiss to ignore the factors associated with students' motivation to study science. Science is like any other subject; it requires positive attitude, academic interest and more importantly students' motivation.

As stated earlier, this study was designed to investigate tertiary students' motivation to study science. Asking students about their reasons to enrol in science may be an efficient means to assess students' motivation to study science. All responses of 571 participants were analysed. The data were investigated according to procedure set by Miles and Huberman (1994). Coding and recoding of the data resulted in six themes: Interest, Prerequisite (individual goal setting), Career aspirations, Enjoyment, Self-concept and knowledge (curiosity). The themes were consistently identified as being factors influencing students' motivation to study science.

IV. DISCUSSION

The purpose of the current research was to examine the reasons influencing undergraduate STEM and non-ST

EM students to enroll in science-based subjects and to to explore whether students' career aspirations were based on their interest in and enjoyment of science.

The findings of this study suggest that, science remains a very interesting subject even for non-science majors. These findings should be considered in the light of the OECD report (OECD, 2017), which indicates that, despite higher rates of students attending university, Australia has one of the lowest rates of graduates in science.

Expectations and aspirations for a highly-paid career, fuelled by science as a prerequisite to entry into medicine, IT, health sciences and other science-based subjects dominated students' responses about what they aspire to achieve. There is evidence that students who enrolled in science value the chance to work in science-related careers. This is especially apparent among students who were motivated by their interest in science.

A strong message from the open-ended question was that science study is something you choose only if you have high interest and motivation in science. While the student responses to the open-ended question were short, they allowed the researcher to avoid misinterpretation of the students' views of science. They also provided an idea about the student's career goals and strategic value in that students use science to enhance their university and career options, e.g., career in medicine and health sciences.

The vivid quotes from students' response illustrate similar patterns among students regarding their attitudes towards science. Only a few students indicated that they are not good at science or not interested in science beyond participating in science classes as a requirement. In addition, the findings reveal that students' motivation to study science is associated with students' achievement goals. The study suggests that extrinsic motivation (e.g., career, money, etc.) is an important factor in students' decisions making. The second factor is strong scientific interests and career goal.

This study has been undertaken to assess the reasons behind students choosing to enrol in science subjects at university. The qualitative data have been crucial in reflecting students' individual and unique accounts in relation to science. The findings should not be interpreted as representing the majority views of students. However, this is not to say that the findings from the student responses alone would not provide important information. The findings were useful in illuminating students' perspectives on science and the variety of factors that associate with their career goals. This study contributes to developing understandings within science education on how we might better approach science careers interventions. In sum, the study contributes to the existing educational research literature with important findings. Further, the open-ended responses could provide vital information for research instruments.

The current findings of this study provide the first evidence that STEM and non-STEM students were motivated to enrol in science for a variety of reasons, including deep interest in science, prerequisite for non-STEM degrees, future career opportunities, enjoyment of science, and knowledge. However, motivation remains the most important reason to study science.

The findings of this study are considered reliable because there were not strong incentives for the participants to provide inaccurate information. Future studies can complement this study by applying longitudinal approaches to understand how students construct their expectations and plan their career overtime as they gain new experiences. All participants gave informed consent prior to completing the questionnaire.

V. CONCLUSIONS

This study demonstrated that, there is mounting evidence that promoting the relevance of STEM and non-STEM subjects for students in an effective way for increasing students' motivation and career aspirations. These results highlight the importance of science in STEM and non-STEM careers.

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