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Process Skills and Attitudes of Grade Eleven Stem Students Toward Biology at Victoria National High School: A Descriptive Study

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Abstract:- This study focused on determining the level of science process skills and attitudes toward biology of 11th grade STEM students. From the 55 respondents, 56 percent or most of the students are normally in the age bracket for 11th grade which is 16 years old. Twenty-nine (29) respondents or 53 percent of the total respondents are female while twenty-six (26) respondents or 47 percent of the total respondents are male.

The overall mean for science process skills is 11.67, which is 65.05 percent, implying that the level of students' knowledge of science process skills is poor. Also, students scored higher in basic process skills (40.38%) than in integrated process skills (22%). Female students obtained higher scores than males and are less dispersed than males based on the descriptive statistics used. The overall mean on Students' Attitudes toward Biology is 3.15 which on the used scale, corresponded to "Agree" implying a good level of students' attitudes towards biology. Male and female students have almost the same means indicating that both groups show positive attitudes toward biology.

In the light of the aforementioned findings, the following conclusions are drawn:

11th grade STEM students of Victoria National High School have less experience in controlling variables, experimenting and interpreting data. This finding may be due to traditional used of teaching method by the teachers. The findings in the level of attitudes of 11th grade STEM students toward biology are generally good. This means that they show no problem with the teaching and learning process. This study suggests that teachers should practice more on doing science process skills especially in integrated process skills so that they can teach it effectively with their students.

Keywords:- *Science Process Skills; Conventional Teaching; Attitude Towards Science; Higher Order Thinking Skills.*

I. INTRODUCTION

The shift in the K-12 curricular program is still an issue in today's educational system. One of the science curriculum's key goals is to generate globally competent individuals who are environmentally, scientifically, and technologically aware. Its emphasis is also on developing scientific breakthroughs that are fundamentally useful to the requirements of people in society, as well as on employing basic science process skills as a basis for understanding scientific concepts and further exploring the natural and physical environment. One of the goals of the Philippine science education framework in the twenty-first century is to develop science process skills. A primary focus is to develop self-assured life-long learners with the knowledge, skills, and attitude to prosper in complex society (Science Education Institute-Department of Science and Technology, 2011). The goal of science education is to teach students how to use science process skills such as observing phenomena, identifying a problem, creating a hypothesis, experimenting, evaluating data, concluding or generalizing theory, and applying previously learned information and abilities.

Based on the conceptual framework of the K–12 science curriculum, one of the goals of science education is to develop highly scientifically literate learners who will be challenged to be informed and cooperative citizens capable of making decisions about the application of scientific knowledge that may influence social, health, and environmental outcomes. It also incorporates science and technology into everyday human affairs. It is organized around three learning science domains: comprehending and applying scientific knowledge, executing scientific processes and skills, and developing and expressing scientific attitudes and values.

Biology's progress as a science has been so rapid in recent decades that gaps have formed, generating serious challenges and concerns not just at the elementary and tertiary levels of biology education, but also at the secondary level. The goal of secondary biology education is to provide students with fundamental concepts and to educate them to appreciate scientific breakthroughs. Along with the obvious deficiencies in biology education, there is a lack of comprehension among young, resulting in a reduction in the number of high school graduates pursuing natural and applied sciences. Agriculture, fishing, and forestry, among other biology-based fields, play an important part in the development of human society. In response to the ongoing need for experts in this subject, it is critical to address the gaps, challenges, and concerns in secondary biology education in order to produce high school graduates who are well-prepared and mature enough to pursue tertiary biology education, whether basic or applied (Raymundo, 2008).

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One of the goals of the Philippine science education framework in the twenty-first century is to develop science process skills. A primary focus is to develop self-assured life-long learners with the knowledge, skills, and attitude to prosper in complex society (Science Education Institute-Department of Science and Technology, 2011). The goal of science education is to teach students how to use science process skills such as observing phenomena, identifying a problem, creating a hypothesis, experimenting, evaluating data, concluding or generalizing theory, and applying previously learned information and abilities (Aktamis and Ergin, 2008).

Olufunminiyi and Afolabi (2010) suggests that SPS allow students to be explored to creativity, problem solving, reflective thinking, originality, and invention, all of which are critical ingredients for any nation's advancement of science and technology. In addition, Harlen (1999) emphasized the significance of measuring science process skills, arguing that they should be implemented and employed in the context of science. While science process skills can be assessed as a means of understanding and mastering science, they are also a major goal of science education because those skills are required not only by scientists, but by every citizen in order to become a scientifically literate person capable of functioning in a society where science plays a major role and has an impact on everyone's personal, social, and global life. People are required to use and apply them in many facets of their daily lives. Science education must involve students in activities that need a higher cognitive stage.

Science process skills, according to Ozgelen (2012), can be divided into two types: basic science process skills (BSPS) and integrated science process skills (ISPS) (ISPS). As BSPS, observing, using space/time relationships, inferring, measuring, communicating, classifying, and forecasting; as ISPS, defining operationally, generating hypotheses, evaluating data, experimenting, formulating models, and presenting information. SPS such as identifying the problem, identifying and controlling variables, formulating hypotheses, interpreting data, defining operationally, reading/constructing graphs, and experimenting are introduced as integrated SPS as well as as more complex skills than the basic skills (Chiappetta and Koballa, 2002).

One of the most essential purposes of science education is to teach students how to engage in inquiry. In other words, students should integrate skills, knowledge, and attitudes to have a deeper comprehension of scientific concepts. To motivate children to engage in scientific enquiry, teachers must focus on teaching science abilities such as facts, concepts, and hypotheses. According to Ango (2002), appropriate use of science process skills can be taught and studied in the early years of primary school. It would serve as the foundation for learning the integrated process skills. Children should be given opportunities to practice observation, manage things on their own, and investigate their learning environment as early as feasible. Chiappetta and Koballa (2002) classified fundamental and integrated scientific skills.

A. Basic Science Process Skills

- Observing: Noting the properties of objects and situations using the five senses. It is description of what was actually perceived.
- Measuring: Expressing the amount of an object or substance in quantitative terms.
- Inferring: Giving an explanation for a particular object or substance in quantitative terms.
- Classifying: Relating objects and events according to their properties or attributes.
- Predicting: Forecasting a future occurrence based on past observation or the extension of data. Communicating: Using words, symbols, or graphics to describe an object, action or event.

B. Integrated Science Process Skills

- Controlling variables: Manipulating and controlling properties that relate to situations events for the purpose of determining causation.
- Hypothesizing: Stating tentative generalization of observations or inferences that may be used to explain a relatively larger number of events but that is subject to immediate or eventual testing by one or more experiments.
- Experimentation: Testing a hypothesis through the manipulation and control of independent variables and noting the effects on a dependent variable: interpreting and presenting results in the form of a report that others can follow to replicate the experiment.
- Data Interpreting: Arriving at explanations, inference, or hypotheses from data that have been graphed or placed in a table.

The primary reason for including science education in secondary school curricula is to help students develop scientific knowledge, abilities, and positive attitudes toward science and technology. This would allow children to comprehend the function and value of science and technology in society, as well as the interrelationship between science, technology, and society. Science education raises awareness about the impact of scientific information in everyday life, such as its applications in society, environmental management and conservation, resource usage, and product manufacturing (Kenya Institute of Education, 2002). Another rationale for having science education in secondary school is to address the issues of scientific literacy, so that students are encouraged to grasp the scientific enterprise and how to benefit from it (Collette & Chiapetta, 1984).

The general stand of people's evaluations and perceived propensity toward emotional or affective components is referred to as their attitude. It is a result of people's wants and expressions of their intellectual processes (Wheeler, 1974). A cognitive component is the individual's views or knowledge about the attitude object, and a behavioral component is the individual's proclivity to act in a specific way toward the attitude object (Gall et al., 2003). One of the curriculum's primary goals is to foster a favorable attitude toward science (Thomas, Koballa & Crawley, 1985). A lot of studies have also looked at people's opinions regarding science in general (Delpech, 2002; Ebenezer & Zoller, 1993). Teachers, on the other hand, focus almost entirely on assessing academic accomplishment rather than student attitudes or science process abilities and the relationship between them. Furthermore, all of this research assessed attitudes and science process abilities in a classroom context under stable political situations. Science process skills and attitudes toward Biology have been explored among STEM students at Victoria National High School in this study.

II. STATEMENT OF THE PROBLEM

The lack of process skills in science instruction is well documented and of great concern to senior high school students. Many students need science process skills to motivate them to explore science subjects such as biology. Students in secondary schools are hampered by a lack of abilities such as classifying, communicating, understanding, and measuring (Kamba et al., 2018). As a result, many students avoid and are discouraged from studying biology. Essential notions are less likely to be employed in real-world problem scenarios. Many elements, including students' attitudes, could be seen as contributing to this problem.

A recurrent issue, however, as demonstrated in school settings, is that SPS acquisition is hampered by factors such as how SPS is created in scientific classrooms. According to international studies (NRC, 1996), students are not given the opportunity to improve their thinking skills since they are not permitted to think entirely independently. Furthermore, Aktamis and Ergin (2008) indicated that lecturers first taught students on the relevant concepts and facts before allowing them to conduct experiments. This hinders the development of SPS among learners, and this type of educational setting is the polar opposite of what the science education framework intends to foster among learners, particularly in the K–12 curriculum (Derilo, 2019). The purpose of this research is to describe the quality of STEM students' science process skills and attitudes about biology at Victoria National High School in Victoria, Tarlac.

III. OBJECTIVES

This study generally aims to investigate the level of science process skills and level of attitudes toward biology among Grade 11 STEM students of Victoria National High School, Victoria, Tarlac.

Specifically, it attempts to:

- Describe the socio-demographic profile of the respondents
- Evaluate the level of the students' science process skills.
- Describe the students' science process skills according to sex.
- Determine the level of students' attitudes towards biology.
- Describe the level of students' attitudes toward biology according to sex

IV. REVIEWS RELATED TO THE STUDY

After the text edit has been completed, the paper is ready for the Science process skills, which include observing, classifying, inferring, predicting, communicating, and measuring, are the foundation of critical thinking and inquiry in science. Learners can acquire these skills through science instruction activities. It was also shown that students' attitudes have a significant impact on physics teaching and learning. However, students' poor performance in physics was due to teachers' lack of originality, encouragement, and ingenuity, despite making the class more participatory and allowing students to ask questions anytime they had any doubts. Inability to solve physics issues accurately using the appropriate formula and inability to perceive the significance of physics to society impairs their learning. As a result, the good students demonstrate an interest in the physics class and, as a result, see no problem with their teachers' attitude toward learning physics (Kamba et al., 2018).

Zeidan and Jayosi (2015) investigated the relationship between Palestinian secondary school students' knowledge level of science process skills and their attitudes toward science, as well as the effect of these students' gender and residence on their knowledge level of science process skills and attitudes toward science. They discovered a substantial correlation between knowledge level of science process skills and attitudes toward science, with a correlation coefficient of 0.69. The study's findings revealed that there were considerable variations in science process skills based on gender, with females outperforming rural students. However, no significant variations in attitudes toward science were found as a result of the covariates.

Tilakaratne and Ekanayake (2017) assessed grade six and seven students' mastery of fundamental science process skills (BSPS). According to the conclusions of their study, the majority of students in both grades obtained a medium level of grasp of BSPS. However, data for both grades revealed statistically significant disparities in the level of understanding of BSPS depending on the medium of instruction (English and native languages) as well as national and provincial schools. Gender also plays a comparable role for sixth graders. Nonetheless, no association was found between SPS knowledge level and gender in the seventh grade. Nonetheless, no relationship was discovered between SPS knowledge level and gender in the seventh grade. As a result, they found that in order to effectively teach science, teachers should incorporate SPS into their teaching method. As a result, the authors believe that instructors should be trained to develop a scientific mentality and important skills in order to apply scientific concepts to their daily lives. Furthermore, student exams should be designed to assess the aforementioned competencies rather than the memorized collection of definitions.

Following the findings of the study conducted by Widdina, Rochintaniawati, and Rusyati (2018), students' basic science process skills can be classified as adequate based on the research findings. The integrated science process skills of the students resulted in a category level of high. The findings of students' basic science process skills based on gender demonstrate that male students outperformed female students in various indicators and categories, but this is not guaranteed because they study the idea in the same class at the same time with the same teacher. There are no disparities in learning which one is superior to the others.

Al-rabaani (2014) studied the learning of science process skills by pre-service social studies teachers in Omani. A questionnaire with 14 items addressing fundamental and integrated science process abilities was used to collect data. The questionnaire was issued to all 59 social studies students' teachers at Sultan Qaboos University in the Sultanate of Oman's faculty of education. The findings revealed that they had a moderate acquisition of science process abilities, with no gender differences.

Bang and Baker (2013) evaluated the impact of gender organization in high schools on Korean tenth-grade students' science achievement and attitudes toward science. An initial survey was completed by three schools, three principals, three science teachers, and 302 tenth-grade students from their different school types, and eleven academically outstanding students were then interviewed. The results showed both male and female co-ed school students had significantly superior science achievement and good views regarding science.

Derilo (2019) also investigated the basic and integrated science process skills development and science achievement of seventh-grade students. He observed that the majority of seventh-grade students have a medium degree of acquisition of the various science process abilities. Their scientific achievement suggests that they met the Enhanced Basic Education Curriculum's basic grade level content standards. However, the results show that, while the learners' performance was respectable, they did not excel in the topic. The highly significant, positive connection between students' SPS acquisition and scientific achievement suggests that students' mastery of science process skills may lead to improved science performance.

Oloyede and Adeoye (2012) discovered a link between SPS and student achievement in their study. His findings show that students who use SPS have a higher likelihood to perform higher than those who do not use such skills. He also claimed that persons with weaker levels of reasoning ability had difficulty understanding concepts, which resulted in decreased performance and achievement. Furthermore, he stated that students with SPS are more capable of reasoning things out logically, successfully confronting issues and situations, resulting in higher successes. Furthermore, SPS-enhanced learners are more likely to think critically and analytically, resulting in a better success rate than SPS-deficient individuals. Aktamis et al. (2008) discovered that students who received SPS instruction performed better. These findings were consistent with what other researchers had previously discovered. Ardaç and Mugaloglu (2002) discovered that students perform better when they gain SPS.

Many studies support the notion that there is a positive relationship between SPS and academic success in science subjects (Beaumont-Walters & Soyibo, 2001; Farsakoğlu, Şahin, & Karsli, 2012; Oloyede & Adeoye, 2012; Delen and Kesercioglu, 2012) studied secondary school students' SPS and its possible relationship with academic achievement. They found that students acquired below average SPS and that there was a positive relationship between SPS and academic achievement.

Akinbobola and Afolabi (2010) examined the science process skills in West African senior secondary school certificate physics practical examinations in Nigeria over a ten-year period (1998-2007). The results demonstrate a greater percentage rate of basic (lower order) science process skills (63%) than integrated (higher order) science process skills (37%). The results also show that the number of basic process skills is much larger than the number of integrated process skills in the West African senior secondary school certificate physics practical tests in Nigeria.

Ozgelen (2012) investigated students' science process skills within the context of a cognitive domain paradigm. 306 sixth and seventh grade kids from public, private, and bussed schools were sampled. To assess scientific process skills, the Turkish integrated process skills test was applied, and the results revealed usually poor scores. Students in private schools outperformed those in public and bused schools.

Several studies have found that both teachers and students have a moderate level of science process abilities. Furthermore, students' mastery of fundamental process skills is greater than their mastery of integrated process skills. Students who learned and practiced science process skills outperformed those who did not. Gender and the learning of science process skills were shown to have no significant relationship. However, science process skills and students' science achievements and attitudes were found to have a favorable relationship. Science process skills assist students in becoming complete and successful learners. Its educational implications primarily address teachers' need to train their students in scientific process skills and to match their instruction with more learner-centered activities in which students can employ their cognitive, motor, and affective skills.

V. METHODOLOGY

This study was conducted at Victoria National High School during the second semester of the School Year 2019-2020. The instruments were disseminated in the 18th day of November, 2019 after receiving the approval from the school principal.

This study is a descriptive survey research design. Descriptive research is inquiry into the nature, incidence, or distribution of variables. It entails describing variables but not altering them. The researcher utilized test paper and survey questionnaire to gather data to evaluate the level of science process skills and level of attitudes toward biology among Grade 11 STEM students, respectively.

The researcher collected data from fifty-five (55) 11th grade STEM students as the respondents of the study. The study included all the population of Grade 11 STEM students

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in Victoria National High School so that descriptive statistics was used in analyzing the data.

The instruments used to collect data in this study were two set of questionnaires: Science Process Skills Test (SPST) adopted from the work of Zeidan and Jayosi (2015) and Attitudes toward Biology Questionnaire (ATBQ) adopted from the work of Kamba et al (2018). The instruments are divided into three parts. Part I contains questions about the demographic characteristics of respondents, Part II contains closed-ended questions about the students' knowledge of science process skills while Part III contains close-ended questions about attitudes of respondents towards biology. Questions in the test instrument are prepared in objective form, with options lettered A to D from which the respondents will choose the most appropriate option. Questions in the questionnaire are prepared based on a four-point Likert scale, ranging from "1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree."

A permission letter to administer questionnaire was given to the school principal because it will involve students as the subject of the study and especially for ethical purposes. After receiving the approval from the school principal, the researcher disseminated the Science Process Skills Test and Attitudes toward Biology Questionnaire to the Grade 11 STEM students with the assistance of their biology teacher. The distribution of the research instrument was simultaneous and direction was also discussed by the researcher to avoid confusion from the part of the students. The researcher allotted forty-five (45) minutes for the students to accomplish the test and the questionnaire in order to gain more efficient data for a desired result.

Data were analyzed using descriptive statistics. The researcher organized the data using charts (frequency counts and percentages) for the distribution of the socio-demographic profile of the respondents and tables for the means, standard deviations and percentages to show the summarized results of the respondents' level of knowledge of science process skills as well as the level of their attitudes towards biology.

VI. RESULTS

Table 1. Demographic Characteristics of the Respondents

Characteristic		Distribution	
		Frequency	Percentage
Sex	Male	26	47.27
	Female	29	52.73
	Total	55	100
Age	15	2	3.64
	16	31	56.36
	17	20	36.36
	above 17	2	3.64
	Total	55	100

Table 1 shows the frequency count and percent distribution of the students' sex and age. Twenty-nine (29) respondents or 52.73 percent of the total respondents are female while twenty-six (26) respondents or 47.27 percent of the total respondents are male. The distribution of sex in the 11th grade students was almost equal.

The fifty-five (55) students have ages that range from 15 years old and above. The youngest student in this group is 15 years old and the oldest is 18 years old. The biggest percentage fell on the age group of 16 years old with 56.36 percent. Most of the students are normally in the age bracket of Grade 11 students.

Table 2. Means, Standard Deviations, and Percentages for Each Component Skill

No	Skills	Max	SD	Mean	Percent
1	Observing	2	0.37	1.84	91.82
2	Measuring	2	0.60	1.56	78.18
3	Classifying	2	0.77	1.35	67.27
4	Predicting	2	0.31	1.89	94.55
5	Communicating	2	0.62	1.06	52.73
6	Controlling variables	2	0.53	0.78	39.09
7	Hypothesizing	2	0.69	1.09	54.55
8	Experimenting	2	0.78	0.89	44.55
9	Data interpreting	2	0.64	1.26	62.73
	SPST	**18**	**0.59**	**11.71**	**65.05**

Table 2 shows that the predicting skill is ranked first due to its mean value (1.89) and standard deviation (0.31). Observing skill is ranked second with a mean value of (1.84) and a standard deviation of (0.37). Similarly, measurement competence is ranked third due to its mean value (1.56) and standard deviation (0.37). The average SPST was 11.71 (65.05%), and the individual process scores ranged from (0.78) to (1.89). There are two types of science process skills: basic process skills and integrated process skills. The former featured five constructs, whereas the later had four constructs with two objects apiece. The overall mean for science process skills is 1.30, which corresponds to disagree on the scale employed, showing that students' knowledge of science process skills is poor. This is congruent with the findings of Akinbobola and Afolabi (2010) where it was found that fundamental (lower order) science process skills (63%) outnumber integrated (higher order) science process skills (37%). The results also show that the number of basic process skills in the West African senior secondary school certificate physics practical tests in Nigeria is much larger than the number of integrated process skills.

Table 2. Means, Standard Deviation and Percentages of the Knowledge Level of Science Process Skills Due to Gender

Sex	N	Mean	SD	Percent
Male	26	11.23	0.61	62.39%
Female	29	12.14	0.13	67.44%

As indicated in Table 2, the mean of knowledge level of scientific process skills for males was 11.23 while the mean of knowledge level of science process skills for females was 12.14. This just means that females outperformed males.

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Female scores are less evenly distributed than male scores. In support to this, Zeidan and Jayosi (2014) came to the conclusion that there are substantial differences in the mean performance of girls and boys in terms of science process skills understanding. Among Palestinian secondary school students, females outperform males.

Table 3. Means and Standard Deviations of STEM Students Attitudes Level toward Biology

Parameter	Mean	SD
a) Student's self-concept		
I like practical works in biology because I can use equipment and scientific tools	3.25	0.55
It is exciting to learn about new things happening in science related to biology	3.25	0.51
I learn biology quickly	2.91	0.44
I like biology because it helps me to develop the skills of thinking	3.13	0.47
Biology excites questions, opinions and idea	3.07	0.60
I like reading biology magazines and books	2.91	0.98
I would like to discuss biology topics with my classmates	3.27	0.65
In my biology class, I understand everything	3.16	0.99
Practical work in biology is exciting	3.29	0.71
I like biology lessons more than most other subjects' lessons	3.13	0.87
b) Student's anxiety		
Biology lesson is boring	3.27	0.84
Practical work in biology is boring	3.13	0.83
I feel helpless when doing biology	3.27	0.90
Biology is not important for society	3.22	1.06
I find biology difficult	2.84	1.11
Practical work in biology is useless	3.47	0.89
c) Fear		
I get scared when biology lesson is going on	2.89	0.80
I entertain fear whenever biology teacher enters our class	3.36	0.77
I am afraid of my biology teacher	3.11	0.93
d) Aspiration		
I would like to study biology at university	3.16	0.73
I would like to become a biology teacher	3.18	0.72
I would like to do more biology activities outside of school	3.20	0.80
I would like to become a researcher in biology	3.05	0.59
The whole instrument	**3.15**	**0.15**

Legend: 3.26-4.00 – Strongly Agree (High Positive Attitude); 2.51-3.25 –Agree (Positive Attitude); 1.76-2.50 –Disagree (Low Positive Attitude); 1.00-1.75 –Strongly Disagree (Very Low Positive Attitude)

The students' attitude toward biology scale was divided into four subscales: self-concept, students' anxiety, fear and students' aspiration. The items were scaled using the four-point Likert scale ranging from a minimum of 1 for the worst-case scenario (strongly disagree) to a maximum of 4, which is the best-case scenario (Strongly agree). Table 3(a) for students' self-concept, seven items had the mean ranging from 3.07 to 3.29, two items had a mean of 2.91, and an overall mean of 3.14, which on the scale used corresponded to "agree" and hence a good overall self-rating of the respondents on students' self-concept of learning. Table 3(b) also illustrates that for students' anxiety, all items had means ranging from 2.84 to 3.47 and an overall mean of 3.20, which on the scale used corresponded to "agree" and hence a good overall self-rating of the respondents also on students' anxiety. Table 3(c) indicates that for fear, the three items had means ranging from 2.89 to 3.36 and an overall mean of about 3.12, which on the scale used corresponded to "agree" and hence a good overall self-rating of the respondents on students' fear. Table 3(d) indicates that for students' aspiration, three items had the mean ranging from 3.05 to 3.20, and an overall mean of about 3.15, which on the scale used corresponded to "agree" and hence a good overall self-rating of the respondents on students' aspiration. Therefore, the overall mean on Students' Attitudes toward Biology is 3.15 which on the used scale, corresponded to "agree" implying a good level of students' attitudes towards biology.

This study's findings confirm the results of Bang and Baker (2013) and Zeidan and Jayosi (2015), who discovered that students' attitudes toward science are generally positive, with a strong preference for physics-related career paths. While the study found that students' self-concept of competence, worry, and fear had a strong influence on their views toward biology, aspiration has a minor influence on their attitudes toward physics. Male students had much more positive opinions toward science than female students.

Table 4. Means, Standard Deviations of Attitudes Level toward Biology According to Sex

Sex	N	Mean	SD
Male	26	3.12	0.81
Female	29	3.18	0.69

Male and female students have pretty much identical means, showing that both groups have good opinions toward biology. The findings of this study reflect the findings of Bang and Baker (2013), who discovered that male and female students had considerably stronger positive attitudes about science. This is also congruent with the findings of Zeidan and Jayosi (2015), who reported that there is no significant variation in the means of attitudes toward science based on gender.

VII. CONCLUSION

Based on the findings, more Grade Eleven STEM students chose the proper alternatives for items linked to Predicting, Observing, and Measuring. Basic science process skills, which include observing, classifying, inferring, predicting, communicating, and measuring, are the building blocks of critical thinking and scientific inquiry skills. These skills can be obtained by learners by implementing a learner-centered classroom and teaching interactive and collaborative science activities. They found predicting and observing to be easier than the other skills. While fewer students chose the correct response for topics relating to the ability to manipulate variables and experiments.

11th grade STEM students have less expertise manipulating variables and experimenting. This finding could be attributed to the teachers' traditional teaching technique. Traditional methods are incapable of developing abilities in the integrated science process.

On the other hand, it has been demonstrated that student attitudes have a significant impact on biology teaching and learning. Biology was one of the most difficult courses for students to master because it was one of the most difficult subjects in science. As a result, the high achievers demonstrate an enthusiasm in biology lessons and, as a result, see no issue with their teachers' approach toward learning biology. The overall examination of the degree of attitudes of 11th grade STEM students toward biology is positive. This indicates they have no problems with the teaching and learning process. Students' interest in learning biology grows in direct proportion to their good opinions toward biology.

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