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STUDENTS' MOTIVATION TOWARDS SCIENCE LEARNING (SMTSL) OF STEM STUDENTS OF UNIVERSITY OF BATANGAS, LIPA CITY

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Abstract

The main purpose of the study is to identify the levels of motivation of STEM (Science, Technology, Engineering, and Mathematics) students in University of Batangas, Lipa City (UBLC). It is necessary as motivation serves as a foundation for better understanding of concepts in an academic setting. The respondents are 111 grade 11 students who are enrolled

during the Academic Year 2016-2017. The researchers assess the levels of motivation of students across four (4) sections of STEM strand. The research utilized a questionnaire SMTSL (Students Motivation Towards Science Learning), a survey questionnaire developed by Tuan, Chin, & Shieh (2005) which is composed of questions which is divided into six (6) domains of motivation namely, self-efficacy, active learning strategies, science learning value, performance goal, achievement goal and learning environment stimulation. Results showed that achievement goal ranked first (1st) among the six (6) domains. This suggests that students have satisfaction in every time they increase their competence in attaining achievements during science class. On the other hand, the data recognizes the performance goal as the least factor. However, the data shows that students do not agree nor disagree whether their goals towards science learning are to compete with other or simply get attention from the teacher. Based on these findings, it is recommended that UBLC considers factors of motivation in implementing science curriculum. This research will not only help students in understanding their motivation but will also help the institution to promote a better environment for learning. Additionally, the study will serve as a foundation for future researches related in assessment of motivation of students towards learning.

Keywords

Science Learning Motivation, STEM, SMTSL, University of Batangas Lipa City

1. Introduction

The recently implemented K to 12 Basic Education (K-12) programs of Department of Education instituted different academic strands to give substance to the academic skills of the students. One of which is the Science, Technology, Engineering, and Mathematics (STEM). The University of Batangas—Lipa Campus (UBLC) is one the educational institution that offers STEM. Furthermore, being in a STEM, students are expected to take various science subjects that tackle different aspects of life, environment, and nature. Thus, a strong affective component of learning to comprehend these different concepts is a must. Within the affective components, motivation is important because students' motivation plays an important role in their conceptual change processes (Lee 1989, Lee and Brophy 1996, Pintrich et al. 1993), critical thinking, learning strategies (Garcia and Pintrich 1992, Kuyper et al. 2000, Wolters 1999) and science learning achievement (Napier and Riley 1985). Without motivation, surface learning or simply

memorization will happen; which will not lead to a proper understanding of essential concepts of Science. Thus, the main objective of the research is to identify the levels of motivation of students as they take science courses of STEM strand. Assessing motivational levels of students will help educational institutions and science instructors to find the solution for the problems regarding student's motivation.

2. Related Literature

There is a wide array of research regarding students' motivation towards Science learning. Lee and Brophy (1996) identified students who were intrinsically motivated to students who had disruptive behaviors. Moreover, Erb (1996) found out that students' lack of lack of motivation were caused by students' lack of responsibility, students' low self-esteem, and students' family dysfunction. Meanwhile, based on the findings of Tuan, Chin, & Shieh (2005) self-efficacy, students' learning goals, learning strategies and perception of science learning values were among the important domains in students' science learning motivation. Their findings showed that students' motivation toward science learning was related to themselves, the teacher's performance, and the abstractness and relevance of science content related to their daily lives. This matched the previous research done by Lee (1989), Nolen and Haladyna (1989), Pintrich and Blumenfeld (1985). Students also mentioned their goals of learning science to be both extrinsic and intrinsic. These goals were identified by Brophy (1998) as motivation theories as a performance goal and achievement goal. This led Tuan et al. (2005) to developed an SMTSL questionnaire which was converged upon six (6) domains and was validated. The following are the domains of motivations; Self-efficacy denotes that it is students' determination or belief to do things they cannot and want to have experience in it. Active learning strategies signify that students get knowledge by studying and understanding things they do not know. Science learning value refers to whether or not students can perceive the value of science learning they engage. The performance goal is about students being concerned with their level of intelligence (e.g. they want to look smart and avoid looking dumb). Achievement goal, on the other hand, is when students are task-involved. Thus, their primary goal is learning and mastery of the task for its own sake. Learning environment stimulation these are teaching strategies, class activities, student-teacher, and student-student interactions.

2.1 Statement of the Problem

The study aims to determine the factors that affect the motivation of the students towards learning science. It seeks to answer the following questions:

1. What is the profile of the respondents based on gender?
2. What is the level of motivation of (STEM) students of UBLC towards learning science, in terms of:
 - a) Self-efficacy;
 - b) Active learning strategies;
 - c) Science learning value;
 - d) Performance goal;
 - e) Achievement goal; and,
 - f) Learning environment stimulation.

3. Methodology

3.1 Research Design

This study used the survey research method. A sample of 111 students from the Senior High School STEM strand at the University of Batangas, Lipa City (UBLC) Campus was selected using random sampling technique.

3.2 Participants

The participants in this study are 111 UBLC High School STEM students from grades 11. They are enrolled during the Academic year 2016-2017. They are equally and randomly selected across the four (4) section of STEM of UBLC.

3.3 Instruments

The Student's Motivation towards Science Learning (SMTSL) Survey by Tuan et al. (2005) was used as the instrument to generate data for this study. This survey questionnaire consists of 35 items for the senior high school STEM students that are distributed to 6 domains of motivation. The following are the domains stated in the survey: (a) self-efficacy, (b) active learning strategies, (c) science learning value, (d) performance goal, (e) achievement goal, and (f) learning environment stimulation. The respondents were asked to indicate their agreement to each statement on a 5-point Likert scale. This instrument has good construct validity and also criterion-related validity. Moreover, it has also significant correlations with science attitude.

3.4 Data Gathering Procedure

After the dissemination of needed documents, the survey questionnaire was dispersed. To ensure the reliability of data, it was answered by the students during their respective Science classes. A total of 111 questionnaires from the students were retrieved.

3.5 Data Analysis

The data gathered through this study were analyzed using descriptive statistics such as mean, standard deviation, and percentage. The Microsoft Excel was used to facilitate the computation of necessary statistics.

4. Results

Table 1: *Profile of Respondents according to Gender*

Gender	Frequency	Percentage
Male	55	49.55
Female	56	50.45
Total	111	100%

Table 1 show that the study has 111 respondents which include 55 males which are equivalent to 49.55% of the total population of the respondents, and 56 females which are equivalent to 50.45% of the total population of the respondents. This data reveals that there are more female respondents of the study.

Table 2: *Domains of Motivation*

Domain	Mean	SD	%	Rank
A. Self-efficacy	3.67	0.27	66.2	5
B. Active learning strategies	3.86	0.19	76.0	3
C. Science learning value	3.96	0.06	79.1	2
D. Performance goal	3.12	0.63	40.8	6
E. Achievement goal	4.05	0.05	82.5	1
F. Learning environment stimulation	3.73	0.15	66.8	4

The table 2 shows that more than half of the respondents agree with the domains of motivation except for performance goal with only 40.77% of agreement. The highest identified domain is achievement goal with 82.52% of agreement followed by science learning value and active learning strategies with 79.15% and 76.01% of the agreement, respectively. Having

achievement goal as 1st rank signifies that students are goal-oriented. Based on the data students are motivated in learning and mastering the lecture for their own sake. On the other hand, results shown that performance goal is the least domain. This means students are least concerned with their level of intelligence. In-depth study in the domains of motivation that affects the students is expounded below.

Table 3: Self-Efficacy

Questions	Weighted Mean	Interpretation	%
1) Whether the science content is difficult or easy, I am sure that I can understand it.	3.93	Agree	82.9
2) I am not confident about understanding difficult science concepts.	3.25	No Opinion	48.6
3) I am sure that I can do well on science tests.	3.38	No Opinion	53.2
4) No matter how much effort I put in, I cannot learn science.	3.95	Agree	76.6
5) When science activities are too difficult, I give up or only do the easy parts.	3.85	Agree	74.8
6) During science activities, I prefer to ask other people for the answer rather than think for myself.	3.71	Agree	65.8
7) When I find the science content difficult, I do not try to learn it.	3.66	Agree	65.8

Table 3 shows the self-efficacy of STEM students towards science learning. Students agree that whether the science content is difficult or easy, I am sure that I can understand it; no matter how much effort I put in, I cannot learn science; when science activities are too difficult, I give up or only do the easy parts; during science activities, I prefer to ask other people for the answer rather than think for myself; and, when I find the science content difficult, I do not try to learn it. Meanwhile, they have on opinion on; I am not confident about understanding difficult science concepts, and I am sure that I can do well on science tests

Table 4: Active Learning Strategies

Questions	Weighted Mean	Interpretation	%
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8) When learning new science concepts, I attempt to understand them.	4.06	Agree	86.5
9) When learning new science concepts, I connect them to my previous experiences.	3.68	Agree	69.4
10) When I do not understand a science concept, I find relevant resources that will help me.	3.57	Agree	60.4
11) When I do not understand a science concept, I would discuss with the teacher or other students to clarify my understanding.	3.94	Agree	83.8
12) During the learning processes, I attempt to make connections between the concepts that I learn.	3.68	Agree	64.0
13) When I make a mistake, I try to find out why.	4.01	Agree	81.1
14) When I meet science concepts that I do not understand, I still try to learn them.	4.05	Agree	84.7
15) When new science concepts that I have learned conflict with my previous understanding, I try to understand why.	3.92	Agree	78.4

Table 4 shows the weighted mean and interpretation of active learning strategies of STEM students. Students agree that; when learning new science concepts, I attempt to understand them; when learning new science concepts, I connect them to my previous; when I do not understand a science concept, I find relevant resources that will help me; when I do not understand a science concept, I would discuss with the teacher or other students to clarify my understanding; during the learning processes, I attempt to make connections between the concepts that I learn; when I make a mistake, I try to find out why; when I meet science concepts that I do not understand, I still try to learn them; and, when science concepts that I have learned conflict with my previous understanding, I try to understand why.

Table 5: Science-Learning Value

Questions	Weighted Mean	Interpretation	%
16). I think that learning science is important because I can use it in my daily life.	3.97	Agree	78.4

17) I think that learning science is important because it stimulates my thinking.	4.04	Agree	82.0
18) In science, I think that it is important to learn to solve problems.	3.95	Agree	80.2
19) In science, I think it is important to participate in inquiry activities.	3.87	Agree	74.8
20) It is important to have the opportunity to satisfy my own curiosity when learning science.	3.99	Agree	80.2

The table 5 shows how STEM students perceive the value of science learning. They agree with all the questions namely; I that learning science is important because I can use it in my daily life; I think that learning science is important because it stimulates my thinking; in science, I think that it is important to learn to solve problems; in science, I think it is important to participate in inquiry activities; and, it is important to have the opportunity to satisfy my own curiosity when learning science.

Table 6: Performance Goal

Questions	Weighted Mean	Interpretation	%
21) I participate in science courses to get a good grade.	2.30	Disagree	12.6
22) I participate in science courses to perform better than other students.	2.97	No opinion	36.0
23) I participate in science courses so that other students think that I'm smart.	3.68	Agree	59.5
24) I participate in science courses so that the teacher pays attention to me.	3.54	Agree	55.0

Table 6 shows the performance of STEM students towards science learning. They agree with; I participate in science courses so that other students think that I'm smart; and, so the teacher pays attention to me. On the other hand, they disagree to I participate in science courses to get a good grade. Lastly, they have no opinion on participation in science courses to perform better than other students.

Table 7: Achievement Goal

Questions	Weighted Mean	Interpretation	%
25) During a science course, I feel most fulfilled when I attain a good score in a test.	4.07	Agree	82.9
26) I feel most fulfilled when I feel confident about the content in a science course.	4.08	Agree	84.7
27) During a science course, I feel most fulfilled when I am able to solve a difficult problem.	4.10	Agree	84.7
28). During a science course, I feel most fulfilled when the teacher accepts my ideas.	4.05	Agree	81.1
29) During a science course, I feel most fulfilled when other students accept my ideas.	3.96	Agree	79.3

Table 7 shows the achievement goal of STEM students towards science learning. They agree that; during a science course, I feel most fulfilled when I attain a good score in a test; I feel most fulfilled when I feel confident about the content in a science course; during a science course, I feel most fulfilled when I am able to solve a difficult problem; during a science course, I feel most fulfilled when the teacher accepts my ideas; and, during a science course, I feel most fulfilled when other students accept my ideas.

Table 8: *Learning Environment Stimulation*

Questions	Weighted Mean	Verbal Interpretation	%
30) I am willing to participate in this science course because the content is exciting and changeable.	3.69	Agree	64.0
31) I am willing to participate in this science course because the teacher uses a variety of teaching methods.	3.80	Agree	64.9
32) I am willing to participate in this science course because the teacher does not put a lot of pressure on me.	3.73	Agree	67.6
33) I am willing to participate in this science course because the teacher pays attention to me.	3.47	Agree	57.7
34) I am willing to participate in this science course	3.90	Agree	75.7

because it is challenging.			
35) I am willing to participate in this science course because the students are involved in discussions.	3.79	Agree	67.6

Table 8 shows the environment stimulation of STEM students towards science learning. Students agree that; I am willing to participate in this science course because the content is exciting and changeable; I am willing to participate in this science course because the teacher uses a variety of teaching methods; I am willing to participate in this science course because the teacher does not put a lot of pressure on me; I am willing to participate in this science course because the teacher pays attention to me; I am willing to participate in this science course because it is challenging; and, I am willing to participate in this science course because the students are involved in discussions.

5. Conclusions

From the data gathered in the results, the researchers came up with the following conclusions: Self-efficacy of the students shows that most of the STEM students understand science whether it is hard or not. The results from the questions 2 and 3 imply that other students are not confident on learning difficult science lessons and at the same time they do well in science class. Moreover, the questions 4, 5, 6, and 7 show results that few students didn't try to learn science and to-do task if it is difficult to do or understand. Since the self-efficacy of the students ranked 5, it could be an indication that, to some extent, they believe they are capable of accomplishing learning tasks, whether tasks are difficult or easy. Active learning strategies reveal that all of the STEM students tend to learn science, put efforts in learning science if the students didn't understand the topic they approach the teacher and discuss the topic. Therefore, table 5 show us on how the students and motivated in learning science by finding other ways to learn it. STEM students' value science because of their career choice. Moreover, they can perceive the value of science learning they engage in science classes between performance and achievement goal since students are inclined to achievement goal than performance goal, they are intrinsically motivated, they intend to accomplish something to satisfy their innate needs for improving their own competence. Moreover, they believe this kind of participation will help them achieve valuable goals. On the other hand, whether or not they are concerned more with performing better than their peers and impressing their teachers, they responded with uncertainty.

Students also have positive learning environment stimulation. This means teachers' teaching strategies, class activities, and student–teacher and student–student interactions influence an individual's motivation in learning.

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