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Learning Challenges and Opportunities as Perceived by Non-STEM Students Enrolled in the BS Biology Program of a Higher Education Institution in Batangas, Philippines

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***Abstract*—** *Choosing the right kind of basic and higher education can definitely help Filipino students prepare well for their target careers in the future. However, the release of Commission on Higher Education (CHED) Memorandum number 105 in 2017 was a game-changer: it now allowed all graduates of the newly adopted senior high school (SHS) program in the Philippines, regardless of the strand, to enrol in any college program of choice. This research study aimed to look into the learning challenges and opportunities experienced by non-STEM SHS graduates who enrolled in the Bachelor of Science (BS) in Biology program of De La Salle Lipa. This is a qualitative type of research study. Data were acquired through a focus group discussion (FGD), and were analysed using the IBM SPSS Text Analysis Software. The Education and Career/Life Planning Framework served as the theoretical framework. Based on the themes generated and recommended by the software, results of the study showed that the challenges perceived by the non-STEM students now enrolled in the BS Biology program centered on the following: encountering scientific terms already familiar to their classmates who are STEM graduates; understanding scientific concepts and principles that connect to previously learned concepts in the senior high school; complying with academic requirements that need application of scientific concepts which they find difficult to understand in the first place; performing laboratory experiments that require application of theories and principles; and adjusting to the expectations of teachers who assume that all BS Biology students are STEM graduates. On the other hand, perceived opportunities include application of learning from non-STEM courses in the senior high school to both major and minor subjects in the BS Biology program; appreciation of everyday life experiences viewed through a scientific lens; recognition of connections between science and disciplines related to their strand in the senior high school such as the importance of effective communication both in the fields of science and technology; and enhancement of one's curiosity, open-mindedness and critical thinking. In response to these student perceptions, an action plan was devised to incorporate these challenges and opportunities in the possible intervention activities or project the Biology Department and Science Area can conduct to assist the non-STEM students to easily adapt to the demands of their BS Biology program.*

***Keywords*—** *Biology: BS Biology program: De La Salle Lipa: learning challenges and opportunities: STEM.*

I. INTRODUCTION

The implementation of the senior high school program in the Philippines starting school year 2016 is basically viewed to serve two important purposes: to make the Philippine educational system at par with global standards, being the only country in Asia and one of the last three in the world still with a 10-year basic education curriculum [1]; and to provide students with a decongested, learner-centered and enriched curriculum responsive to the needs of 21st century learners [2]. The Senior High School Program in the Philippines is structured into various tracks and strands to give students ample mastery of content and performance, and to help them acquire the 21st century skills to better prepare them to join the workforce or move on to college. For one, the academic track is divided into four major strands: the Science, Technology, Engineering and Mathematics (STEM) strand; Accountancy, Business and Management (ABM) strand; Humanities and Social Sciences (HUMSS) strand and General Academics (GAS) strand. There are also tracks for Technical-vocational-livelihood (TVL), Sports and Arts and Design. Specifically, SHS students enrolled in the academic track are expected to be the ones who will continue to higher education and the strand of their choice is assumed to be aligned with the course they take in college – for one, STEM students are expected to take science, engineering or allied health courses; while ABM students are into business and accountancy courses [3].

This aforementioned SHS policy was actually overridden when the then-commissioner of CHED Patricia Licuanan released CHED Memorandum Order no. 105 which mandated the admission of all SHS graduates to any college course without taking into consideration the nature of the track or strand they finished. CHED has reiterated that no Grade 12 student or graduate "shall be denied acceptance" in taking a college entrance exam in a college or university of choice anywhere in the country. This memorandum was released to provide guidance to HEIs in the admission of SHS graduates to their higher education programs effective Academic Year (AY) 2018-2019 [4].

For this school year, De La Salle Lipa (DLSL) welcomed more than a thousand freshmen college students enrolled in various programs being offered in its five existing colleges. As expected, there are a number of students enrolled in courses that are not aligned with their completed SHS strand. The BS Biology program under the College of Education, Arts and

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Sciences (CEAS) is an example. Technically, the BS Biology program should only expect SHS STEM graduates, since the said strand is the only one from the academic track which offers both lecture and laboratory classes for such foundation courses leading to college science courses as Biology. However, in the case of DLSL, there are students currently enrolled in BS Biology who come from ABM, HUMSS and even the GAS strands. Hence, this study explored on the learning experiences of non-STEM students under the BS Biology program, highlighting their perceptions on both the challenges and opportunities of being non-science majors in the SHS and now science-inclined students in college.

This study proved to be important to a number of people and agencies. As an institution that caters to both relevant and quality education, the results of this study may help De La Salle Lipa set better programs or policies to ensure that students get the best learning experience in their respective courses in lieu of the SHS strand they have completed. Second, as one of the colleges with the most diverse course offerings; the College of Education, Arts and Sciences of DLSL can benefit from the results of this study by devising strategies to help students under its care whose current college program is not aligned with what they have finished in the SHS. Third, the results of the study can help the administrator and the faculty members of the Biology department plan better for the delivery of course-related subjects considering both the levels of knowledge of the STEM and non-STEM students especially in more specific and complex science courses innate to the Biology program. Lastly, the non-STEM BS Biology students can directly benefit from the action plan to be devised in relation to the learning challenges and opportunities they have identified, which is assumed to assist non-STEM students to acquire better learning under the BS Biology program.

The study aimed to enumerate the challenges and opportunities experienced by the SHS non-STEM students currently enrolled in the BS Biology program of De La Salle Lipa. It sought to answer the following specific questions:

1.) What were some of the challenges experienced by these students under the BS Biology program?
2.) What were some of the opportunities they identified in shifting from a non-science strand in the SHS to a science-based course in college?
3.) Based on the challenges and opportunities identified, what suggestions can be made to make learning more responsive and valuable for non-STEM students in the said program for the succeeding school years?

This study was confined to the responses of six male or female freshmen non-STEM students currently enrolled in the BS Biology program of DLSL. They may be graduates of either the SHS department of DLSL or any other SHS in the Philippines.

Throughout the course of this study, the following responses were obtained from them: their perceived challenges of being non-STEM students enrolled in a science course for this school year, and the opportunities they see from being so.

This research study was limited to the assessment of the perceived challenges and opportunities only of BS Biology students who have not directly aligned their SHS education with their current college course. Although there might be some other students who are in the same situation in a different course offering in DLSL, they are no longer included as participants of the study. Likewise, this study bears no control on the willingness of the target respondents to take part in the study. They may or may not accept the invitation to participate in the target focus group discussions to gather data.

Some studies already prove the significance of alignment between education and possible career in the future. For one, Kamovich and Foss have reiterated the need for effective alignment between the teaching methods employed in schools and the actual scenarios in a very diverse and highly complex discipline as entrepreneurship [5]. They contend that alignment presupposes that three instructional components—intended objectives, instructional processes, and evaluation criteria—must be congruent in order for instruction to be effective. Next, a study by Aksoy explored on the relationship between education and employment. The findings of his study suggested the importance of alignment between the kind of education offered to students and the careers they plan to have in the future: that teachers must consider education as a way to prepare students to the 'real life' outside of the confines of the classroom; and that teachers must ensure that their students graduate and apply what they learned in school in their respective fields of work [6]. Lastly, a study by Cotner, Thompson and Wright identified differences between Biology majors and non-STEM majors as far as learning is concerned. According to them, non–STEM majors are not unilaterally science averse; non–STEM majors are more likely than biology majors to possess misconceptions about science despite the fact that they basically know how science works; non–STEM majors view the personal relevance of science less likely than biology majors; and the population of non–STEM majors are considered to be more diverse in terms of incoming knowledge, perceptions, backgrounds, and skills as compared with the biology majors. Towards the end, they recommended that science educators must consider these differences in terms of designing curricula for both groups of students [7]. Additionally, in a study by Reed and Lyford, they were able to devise a survey system through an integrated freshmen-level science course that allowed students to assess their current attitudes towards science and their corresponding course expectations. The survey results showed a considerable increase in the interest and comfort of non-science majors in science classes even after taking the course, and a decrease in their grade expectation for the said course. The authors concluded that while it is a given fact that a science course can be content-rigorous for non-science majors, teachers can find for ways to help these students connect and apply their learning in a science course to real life [8]. Warner concluded by evaluating the effects of a supplementary instruction (SI) program for female students participating in a postsecondary biology course intended for non-majors. She was able to find out that the SI program positively affected not only the grades of the women who participated regularly. It also increased their comfort in taking up the course, which in turn enhanced their competence and confidence in biology. The SI program

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helped improve their interest in the biology course, and provided them with increased recognition for their abilities in science [9].

This study was anchored on the Education and Career/Life Planning Framework devised by Ontario Public Service for Creating Pathways to Success, a program for education and career or life planning among schools in Ontario Canada from Kindergarten up to Grade 12 [10].

Fig. 1. Education and Career/Life Planning Framework.

The diagram above demonstrates that this framework is an inquiry-based conceptual framework intended to help schools establish effective education and career or life planning for students. The framework comprises an inquiry process based on four questions that are connected with the four areas of learning in education and career/life planning - *Knowing Yourself; Exploring Opportunities; Making Decisions and Setting Goals; and Achieving Goals and Making Transitions.* The framework is considered on-going and cyclical, with students constantly asking the same four questions at any point in their educational journey to increase their knowledge about themselves, the opportunities surrounding them and the ways by which they can better shape their future. Likewise, the framework is intended for use by educators, who must be encouraged to refer to the concepts of the framework in developing learning activities for their students and in communicating with them.

In an input-process-output structure, the operational framework of the study is illustrated below:

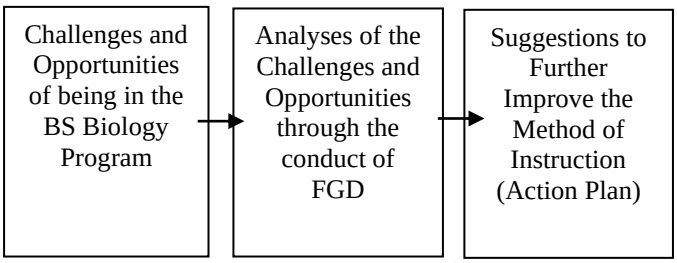

Fig. 2. The Operational Framework of the Study.

As seen in the diagram, inputs came in the form of the shared experiences by the non-STEM students enrolled in the BS Biology program, focusing on the challenges and opportunities of being enrolled in the said program. Analyses of such challenges and opportunities were made, with statements acquired through the conduct of a focus group discussion (FGD). Based on the challenges and opportunities identified, a written action plan suggesting possible interventions the Biology Department and Science Area can conduct to assist these students in adapting to the demands of the BS Biology program was accomplished.

II. METHODOLOGY

A. Research Design

The study is a qualitative type of research. This is a type of research defined by Wyse as exploratory in nature and "is used to gain an understanding of underlying reasons, opinions, and motivations" [11]. It provides insights and an in-depth exploration into the setting of a problem. Qualitative research serves the purpose of generating ideas and hypotheses which can further be used in the conduct of quantitative research.

B. Participants of the Study

The participants of this study were male or female freshmen BS Biology students who were able to take up and complete a non-STEM track or strand and to graduate from the senior high school during AY 2017-2018. They may either be graduates of DLSL or any other senior high school in the Philippines.

C. Data Gathering Procedures and Ethical Considerations

The research study basically explored on the learning challenges and opportunities perceived by students currently taking up the BS Biology program, but were not STEM graduates in the SHS. Data were acquired through the conduct of an FGD among the students.

The researcher asked colleagues to act as moderator or facilitator (male faculty members) and recorder (female academic staff) of the FGD. They were oriented about the steps of conducting an FGD, and were instructed to use a moderator's guide that contained the questions for the FGD. They were likewise provided with the Powerpoint presentation containing the necessary questions to elicit the responses of the participants regarding their perceived challenges and opportunities of being enrolled in the program. The FGD was accomplished at the CEAS Conference Room located at the 6th floor of the Mabini Building, where there is proper ventilation and multimedia equipment were readily available.

On the day of the FGD, the moderator welcomed the participants and briefed them about the process of this academic exchange. He reiterated among the participants that they would speak one at a time and there would be no right or wrong answers. He also informed the students that although the discussions would be recorded, confidentiality would be upheld and their identities would remain anonymous. The moderator effectively managed the FGD by maintaining focus, giving equal chances for all participants to express their opinions, ensuring that the target questions were answered and making double checks with the recorder if she was able to capture the responses through both audio-recording and note-taking. The session ended with a closing statement of gratitude from the moderator. Computerized transcriptions of the students' responses were accomplished by the recorder in MS Excel format. Data were then analyzed using a software (*IBM SPSS Text Analytics Software*) made available for use by the Office of Research and Publications of De La Salle Lipa.

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In the course of conducting this study, the ethical principles of providing informed consent and upholding confidentiality were observed. Before the conduct of the FGD, the participants were provided an informed consent form stating the purpose of the research study, the approximate time of the conduct of the FGD and the participants' rights. The form likewise stressed that confidentiality would be upheld throughout the course of the study as their identities would be kept anonymous and their responses would solely be used to assess their perceptions on the challenges and opportunities of being enrolled in the BS Biology program. They were informed that audio or video-recording of what transpired in the FGD session would only push through if all participants agreed that such be made. The participants were likewise informed that at any point of the data gathering process, they have the full right to withdraw from the study should they wish to do so.

III. Results and Discussion

The use of the IBM SPSS Text Analytics Software facilitated the interpretation of the transcribed word-for-word responses by identifying the frequencies of similar words from various statements, and building categories or themes from such. With the transcription of responses prepared in Microsoft Excel format and loaded into the software, text analyses of responses for the two major questions of the FGD (about the challenges and opportunities experienced by the non-STEM students in being enrolled in the BS Biology program) were accomplished. The first phase in the use of the software entailed the extraction of common words from the responses. The software provided the researcher with a summary of the words which were similar or related to each other based on the participants' responses. After extraction, an option of building categories is made available by the software. Doing so provided the researcher with suggested themes or categories which reflect all statements from the participants that stem from each category. In the final analysis, the software can only go as far as recommending themes – it has still been the task of the researcher to scrutinize relevant categories, and to analyze from the suggested themes which were best to include in the discussions with reference to existing literature.

On the one hand, the learning challenges focused on the numerous scientific terms and difficult concepts to learn; the corresponding academic requirements of their science courses; and the expectations of their teachers. On the other hand, opportunities determined by the students include increased appreciation of life after being immersed in biology and other science subjects; application and integration of learning in science to other relevant disciplines; and enhanced thinking skills not only as students but more so as individuals.

As regards the challenges experienced, a number of participants have identified learning new and confusing scientific terms as a challenge of being immersed in a number of science subjects for the BS Biology program. Student 1 recounted, *"during our discussion in science subjects, we usually encountered new words and concepts which are complicated."* Student 2 agreed by saying, *"There are a lot of confusing words which we only encounter in this subject, and to which our classmates who are STEM graduates are already familiar with."* Student 6 also highlighted *"understanding and memorizing scientific names, terms and procedures"* as the challenge she usually experienced as a biology student. All of these statements still affirm a previous study by Wandersee which cited findings of previous authors that one of the crises of science education is mastering terms, words and definitions; and that biology, compared with other scientific disciplines such as chemistry and physics, require more vocabulary knowledge and reading ability [12]. Their sentiments also agree with that of May, Cook and May who said that biology courses require students to learn over thousands of words for them to discuss concepts and principles with ease, and to ace their exams in the subject. They called this skill biological fluency which, according to them, can be attained by students through practical and constructivist teaching methods [13]. In relation to this, the participants have likewise identified it a challenge to learn concepts in their current science subjects which find basis on subjects in the senior high school exclusively taken up by STEM students. For one, student 2 said, *"my STEM classmates were always to an advantage in terms of science subjects, as far as concepts and terms are concerned."* This holds true according to Cotner, Thompson and Wright who found that indeed, non–STEM majors are more likely than biology (STEM) majors to hold misconceptions about the nature of science. They are likewise considered more diverse in terms of incoming knowledge, perceptions, backgrounds, and skills in science as compared with their STEM counterparts [14].

Next, the participants have likewise identified the various requirements of their program as challenges. More specifically, a number of them have expressed difficulties in performing laboratory experiments. Student 1 recounted, *"this is my first time [in years] to perform laboratory experiments and to encounter a number of unfamiliar apparatus,"* which was agreed upon by Student 3, who found it *"difficult to do the laboratory activities because of the materials and equipment to use."* Student 4 likewise said, *"We also had a hard time in making the laboratory reports. Subjects with laboratory tend to be more difficult."* Croker, et al. have reported that laboratory classes are important, since lab-based learning provides students with first-hand application of bioscience principles [15]. If that is the case, then the participants are really expected to find it equally a challenge to perform laboratory experiments if they already experience difficulty in the terms and concepts being discussed in class.

Lastly, the participants have identified teacher expectation as another challenge that non-STEM students like them face. It is for the reason that according to them, their science teachers will always assume that like the STEM graduate-majority in their class, they are already knowledgeable of the topics being discussed by virtue of their educational background in the senior high school. Student 3 narrated, *"I also consider our professors a challenge, since they are expecting that we all have a good background in the science subjects,"* which have been agreed upon by almost all of the other participants. This sentiment seems to agree with a

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finding by Jordan, DiCicco and Sabella in their study on the expectations of beginning STEM teachers among their students, who usually view their students through the lenses of their previous educational experiences which are science-based [16].

On a lighter side of things, the participants of this study have also identified a number of opportunities that opened for them after shifting to STEM in college despite a non-STEM background in the senior high school. For one, the participants have recognized that they have increased appreciation of life after being immersed in more biology subjects in college. For one, Student 1 said, *"I love studying about life, and being a BS Biology student increased my appreciation of life in general."* Student 5 agreed when she said, *"The biology program has given me the chance to learn about and investigate more living species"* These statements coincide with the concept of functional scientific literacy, defined by Zeidler and Sadler as acquiring proper understanding of science and appreciating its relevance to daily life [17]. Fowler has said that with regard to biology, a scientifically literate person needs to have a basic understanding of biological principles and processes in order to make sense of myriad instances when they come in contact with them in day-to-day life [18].

The next opportunity identified by the participants in being enrolled in the BS Biology program is applying and integrating the learning and skills they have acquired from their non-STEM program in the senior high school to either major or minor subjects now in college. The participants expressed that they find the skills they have learned in senior high school still useful today. For one, Student 4 said, *"by being in this program, I still get to use my communication skills for both oral [reports] and written [laboratory] requirements. As a HUMSS [humanities and social sciences] graduate in the senior high school, my creativity skills are likewise very useful in the various requirements we have to submit both in major [science] and minor [non-science] subjects."* Similarly, Milkova, Crossman, Wiles and Allen also recognized the relevance of creative skills in biology courses when they assessed the impact of art analysis as a way to increase engagement and skills development among biology students. According to them, such an activity was made with the goal of broadening the ways in which college students meaningfully engage with course content and concepts, and developing aspects of students' higher-level thinking skills [19]. Also, Segarra, et al. recognized that both visual and performing arts are beneficial in training well-rounded and creative scientists [20].

Lastly, the non-STEM students have identified enhanced thinking skills as opportunities brought forth by being enrolled in the biology program. Specifically, student 3 identified *"increased curiosity, open mindedness and critical thinking"* as consequences of being immersed in the biology program. This is seconded by student 1 who said, *"I am always curious, and I am confident of getting answers because of science."* Biology is indeed a discipline that addresses curiosity and inquisitiveness. Le has specifically stated that biology is best taught with questions. According to him, students have usually shown themselves to be very curious about how the science of life applies to their lives: "the curious mind wants to connect the biological dots, talk about what is possible and figure out how to use that knowledge to build a better future. By doing so, students can reach a higher level of critical thinking based on Bloom's Taxonomy for learning" [21]. In a follow-up study, Chamany, Allan, and Tanner discovered that incorporating people, history, and context into college biology instruction makes biology lessons more meaningful for students. Specifically, incorporating the history of biology into the lessons has been found to enhance the critical thinking of the students by providing them with avenues to express their current misconceptions, to take risks and to ask questions [22].

TABLE I. Proposed Action Plan to Assist Non-STEM Students Enrolled in the BS Biology Program.

Goals / Objectives	♣ to develop an orientation course that non-STEM students enrolled in the BS Biology program will be required to take ♣ to mobilize the Biology Society (BioSoc) in providing assistance to non-STEM students enrolled in the BS Biology program
Activities / Strategies	*Revisit all the science courses that the STEM strand in the senior high school offers based on the standards of the Department of Education *Compare the current subject offerings of the BS Biology program as prescribed by the Commission on Higher Education * Identify the gaps between the two, which could become the focus areas of the orientation course to be developed *Design the orientation course in such a way that it exists prior to or parallel the required subject offerings of the biology program for every term *Coordinate with the Language and Literature Area of the institution to benchmark on their previous conduct of an almost similar course for English (English Plus for those who failed in the English test during the entrance exam) * Encourage the officers and senior members of the BioSoc (the professional organization of biology students in De La Salle Lipa) to propose projects or activities aimed at assisting non-STEM students to effectively cope with the demands of the BS Biology program *Suggest such activities as peer tutoring to help non-STEM students
Persons Involved	Dean Program Chair for Biology Learning Area Chair for Science Faculty Members of the Biology Department and the Science Area BioSoc Officers BioSoc Members
Resources Needed	Copies of the DepEd curriculum guides for the various STEM science subjects Copy of the prospectus for the revised BS Biology program Previous learning resources and materials used by senior Biology students or classmates from the STEM strand in the senior high school
Time Frame	May to July 2019 Aug to Dec 2019
Success Indicators	Offering a science orientation course to non-STEM enrollees of the BS Biology program starting SY 2019-2020 the Biology Society spearheading an assistance program for non-STEM BS Biology students starting the first semester of the next school year

In relation to the results of this study as presented and detailed on the previous sections, an action plan or proposal

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with recommendations on how to assist non-STEM students enrolled in the BS Biology program is formulated and presented on the previous page. Specifically, it puts forward the suggestion of developing a science orientation course for incoming biology college freshmen who do not have a STEM background in the senior high school; and utilizing the talents and skills of the officers and members of the Biology Society in assisting these non-STEM students adopt to the demands of the college course they have chosen. These suggestions are made based on the proposal by Cotner, Thompson and Wright that science educators must consider differences when designing curricula for students [14]; and by Reed and Lyford who said that teachers must find for ways to help non-science majors think about and interact with science in their lives outside of science courses [8]. More explicitly, the suggestion for an orientation course is based on the previously discussed assessment of supplementary instruction for biology among non-science majors by Warner, found to increase not only their academic skills in the course but also their comfort and interest in the subject and their confidence in their abilities [9].

IV. Conclusion and Recommendations

Fred Ende once said, "Relevance is the key that unlocks the door to learning" [23]. Indeed, education becomes more valuable for a student if the kind of education he acquires is consistent, relevant and comprehensive. If that is so, then education thus becomes an avenue for him to prepare himself better for the world of work or to aspire for even higher learning.

This research study explored on the experiences of non-STEM graduates in the senior high school as they enroll in college under the BS Biology program which is STEM in nature. Learning challenges and opportunities were focused in their sharing of experiences in the light of their abrupt shift in education. On the one hand, the learning challenges of the participants focused on encountering difficult terms and concepts; complying with equally difficult requirements which include laboratory performance and written reports; and putting up with teacher expectation and preconception that they are STEM graduates. On the other hand, opportunities include better appreciation of life and its various processes; application and integration of learning from science to other subjects, and vice-versa; and enhancement of one's curiosity, open-mindedness and critical thinking.

Based on the results of the study, it is thus recommended that actions be taken to ensure that non-STEM students enrolled in the BS Biology program be given proper care and attention to help them cope with the demands of their chosen field in college which is technically not aligned with their most recent educational background in the senior high school. The action plan devised in this study – focusing on developing an orientation course and utilizing the student organization for biology students for assistance – may be taken into consideration.

Lastly, with regard to future similar studies, the following recommendations are made: to conduct a similar study exploring on the experiences of students from other programs (engineering, allied health, business, hospitality and liberal arts, among others) who also decided to make a shift of program from senior high school; to establish the challenges and opportunities of non-STEM biology majors by means of quantitative data; and to explore on variables other than challenges and opportunities in assessing the experiences of non-STEM students in a STEM college program as biology. ♦

Appendix

Clustered Themes and Students' Responses during the Focus Group Discussions

LEARNING CHALLENGES

TERMS
St. 1 "during our discussion in science subjects, we usually encountered new words and concepts which are complicated"
St. 2 "There are a lot of confusing words which we only encounter in this subject, and to which our classmates who are STEM graduates are already familiar with."
St. 4 "It was truly difficult for me because of the new terms that I encountered."
St. 5 "Similar to others, the new words and terms which our professors used and laboratory activity became a challenge to me."
St. 6 "understanding and memorizing scientific names, terms and procedures"

CONCEPTS
St. 1 "during our discussion in science subjects, we usually encountered new words and concepts which are complicated"
St. 2 "my STEM classmates were always to an advantage in terms of science subjects, as far as concepts and terms are concerned."
St. 6 "Most difficult part in Biology is reading, memorizing, and understanding concepts."

REQUIREMENTS
St. 1 "this is my first time [in years] to perform laboratory experiments and to encounter a number of unfamiliar apparatus"
St. 3 "It was difficult to do the laboratory activities because of the materials and equipment we use."
St. 4 "We also had a hard time in making the laboratory reports. Subjects with laboratory tend to be more difficult."
St. 5 "[The] laboratory activities became a challenge to me."

TEACHER EXPECTATION
St. 2 "Teachers think that we all come from STEM in senior high school, so we are assumed to be advanced in terms of science subjects."
St. 3 "I also consider our professors a challenge, since they are expecting that we all have a good background in the science subjects."

LEARNING OPPORTUNITIES

APPRECIATION OF LIFE
St. 1 "I love studying about life, and being a BS Biology student increased my appreciation of life in general."
St. 1 "Having the knowledge to understand and knowing the importance of every living thing in our ecosystem make me aware of what is happening around us."
St. 2 "I enjoyed much of the study about animals and plants. It opened my mind to the origin of life."
St. 3 "Biology has increased my interest about animals and plants, and has made me very much amazed about the environment."
St. 4 "The course is interesting because one gets to study the different forms of living organisms."
St. 5 "The biology program has become an opportunity for me to discover and explore more species of life."
St. 5 " I will be able to discover things about life."

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APPLICATION AND INTEGRATION OF LEARNING
St. 1 "I love studying [about] life and it will help to apply my learning in our daily life."
St. 2 "And I loved science subjects since high school. I'm using the science skills I learned in my major subjects."
St. 4 "by being in this program, I still get to use my communication skills for both oral [reports] and written [laboratory] requirements. As a HUMSS [humanities and social sciences] graduate in the senior high school, my creativity skills are likewise very useful in the various requirements we have to submit both in major [science] and minor [non-science] subjects."

ENHANCED THINKING SKILLS
St. 1 "I am always curious, and I am confident of getting answers because of science."
St. 1 "Having the knowledge to understand and knowing the importance of every living thing in our ecosystem make me aware of what is happening around us."
St. 3 "increased curiosity, open mindedness and critical thinking"
St. 6 "Deeper understanding of all Biology major subjects and their related fields, like Chemistry and Physics.

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