Curriculum Exit Choice of Stem Graduates: A Tracer Study

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Abstract. K to 12 Basic Education in the Philippines provides four curriculum exit choices to its graduates namely, higher education, middle-level skills development, employment, and entrepreneurship. The study explored the curriculum exit choices, and the influence of the strand on those choices, and evaluated the preparedness and performance in chosen curriculum exits of Science, Technology, and Engineering (STEM) Strand graduates. The descriptive research design was used in the study. The findings show that the majority pursued higher education courses aligned with their Senior High School (SHS) strands, highlighting the importance of informed decision-making during SHS education. Many graduates demonstrated moderate preparedness, while a notable fraction exhibited high performance in their chosen curriculum exits. Career flexibility was evident with graduates pursuing careers beyond their specific disciplines. The findings of the study necessitate that students carefully consider their academic pathway and specialization in senior high school, prioritize preparedness and strive for excellence in their chosen curriculum exit options and that future researchers conduct longitudinal studies to track STEM graduates' career paths, providing valuable insights for curriculum effectiveness and informing policy decisions in STEM education and career pathways.

Index Terms: K to 12 Curriculum exit, STEM graduates, Senior High School, alignment

I   Introduction

The Philippines has implemented the "K-12" Program, a comprehensive reform of its basic education system, intending to meet global standards in secondary education and emphasize the importance of kindergarten (Masayoshi, 2013). The program spans twelve years of basic education, comprising six years of primary education, four years of Junior High School, and two years of Senior High School (Official Gazette). Its primary objectives are to provide students with ample time to master concepts and skills, foster a lifelong love of learning, and prepare graduates for tertiary education, middle-level skills development, employment, and entrepreneurship.

Within the Senior High School level, the K-12 Program offers two main tracks: the Technical-Vocational-Livelihood (TVL) Track and the Academic Track. The TVL Track consists of four strands, while the Academic Track includes the General Academic Strand (GAS), Humanities and Social Sciences (HUMSS), Accounting, Business, and Management (ABM), and Science, Technology, Engineering, and Mathe-

matics (STEM) strands (Official Gazette). The STEM strand specifically focuses on inquiry-based and research-oriented learning, exposing students to complex mathematical and scientific concepts, fostering problem-solving skills, and providing a strong foundation for future college degrees (Reedley International School, 2022). Graduates of the STEM strand have diverse career prospects in fields such as architecture, engineering, healthcare, and other STEM-related industries (I-STEM Resource Network, 2022).

Upon completing the K-12 program, high school graduates are presented with four distinct curriculum exits: higher education, middle-level skills development, entrepreneurship, and employment. These options aim to provide a diverse range of opportunities that align with the program's overarching objective of enhancing productivity and fostering national growth.

Existing literature on tracer studies in the Philippines has primarily focused on higher education, with limited research available on K-12 graduates. The DepEd's Basic Education Report (BER), as highlighted in Sara Duterte's speech on the state of education, revealed that only a small percentage (slightly over 10%) of senior high school graduates entered the workforce, while the majority (83%) opted for higher education (Chi, 2023).

This indicates a need for further research in the form of K-12 graduate tracer studies to assess the effectiveness of K-12 programs (Ulanday, M. L. P., 2021). In response to the dearth of literature and the importance of tracing K-12 graduates, the researcher has undertaken a study to track the STEM graduates from the batches 2018-2021 of Caibiran National High School, drawing inspiration from various tracer studies. This study aims to determine the career paths pursued by SHS graduates, whether it be employment, college education, entrepreneurship, or middle-level skills development.

II   Methodology

1. Research Design
The descriptive design was used in this study (Creswell, 2018). Such design allows us to describe a phenomenon, occurrence, or event, that happens in the present. Creswell (2018) explained that the purpose of the descriptive method is to find a detailed explanation and description of the object of the research systematically. In this study, the descriptive method was used to describe the chosen curriculum exit, and how strand choice affected the chosen curriculum exit choices of the graduates in terms of their alignment to the STEM strand and their performance of duties in their selected curriculum exit.

Respondents of the Study
The respondents of this study were the Science, Technology, Engineering, and Mathematics (STEM) strand graduates of Caibiran National High School from the years 2018-2021. 180 respondents took part in the study.

Sampling Procedure

Availability sampling was utilized in this study. This sampling technique was employed since not all the STEM strand graduates are in the locale of the study and not all responded to online survey mechanisms.

2. Research Locale

This study was conducted in the municipality of Caibiran, Biliran Province. It is the town where the Caibiran National High School is located, the only school in the municipality offering STEM strand.

3. Research Instrument

The instrument used in the study was adapted from the Senior High School Graduate Tracer Study Survey questionnaire from the Department of Education Region X Memorandum no. 287, s.2018. The researcher made a few modifications to the questionnaire and only included questions that were relevant to the purpose of the study. The questionnaire consisted of two parts: the curriculum exit choices for Senior High School, and how their strand choice affected their chosen curriculum exit. The first part of the questionnaire was the curriculum exit choices for SHS, which were employment, higher education, entrepreneurship, and middle-level skills development for the researchers to determine their chosen curriculum exit. An option for not pursuing any of the four curriculum exits was included to account for the respondents belonging to this classification. Finally, the last part consisted of how their strand choice affected their chosen curriculum exit.

4. Research Procedures

In the collection of data, three phases were followed: 1. Initial preparation, 2. Questionnaire administration, 3. Organizing survey responses.

Phase 1

Initial Preparation. Before the conduct of the study, an approved letter request was secured from the school head. After seeking and being granted approval, a list of participants was requested. Informed consent "agreement" was given to participants in adherence to Data Privacy Act 2012. Also, survey questionnaires were distributed using Google Forms and through face-to-face interviews.

Phase 2

Questionnaire Administration. The survey was conducted online using Google Forms for respondents located outside the municipality of Caibiran. The link to the survey questionnaire was individually sent to the participants through Facebook Messenger and/or personal email. For respondents located within the reach of the research, face-to-face administration of the questionnaire was done.

Phase 3

Organizing Survey Responses. The data that was obtained from survey questionnaires were tabulated, analyzed, treated, and interpreted using the appropriate statistics.

Statistical Treatment

A descriptive method was used in this study to describe the profile of the STEM graduates. Descriptive statistics such as frequency and percentage were used in this study. The researchers used percentages in this study to calculate the percentage of how their strand choice affected their chosen curriculum exit and the curriculum exit choice pursued by the graduates.

III   Results and Discussion

Curriculum exit choices by the respondents were analyzed using frequency distribution and percentage tables. Table 1 shows the distribution of curriculum exit choices adapted by the respondents.

Table 1. Curriculum Exit Choices Pursued After Graduation

Year Graduated	Curriculum Exit Chosen					Total
	Entrepreneur-ship	Employment	Middle-level Skills Development	Higher Education	Did not pursue any of the 4 Curriculum Exits	
2018	1	8	1	25	5	40
2019	1	6	1	42	2	52
2020	0	4	0	44	1	49
2021	0	0	0	38	1	39
Total	2	18	2	149	9	180
%	1.11	10.00	1.11	82.78	5.00	100

Table 1 presents the data collected by the researchers, highlighting the curriculum exit choices of STEM graduates. The results demonstrate a prevalent pattern among STEM graduates, with a strong inclination towards pursuing Higher Education. This finding reinforces the conclusions drawn in a previous study conducted by Awi, E., Calasin, R. C., and de Guzman, R. (2022), which revealed that a majority of Senior High School (SHS) graduates opt for higher education, predominantly enrolling in undergraduate programs in business, engineering, and architecture. Moreover, both Middle-level Skills Development and Entrepreneurship show equal rates of 1.11%. Regarding employability, the current employment rate among the respondents stands at 10%. On the contrary, 5% of the respondents did not choose any of the four curriculum exits.

Table 2: Distribution of College Course Chosen by STEM Graduates

College Course Chosen	Year Graduated				Total	%
	2018	2019	2020	2021		
STEM Related Courses	16	27	30	30	103	69.1%
Non-STEM Related Courses	9	15	14	8	46	30.9%

Based on the information presented in the tables above, it can be observed that students 69.1% of the respondents who opted for higher education choose college courses that are aligned with the STEM strand which manifests a significantly high percentage of graduates choosing college courses related to their taken SHS strand. This

finding is consistent with the outcomes of a tracer study conducted by Padios et al. (2021) on SHS graduates from Aurora State College of Technology (ASCOT) which revealed a notable proportion of SHS graduates enrolling in college programs that align with their SHS strands. This suggests that students are making well-informed decisions by considering their chosen academic pathway and specialization during their SHS education. In contrast, a mere 30.9% of the respondents opted for college courses that are unrelated to STEM fields.

Table 3: Distribution of Employed STEM Graduates

Indus-try/Workplace	Year Graduated								Total	%
	2018		2019		2020		2021			
	Government	Private	Government	Private	Government	Private	Government	Private		
STEM Related	0	0	0	1	0	0	0	0	1	5.26%
Non-STEM Related	0	8	0	6	0	4	0	0	18	94.74%

Table 3 presents the employment status of graduates from Caibiran National High School after completing Senior High School (SHS). Surprisingly, the findings reveal that 94.74% of STEM graduates who entered the workforce did not pursue careers aligned with their chosen strand, indicating graduates' ability to pursue employment opportunities beyond their specific academic disciplines, showcasing a notable level of career flexibility. Furthermore, only a few opted for employment in STEM-related fields. These results mirror the findings of Balasbas (2021), which highlighted that some students prioritized immediate employment (trabaho) rather than pursuing higher education (kolehiyo), despite the majority of the Senior High School graduates focusing on furthering their studies. Additionally, it can also be noted from the results that most of the graduates are employed in the private sector than in government offices, which suggests that private companies value the skills and qualifications possessed by the graduates, making them attractive candidates for employment.

Table 4: Effects of Strand Choice on the Curriculum Exit Choice STEM Graduates

Effects	Year Graduated				Total	%
	2018	2019	2020	2021		
Slightly equipped in my curriculum exit	9	20	21	8	58	33.92
Are well-equipped or have sufficient abilities in my curriculum exit	19	11	13	11	54	31.58
Highly performing in my curriculum exit	10	10	14	11	45	26.32
Not well-equipped or do not have sufficient abilities in my curriculum exit	0	7	2	4	13	7.6
Low performance in my curriculum exit	0	0	0	1	1	0.58

The table presented above provides insights into the impact of the graduates' strand choice on their chosen curriculum exit. About 33.92% of the respondents who pur-

sued higher education, employment, middle-level skills development, and entrepreneurship demonstrate a slight level of preparedness. This suggests that they do not possess sufficient proficiency or readiness in the specific area they have chosen to pursue. This finding aligns with the research conducted by Paat (2020), which reveals that a significant number of K-12 graduates are unprepared for college. However, it is noteworthy that 31.58% of the students demonstrate adequate skills and abilities in their chosen curriculum exit, and 26.32% of the respondents highly perform in their curriculum exit choice.

IV   Conclusions and Recommendations

The findings of this study posed several noteworthy conclusions. First, STEM graduates from Caibiran National High School possess a strong awareness of the significance of pursuing higher education. These graduates perceive college as a means to further enhance the skills and abilities they acquired during their senior high school education (Padios et al., 2021). This indicates a positive mindset toward pursuing higher education among these graduates. Second, students considered their chosen academic pathway and specialization, aligning their choices with their future goals. This finding aligns with the research conducted by Domanais and Quiapon (2022), which observed that a majority of STEM graduates opt for higher education in fields closely related to their chosen academic strand. This decision-making process demonstrates a level of maturity and foresight among the graduates. Furthermore, the results reveal a notable degree of career adaptability among STEM graduates, as they pursue employment opportunities beyond their specific fields of study. This adaptability suggests that these graduates possess transferable skills and possess a willingness to explore diverse career paths. It is important to note that although a significant number of graduates may not exhibit a high level of proficiency or readiness in their chosen fields, a considerable portion demonstrates commendable performance in their chosen curriculum exit choice, thereby showcasing their competence and capability in their respective domains. These outcomes are consistent with the study of Awi et al. (2022), highlighting that STEM graduates possess the necessary skills required by the industries they are presently employed or have acquired and developed the requisite skills during their employment.

Based on the aforementioned conclusions, several recommendations can be put forth. First, it is advised that students give careful consideration to their academic pathway and specialization during their senior high school education. Making informed choices in these areas will set a solid foundation for their future educational and career endeavors. Second, students should prioritize preparedness and strive for excellence in their chosen curriculum exit options. While a significant percentage of respondents demonstrated a moderate level of preparedness, it is crucial to aim for high performance. It is essential to actively work on developing skills, acquiring knowledge, and enhancing competence in the selected field of study. Students should actively seek out additional learning opportunities, engage in practical experiences, and make use of available resources to improve their preparedness and increase their likelihood of success. Furthermore, it is recommended that future researchers conduct longitudinal studies to track the career paths and achievements of STEM graduates over time. Such studies will provide valuable insights into the effectiveness of the curriculum and shed light on the long-term outcomes of STEM education. Additionally, these research efforts will help identify areas for improvement and inform future policy decisions about STEM education and career pathways.

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