INFLUENCING FACTORS OF NON-STEM STUDENTS SHIFTING TO STEM-RELATED COLLEGE PROGRAMS IN A CATHOLIC UNIVERSITY

ABSTRACT

In the Philippines, the additional two years in Senior High School allow the student to select a specialization depending on ability, interests, and academic capabilities that prepare them for their chosen course in college. However, statistics show that more students shift from their chosen strand in Senior High School when they pursue their undergraduate education. Quantitative research design utilizing the descriptive and comparative approaches determined the degree of influence of factors on non-STEM students shifting to STEM-related courses and identified if there exists a difference when grouped according to demographics. Using snowball sampling, 214 college students from STEM-related college programs who are shiftees from the non-STEM strand in Senior High School were selected as participants. Utilizing mean and standard deviation, results showed that work opportunities is the most dominant influencing factor in the shift of non-STEM students to STEM-related college programs. Further, utilizing the Mann-Whitney U test, the result showed a significant difference in the degree of influence of factors to shifting career choice in terms of school factor when grouped according to sex. Using Kruskal-Wallis H Test, the result showed no significant difference in the degree of influence of factors to shifting career choice when grouped according to strand in Senior High School. A career awareness seminar in collaboration with the guidance was developed based on the findings of the study.

Keywords: *influencing factors of a career shift, Quantitative research, Philippine education, Career awareness, STEM and non-STEM students, Senior high school students*

INTRODUCTION

Choosing an appropriate career or profession is one of the most important decisions one makes in life (Mashige & Oduntan, 2011). Career choice is a complex and multifaceted phenomenon, which makes it difficult to predict and understand. In making decisions in career selection, one must undergo an intricate process and forcefully open-minded person to choose his specialty, practice, and location of the educational institution (Cheema et al., 2017). Misfit of choosing a career may result in unemployment and underemployment (Pascual, 2014). Thus, professional life and future achievement result from the appropriate career choice (Ahmed et al., 2017). However, choosing a career is crucial, especially among secondary or middle school students who will be going to college. They become confused. For instance, negative perceptions of certain specialties of a preferred career (McCann et al., 2010; Cheema et al., 2017) may lead to career shifting.

Many influencing factors can be considered in shifting a career or course among secondary students. Some factors can be personal, socioeconomic considerations, and socializers (Niu, 2017), the prestige of the course, an indication of a well-paying job and bright prospects, and the influence of demand for a job (Fatoki, 2014; Makhlouf & Mine, 2020). Job security and work opportunities (Gour et al., 2011; Song & Glick; 2004; Rababah, 2016; Melguizo & Wolniak, 2015), the type of school (Llenares & Deocaris; 2014), and the number of financial assistance and scholarships available (Gestiada et al., 2017; Dagang & de Mesa, 2017; Bruno & Faggini, 2021) could also be some of those factors that can lead students to shift from a standpoint that is unknown and known.

In the Philippines, the Department of Education implemented the K-12 curriculum through

Republic Act 10533, also known as the Enhanced Basic Education Act of 2013, extending primary education by two years. The law increases the length of primary education by making kindergarten mandatory and prolonging secondary Education by two years. Incorporating kindergarten, six years of elementary school, four years of junior high school (JHS), and two years of senior high school (SHS), primary Education now lasts 13 years (Rivera, 2017). The RA 10533 was created to solve various problems in fundamental education, including the need for more skills and global employment competency of undergraduate and part-time student employees (Ongkiko & Ong, 2013). The law also aims to provide students ample time to grasp the necessary concepts and skills, foster lifelong learners, and prepare them for middle-level skill development, employment, entrepreneurship, and university education (Oracion et al., 2020).

However, the Commission on Higher Education (2017) in the Philippines released a memorandum order indicating that all Grade 12 senior high school graduates are eligible to enter college irrespective of the strand or track they have taken in senior high school. The problem arises when the K to12 graduates are to pursue a college degree that is not related to the strand they finished during their senior high school years (Malaga et al., 2021). An abundant number of cases caught the attention of the institution when college students who graduated from the non-STEM strands started choosing a STEM (science, technology, engineering, and mathematics) field as their major when they enrolled in college.

Several studies have been conducted on career choice and decisions (Orbeta et al., 2019; Roxas, 2022; Mashige & Oduntan, 2011), students' career shifting to STEM-related courses (Makhlouf & Mine, 2020; Ban, 2016), and factors influencing the shift in career choice (Niu, 2017; Fatoki, 2014; Makhlouf & Mine, 2020; Gour et al., 2011; Song & Glick; 2004; Rababah, 2016; Melguizo & Wolniak, 2015). However, very limited studies were conducted on the degree of influence of factors on non-STEM students shifting to STEM-related courses in college. Thus, this study was conducted to fill in the gap in the literature.

This paper aimed to investigate the degree of influence of factors on non-STEM students shifting to STEM-related college programs in a Catholic university. The findings of the study will serve as a basis for the preparation of a career orientation program to assist students in deciding on their career path and a career awareness seminar in collaboration with the SHS SDPC office.

METHODOLOGY

Research Design

This research employs the quantitative research design utilizing descriptive and comparative approaches. A descriptive research design examines one or more variables using various research techniques (McCombes, 2022). Researchers can describe the characteristics and viewpoints of the particular group using descriptive research. In this study, the descriptive approach was utilized in determining the degree of influence of factors on non-STEM students shifting to STEM-related college programs. On the other hand, a comparative research approach determined whether a significant difference exists in the influencing factors when students are grouped according to sex and strand.

Respondents

Using the snowball technique, this study was participated by two hundred forty-one (241) 1st to 4th-year college students from the College of Engineering (BS Civil Engineering, BS Mechanical Engineering, BS Electrical Engineering, BS Chemical Engineering, BS Computer Engineering, and BS Electronics Engineering), College of Allied Medical Health Sciences (BS Pharmacy, BS Medical Technology, and BS Nursing), and College of Accountancy, Business, and Computer Studies (BS

Information Technology, BS Computer Science, BS Entertainment and Multimedia Computing, and BS Information Systems) for the school year 2022-2023, second semester.

Table 1. Distribution of Respondents

College	College Program	n	%
College of Accountancy, Business, and Computer Studies	Information Technology	33	15.42
	Information Systems	2	0.93
	Computer Science	17	7.94
	Entertainment and Multimedia Computing	1	0.47
	Sub Total	53	24.76
College of Allied Medical Health Sciences	Medical Technology	27	12.62
	Nursing	18	8.41
	Pharmacy	18	8.41
	Sub Total	63	29.44
College of Engineering	Civil Engineering	57	26.64
	Computer Engineering	1	0.47
	Chemical Engineering	6	2.80
	Mechanical Engineering	20	9.35
	Electronics Engineering	3	1.40
	Electrical Engineering	11	5.14
	Sub Total	98	45.80
	Grand Total	214	100

Research Instrument

A modified survey questionnaire was adopted and utilized from the studies of Alba et al (2010) and Matias (n.d.). The survey questionnaire consisted of two parts. Part I included the demographics of the respondents such as name, sex, year level, college program enrolled in, and their graduated senior high school strand. Meanwhile, Part II included the degree of influence of factors on non-STEM students shifting to STEM-related college programs, including their school influence, work opportunities, financial assistance and scholarships, and personal and socioeconomic status. Furthermore, the researchers used close-ended questions using a five (5)-point Likert-type scale.

To ensure the validity of the modified research questionnaire, it was subjected to validity testing using Carter V. Good and Douglas B. Scates. The instrument obtained the score of 4.79, interpreted as excellent. Thus, the research instrument was considered valid. Moreover, to ensure the reliability of the modified research questionnaire, it was pilot-tested to thirty (30) respondents from the College of Engineering, College of Allied Medical Health Sciences, and College of Accountancy, Business, and Computer Studies. Also, the researchers analyzed the internal consistency of the measurements using Cronbach's Alpha. The instrument obtained the score of 0.773, interpreted as acceptable. Thus, the research instrument was considered reliable.

Data Gathering Procedure

Upon the approval of the gatekeepers, the Deans of the College of Engineering (COE), College of Allied Medical Health Sciences (CAMHS), and College of Accountancy, Business, and Computer Studies (CABACS), the researchers then identified the participants of the study. A two- minute orientation was

conducted to inform the participants of what the study was about before securing their informed consent for voluntary participation. The survey questionnaire was administered to the identified first to fourth-year college students. The survey questionnaires were physical and electronic, conducted face-to-face and virtually, through the help of Google Forms and printed materials. The participants were given enough time to answer through an online survey platform or printed questionnaire. After the participants submitted the accomplished research instrument, the data were analyzed and treated. All raw data were stored and disposed of properly to protect the identity of the participants and to adhere to the proper protocol set by the universal standards in research and the university research guidelines.

Data Analysis Procedure

The study utilized descriptive analysis to determine the influencing factors of students shifting to STEM-related programs in the college years for non-STEM students. Furthermore, comparative analysis was used to determine the significant difference in the factors of students shifting to STEM-related programs in the college years for the non-STEM students when they are grouped according to sex and senior high school strand. In addition, the researchers used Mean and Frequency for descriptive analysis, and the Mann-Whitney U test and the Kruskal Wallis H test for comparative analysis.

Ethical Considerations

This study adheres to integrity, which equates to honesty and transparency. The participants' privacy is guaranteed, as the researchers are held responsible and trustworthy for every step of the data collection procedure. Moreover, this study upholds professional, scientific, and scholarly responsibility by using references from reliable, peer-reviewed sources to ensure the study's trustworthiness. The sources were properly cited to show respect and credit to the legal proprietors of the studies used. The researchers ensured all the participant's rights and dignity during the research process is in accordance with the principle of respect for people's rights, dignity, and diversity. The researchers ensured that the participants completed the informed consent form prior to conducting the study. To protect the identity of the participants, confidentiality was observed during the data collection process, where the researchers used measures to ensure that the data is only accessible by the researchers. The researchers conducted their research professionally and aimed to deliver the best solutions for a single institutional problem while protecting the data subjects' privacy. This procedure, in turn, fulfilled the researchers' social responsibility.

RESULTS AND DISCUSSION

Degree of Influence of Factors on Non-STEM Students Shifting to STEM-Related Programs in College

Table 2 presents the degree of influence of factors on non-STEM students shifting to STEM-related programs in college. The results of the study showed that work opportunities (M=3.90, SD=0.73) is the most dominant factor influencing students' career shift obtaining a high degree of influence. This means that most non-STEM students shifting careers to STEM-related courses consider job security and opportunities as important in their decisions. They have seen a higher possibility of getting hired after graduation if they will take STEM-related courses.

As stated in the study of O'Rourke (2021), the need for qualified workers is still increasing. Compared to other non-STEM positions, employment in STEM-related occupations has escalated more in the United States and other parts of the world. STEM employment vacancies have surged about 24.4% over the past ten years, yet non-STEM job openings have only increased by 4% (Noonan, 2017). This

could be the common response of students since, nowadays, graduates find it difficult to find a job even if they have already finished well-known courses (Pascual, 2014).

In addition, when students choose a major or a career path, they seek higher-salary jobs or look for majors that involve the most job security (Wildman & Torres, 2002). The financial aspects that students consider include high earning potential, benefits, and opportunities for advancement (Beggs et al., 2008). Given the current economy, many students think they need a high-paying job to make it in society. Along with stability during their career, some students may even look ahead to retirement. Students want to ensure they are secure for the rest of their lives and may consider careers that have benefits to help them in the long run (Wildman & Torres, 2002).

In contrast, personal and socioeconomic status (M=3.03, SD=0.93) obtained the lowest degree of influence, interpreted as moderate. Their personal and socioeconomic status least influences their decision to shift careers. This is in contrast with the results of the study by Fatoki (2014), stating that personal factors, socioeconomic factors, and socializers are important determinants of career choice.

Table 2

Degree of Influence of Factors on Non-STEM Students Shifting to STEM-Related Programs in College

Variables	**n**	**Mean**	**SD**	**Interpretation**
Work Opportunities	214	3.90	0.73	High
Financial Assistance and Scholarship	214	3.83	0.81	High
School Influence	214	3.30	0.72	Moderate
Personal and Socioeconomic Status	214	3.03	0.93	Moderate
As a Whole	***214***	***3.52***	***0.80***	***High***

Difference in the Degree of Influence of Factors on Non-STEM Students Shifting to STEM-Related Programs when Grouped According to Sex

Table 3 presents the difference in the degree of influence of factors on non-STEM students shifting to STEM-related programs in terms of school, work opportunities, financial assistance, and personal and socioeconomic status when they are grouped according to sex. Using Mann-Whitney U Test, it was found that there was a significant difference in the degree of influence of school factors on non-STEM students shifting to STEM-related programs in the college years when they are grouped according to sex with the p-value of 0.008*.

Specifically, male respondents obtained a higher degree of influence of school factors than female respondents. This means that male non-STEM students' decision to enroll in STEM-related college programs is more influenced by the school's accessibility, desirableness, and reputation. The university holds a reputable name for its STEM-related programs. That explains why more males are shifting to STEM-related programs in the university.

Sex is a crucial factor among students in their choice of course. Sex distinguishes female students to be inclined to artistic-related careers, while male students select scientific-related careers (Sara, 2010), thus, ascertaining preferred specialties (Hameed et al., 2017). Some researchers argue that differences in students' career choices result from socialization in traditional gender roles (Porter & Umbach, 2006).

Moreover, studies have shown that young men and women have different styles when choosing a career. Men have a more liberal and progressive style of thinking. Women prefer a hierarchical style of thinking (Mihyeon, 2009).

Table 3

Difference in the Degree of Influence of Factors on Non-STEM Students Shifting to STEM-Related Programs when Grouped According to Sex

Variables	Sex	n	Mean Rank	U	z	p
School Factor	Male	100	119.41	4509.000	-2.651	0.008*
	Female	114	97.05			
Work Opportunities	Male	100	107.07	5657.000	-0.096	0.924
	Female	114	107.88			
Financial Assistance	Male	100	103.40	5290.000	-0.912	0.362
	Female	114	111.10			
Personal Socioeconomic Status	Male	100	112.08	5242.000	-1.018	0.309
	Female	114	103.48			

Note: The difference is significant when $p \leq 0.05$

Difference in the Degree of Influence of Factors on Non-STEM Students Shifting to STEM-Related Programs when Grouped According to Strand

Table 4 presents the difference in the degree of influence of factors on non-STEM students shifting to STEM-related programs in terms of school, work opportunities, financial assistance, and

personal and socioeconomic status when they are grouped according to senior high school strand. Utilizing Kruskal Wallis H Test, it was found that there was no significant difference in the degree of influence of factors of non-STEM students shifting to STEM-related programs in the college years when they are grouped according to strand.

This indicates that regardless of the participants' senior high school strand, they experience the same degree of influence of factors that drive them to switch to STEM-related college programs. Additionally, their chosen specialization in their senior high school does not matter in their decision to shift to STEM-related programs. In support, many students studying in upper secondary schools will enter college without considering their strand, specialization, talents, gifts, abilities, and strengths (Angara, 2012).

Table 4

Difference in the Degree of Influence of Factors on Non-STEM Students Shifting to STEM-Related Programs when they are Grouped According to Senior High School Strand

Variables	Strand	n	Mean Rank	$\chi 2$	df	p
School Factor	ABM	64	105.09	3.033	5	0.695
	Arts and Design	1	27.50			
	GAS	29	106.66			
	HUMSS	70	108.01			
	Sports	2	154.00			
	TVL	48	110.22			
Work Opportunities	ABM	64	110.41	3.365	5	0.644
	Arts and Design	1	80.50			
	GAS	29	91.66			
	HUMSS	70	114.44			
	Sports	2	96.50			
	TVL	48	104.10			

Financial Assistance and Scholarships	ABM	64	108.05	4.941	5	0.423
	Arts and Design	1	16.50			
	GAS	29	108.43			
	HUMSS	70	113.28			
	Sports	2	150.25			
	TVL	48	97.90			
Personal and Socioeconomic Status	ABM	64	107.04	3.294	5	0.655
	Arts and Design	1	31.50			
	GAS	29	103.90			
	HUMSS	70	103.39			
	Sports	2	107.25			
	TVL	48	117.89			

Note: ABM- Accountancy, Business and Management, GAS- General Academic Strand, HUMSS- Humanities and Social Sciences, TVL- Technical-Vocational-Livelihood

CONCLUSION

Having identified that work opportunities is the dominating factor influencing the career shift among college students, this study provides a vivid image of why students do not pursue a course aligned with their chosen strand in senior high school. It is likely that students who shift aim to have a job or work opportunity once they graduate. Their shift in their career is reflective of how they perceive themselves in the future.

In cases of shifting programs, it defeats the very purpose of having two additional years of training in senior high school before going to college. Thus, there is a need for a stronger campaign of non-STEM related programs in college, especially in terms of scholarships, to make the students choose the programs aligned with their senior high school strand. Also, teachers' guidance and help are important for students in choosing the right and appropriate track. Understanding the motivations of the career choices of students is highly relevant to the socioeconomic role of the university. In addition, understanding the determinants of career choice will help the university facilitate a career path plan for the students.

Integrating career plans into the curriculum can help students make sound decisions in career selection. Career guidance may be given intensively and implemented through the mandate of the school. Through improved career guidance and counseling and enhanced career seminars, both the incoming senior high school and incoming college students will be enlightened about the advantages and disadvantages of shifting a career and the advantages of properly choosing your strand aligned with your program of choice in college. Thus, all knowledge gained in their senior high school years could be fully utilized to the fullest capacity in their college and professional years.

For future researchers, a correlational study on a career shift and their academic performance in college could be conducted. A qualitative study on the challenges encountered by shiftees could also be conducted. A similar study could also be conducted utilizing other influencing factors that may lead to career shifts among students.

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