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Interrelationship of Academic Motivation, Science Process Skills, and Study Habits among BSEd Science Students

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Abstract

The major aspirations of this study are (a) to promote and direct student behavior toward achievement, referred to as Academic Motivation (AM); (b) to help students understand phenomena, answer questions, develop theories, and discover information, which is referred as Science Process Skills (SPS); and (c) maintain self-esteem and competence in learning science known as Study Habits (SH), which are the qualities needed by students to become abreast and have a better learning encounter. This study utilized a quantitative-correlational research design amongfirst- and second-yearBSEd Science students, school year 2021-2022. Results revealed that academic motivation was “high” (M=3.98, SD=0.44), signifying that students put more emphasis on the subject's contribution to their career than worrying about failing the tests. Science Process Skills were also noted as “high” (M=2.73, SD=0.64), proving that students could record data accurately, use scientific knowledge to form a question, and analyze the results of a scientific investigation. Likewise, Study Habits revealed “high” (M=2.92, SD=0.51), denoting that students devote sufficient time to study their courses and review and edit their notes systematically. Moreover, significant interrelationships among the three variables were exposed. If the interests of the students would upsurge, so would their levels of science processing skills and study habits. Consequently, the teacher must assess academic motivation, science process skills, and study habits to tailor instruction to students' current acquisition and attain the highest learning experience.

Keywords: scales, integration, attitudes, activity, academic motivation, science process skills, study habits, science students, education, college

1. Introduction

According to studies [1,2,3] motivation is a more multi-faceted, non-cognitive psychosocial structure. In contrast, academic motivation is a more specialized term that includes students' creative thinking and learning skills and motivations for attending school and performing assignments. Motivation has been studied from various theoretical viewpoints, including behavioral, social, cognitive, and humanistic approaches. Academic engagement is an expression of academic motivation in terms of participation in learning activities or academic assignments, and it is determined by how well students perceive those academic activities to fit their psychological requirements. Naturally motivated students are likelier to engage in activities that meet their needs. When someone is highly motivated, they will not experience difficulties in mastering their science process skills. So, if someone has the low motivation, they will experience difficulties in their process skills [4,5]. Mastering science process skills is one of the desired learning outcomes; motivation is key. When learners interact in science, they find their research through the stages of the question, hypothesis, prediction, investigation, interpretation, and communication, which are called science process skills. These three basic science skills prioritize goal achievement and the learning process, which is aimed at the overall development of students’ potential.

2. Objectives

The primary objectives of this study revolve around three key dimensions crucial to students' academic success: Academic Motivation (AM), Science Process Skills (SPS), and Study Habits (SH). Firstly, the study aims to promote and direct student behavior towards achieving Academic Motivation, emphasizing the significance of students' perception of the subject's

contribution to their career over test-related concerns. Secondly, the research seeks to enhance students' understanding of scientific phenomena and their ability to answer questions, develop theories, and acquire information—collectively called Science Process Skills. Lastly, the study aims to maintain and foster students' self-esteem and competence in learning science, denoted as Study Habits, which involves devoting sufficient time to study and systematically reviewing and editing course notes.

3. Methods

The research design, locale, respondents, research instruments, data gathering procedure, and statistical data analysis process. This quantitative study design employs descriptive-correlational research. The descriptive method examines and determines the interdependencies and significant relationships between Academic Motivation, Science Process Skills, and Study Habits among BSEd Science Students. A correlational study is a type of non-experimental research in which the researcher measures three (3) variables, and the statistical correlation between them is evaluated with little to no attempt to monitor foreign variables. The correlational approach of gathering the data employed for collecting and measuring the quantitative levels of academic motivation, science process skills, and study habits among BSEd Science students through a five-point Likert scale and a four-point Likert scale questionnaire. To quantify the magnitude of the interrelationship among Academic Motivation, Science Process Skills, and Study Habits among BSEd Science students, the researcher used a purposive sampling method, specifically whole population sampling of the 1st and 2nd year BSED Science students. The study was conducted in one of the state colleges in the Philippines, located in the province of Zamboanga del Sur. The researchers chose this school to find out the result of students' level of Academic Motivation, Science Process Skills, and Study Habits for BSEd Science Students.

This study utilized an adapted questionnaire. The Academic Motivation questionnaire adapted from Glynn &Koballa[6] is intended to understand betterstudents' thoughts and feelings about their college science courses. The questionnaire had a Cronbach's alpha coefficient of α=.0.93. It is a 5-point Likert scale; points in the Likert scale were assigned as follows: Never (1), rarely (2), sometimes (3), usually (4), and always (5). The science process skills questionnaire adaptedfrom Arnold &Bordeau[7] measures students' science process skills to know how good of a science student they are. The questionnaire revealed coefficients of 0.84 and 0.94, respectively. Split-half reliability (Spearman-Brown) was 0.93. The survey consists of eleven items, each representing a different skill in the science inquiry process. Youth are prompted to respond to each statement using a 4-point Likert scale indicating how often they practice each of the items when doing science: Never (1), sometimes (2), usually (3), and always (4). And last, the study habits questionnaire adapted fromHouston Clear Lake, Texas [8] is designed to help us look at some of the students' academic skills and give us a general idea of how they view their abilities in science. This questionnaire had a Cronbach's alpha coefficient of 0.93 and was approved. The survey consists of twenty-four (24) items; each of these questions had possible answers arranged in five-point Likert scales. Points in the Likert scale were assigned as follows: Never (1), sometimes (2), usually (3), and always (4). Time management and procrastination (items 1-8), study aids and note-taking (items 9-16), and organizing and processing information (items 17-24). The participants were the 1st- 2nd year science students enrolled in 2021-2022. Participants from the School of Teacher Education (STE) major in science. The first-year students are composed of twelve males and thirty-eight females, while the second-year students have ten males and twenty-nine females; we all have eighty-six respondents. The statistical treatment of the data is composed of two sections. Descriptive statistics (means and standard deviations) were used to analyze and interpret the degree measures of students' academic motivation, science process skills, and study habits. Inferential statistics Pearson Product Moment Correlation (PPMC) test was used to explore the significant associations/correlations between the two theoretical constructs. The results of the correlation coefficient were interpreted using the scale of Cohen (1992): -0.3 to +0.3 = weak, -0.5 to -0.3 or +0.3 to +0.5 = moderate relationship, -0.9 to -0.5 or +0.5 to +0.9 = strong relationship, -1.0 to - 0.9 or +0.9 to +1.0 = very strong relationship.

Figure 2. The Data Gathering Process

Seek Permission. Researchers asked permission from the office of the Dean of the College of Education to conduct the study among BSED science students.

Collect Data. An email was delivered to first- and second-year advisers requesting a list of students' names. The participants were asked to fill out questionnaires via GoogleForms.

Analysis of Data. Nm. After the researchers collected the data, they analyzed the data of their respondents' overall results through the given questionnaires.

Interpretation. After the data gathering, the researchers then proceed to the tallying, computation, analysis, and interpretation of the figures to arrive at the accurate results reflected upon the data.

4. Results and Discussion

Results in Table 1 showed that the respondents generally obtained a high level (M = 4.02, SD = 0.47) in the Academic Motivation interest in learning science. Out of the thirty (30) questions in this variable, the students seem to have less interest in the question, stating, "*I like to do better than the other students on the science tests."* (M=3.31, SD=1.08).

Table 1. Descriptive levels of students' academic motivation (n=86)

	M	**SD**	**QD**
1.1 Academic motivation interest in science			
1. I enjoy learning the science.	4.40	0.71	VH
2. The science I learn relates to my personal goals.	4.22	0.77	VH
3. I like to do better than the other students on the science tests.	3.31	1.08	M
4. I am nervous about how I will do on the science tests.	3.81	0.86	H
5. If I am having trouble learning the science, I try to figure out why.	3.84	0.88	H
6. I become anxious when it is time to take a science test.	3.70	0.84	H
7. Earning a good science grade is important to me.	4.49	0.75	VH
8. I put enough effort into learning the science.	4.34	0.75	VH
9. I use strategies that ensure I learn the science well.	4.02	0.77	H
10. I think about how learning the science can help me get a good job.	4.23	0.78	VH
11. I think about how the science I learn will be helpful to me.	4.34	0.82	VH
12. I expect to do as well as or better than other students in the science course.	3.56	0.97	H
Mean	**4.02**	**0.47**	**H**
1.2 Academic motivation factors in learning science			
13. I worry about failing the science tests.	4.56	0.68	VH
14. I am concerned that the other students are better in science.	3.38	1.09	H
15. I think about how my science grade will affect my overall grade point average.	4.16	0.81	H
16. The science I learn is more important to me than the grade I receive.	4.15	0.90	H
17. I think about how learning the science can help my career.	4.26	0.83	VH
18. I hate taking the science tests.	3.77	1.19	H
19. I think about how I will use the science I learn.	3.84	0.85	H
20. It is my fault, if I do not understand the science.	3.69	1.01	H
Mean	**3.98**	**0.45**	**H**
1.3 Academic motivation positive perspective in learning science			
21. I am confident I will do well on the science labs and projects.	3.57	0.83	H

22. I find learning the science interesting.	4.17	0.81	H
23. The science I learn is relevant to my life.	4.15	0.86	H
24. I believe I can master the knowledge and skills in the science course.	3.99	0.79	H
25. The science I learn has practical value for me.	4.08	0.77	H
26. I prepare well for the science tests and labs.	3.88	0.80	H
27. I like science that challenges me.	4.20	0.76	VH
28. I am confident I will do well on the science tests.	3.76	0.77	H
29. I believe I can earn a grade of "A" in the science course.	3.44	0.86	H
30. Understanding the science gives me a sense of accomplishment.	4.17	0.84	H
Mean	**3.94**	**0.57**	**H**
Students' Academic Motivation	**3.98**	**0.44**	**H**

Note: M = mean, SD = Standard deviation, QD = Qualitative description: 1.00 – 1.79 = Very Low (VL), 1.80 – 2.59 = Low (L), 2.60– 3.39 = Moderately High (M), 3.40 – 4.19 = High (H), 4.20 – 5.00 = Very High (VH)

Academic Motivation factors in learning science manifested a high level (M = 3.98, SD =0.45). Students believe they could be more competent regardingtheir feelings about a specific assignment. Students believe that learning science can help their careers,as shown in item number thirteen (13), which manifested a very high level (M=4.26, SD=0.83).

Students believe that they can master the knowledge and skills in the science course, and this is indicated by their high level of positive perspective in learning science (M= 3.94, SD = 0.57).

Table 2. Descriptive levels of students' Science Process Skills (n=86)

	M	**SD**	**QD**
2.1 Science process skills using scientific knowledge			
1. I can use scientific knowledge to form a question	2.58	0.69	H
2. I can ask a question that can be answered by collecting data	2.71	0.80	H
3. I can design a scientific procedure to answer a question	2.85	2.26	H
4. I can communicate a scientific procedure to others	2.49	0.72	L
5. I can record data accurately	2.59	0.80	H
Science process skills using data	**2.79**	**0.65**	**H**
6. I can use data to create a graph for presentation to others	2.76	0.81	H
7. I can create a display to communicate my data and observations	2.67	0.71	H
Students' Science Process Skills	**2.64**	**0.75**	**H**

Note: M = mean, SD = Standard deviation, QD = Qualitative description: 1.00 – 1.74 = Very Low (VL), 1.75 – 2.49 = Low (L), 2.50 – 3.24 = High (H), 3.25 – 4.00 = Very High (VH)

Results in Table 2 showed that the respondents generally obtained high levels(M=2.64, SD = 0.75) in the Science Process Skills using scientific knowledge in learning science. Out of the eleven (11) questions in this variable, the students seem to have less-high interest in the question, stating, *"I can communicate a scientific procedure to others."* (M=2.49, SD=0.72). This means students are confident that they understand scientific knowledge and can use it to form or answer a question by collecting data and communicating scientific procedures to others.

On the other hand, students' level of Science Process Skills using data manifested a high level (M = 2.79, SD = 0.65). This shows they can use data to create presentations to explain and analyze scientific investigations. Students can also use science terms to share the results of their gathered data.

Table 3. Descriptive levels of students' Study Habits (n=86)

	M	SD	QD
3.1 Study habits for preparation to learn			
1. I arrive at classes and other meetings on time.	3.09	0.68	H
2. I devote sufficient study time to each of my courses.	2.95	0.70	H
3. I schedule definite times and outline specific goals for my study time.	3.09	0.76	H
4. I prepare a "to do" list daily.	3.09	0.70	H
5. I avoid activities which tend to interfere with my planned schedule.	2.64	0.82	H
6. I use prime time when I am most alert for study.	2.80	0.75	H
7. At the beginning of the term, I make up daily activity and study schedules.	3.03	0.71	H
8. I begin major course assignments well in advance.	2.71	0.70	H
Mean	**2.93**	**0.55**	**H**
3.2 Study habits for taking notes in class			
9. While I am taking notes, I think about how I will use them later.	3.23	2.17	H
10. I understand the lecture and classroom discussion while I am taking notes.	2.88	0.73	H
11. I organize my notes in some meaningful manner (such as outline format).	3.00	0.78	H
12. I review and edit my notes systematically	2.85	0.73	H
13. I take notes on supplementary reading materials.	2.87	0.79	H
Mean	**2.97**	**0.69**	**H**
3.3 Study habits in reading books			
14. I have a system for marking textbooks.	2.67	0.86	H
15. When reading, I mark, or underline parts I think are important.	3.15	0.79	H
16. I write notes in the book while I read	3.03	0.77	H
17. When reading, I can distinguish readily between important and unimportant points	3.00	0.70	H
Mean	**2.97**	**0.61**	**H**
Study habits for strategies in studying			
18. I break assignments into manageable parts.	2.74	0.69	H
19. I maintain a critical attitude during my study - thinking before accepting or rejecting.	2.87	0.73	H
20. I relate material learned in one course to materials of other courses	2.81	0.69	H
21. I try to organize facts in a systematic way.	2.83	0.75	H
22. I use questions to better organize and understand the material I am studying.	2.90	0.70	H
23. I try to find the best method to do a given job.	2.87	0.70	H
24. I solve a problem by focusing on its main point.	2.99	0.73	H
Mean	**2.86**	**0.57**	**H**
Study Habits	**2.92**	**0.51**	**H**

Note: M = mean, SD = Standard deviation, QD = Qualitative description: 1.00 – 1.74 = Very Low (VL),1.75 – 2.49 = Low (L), 2.50 – 3.24 = High (H), 3. 25 – 4.00 = Very High (VH)

Results in Table 3 showed that the respondents generally obtained a high level (M = 2.93, SD = 0.55) in the Study Habits preparation to learn in learning science. Out of the twenty-four (24) questions in this variable, the students are highly interested in the twenty-four (24) questions. This means students prepare for their studies before class, give value to their schedule to have sufficient study time, and avoid any interference that affects it.

Likewise, Study Habits for taking notes in class indicate a high result of (M = 2.97, SD = 0.69), which states students have understood their lesson during their class aside from taking down notes they can scan to review after a class discussion.

Study habits for reading books are high-level, as shown in the result (M= 2.97, SD = 0.61). Students look for reading materials related to their studies that help them gain more knowledge about the subject, which expands their ideas and is useful for having additional information before introducing another topic.

Study Habits for strategies in studying reveal students' strategies in learning are high level (M 2.86, SD = 0.57). Students use different learning strategies for them to better understand a lesson. They try to find the best method to do a task that helps them solve a problem fast.

Table 4. Correlation matrix among Academic Motivation, Science Process Skills, and Study Habits.

Factors	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***
Academic motivation interest in science	-										
Academic motivation factors inlearning science	.55	-									
Academic motivation positive perspective in learning science	.688*	.598*	-								
Academic Motivation	.894*	.767*	.889*	-							
Science process skillsusing scientific knowledge	.594*	.401*	.634*	.651*	-						
Science process skillsusing data	.561*	.438*	.697*	.657*	.807*	-					
Science Process Skills	.588*	.429*	.691*	.673*	.947*	.942*	-				
Study habits for preparation to learn	.527*	.365*	.611*	.580*	.580*	.603*	.620*	-			
Study habits for taking notes in class	.496*	.384*	.568*	.562*	.538*	.641*	.601*	.751*	-		
Study habits in reading books	.368*	.345*	.509*	.464*	.466*	.518*	.517*	.703*	.660*	-	
Study habits for strategies in studying	.518*	.476*	.671*	.628*	.634*	.721*	.704*	.676*	.733*	.706*	-

Study Habits	.521*	.426*	.650*	.613*	.635*	.697*	.692*	.893*	.900*	.830*	.862*

*Note: Cell contains Correlation coefficient, * Correlation is significant at the 0.05 level (2-tailed). r is interpreted using Cohen's Scale: -0.3 to +0.3 = weak, -0.5 to -0.3 or +0.3 to +0.5 = moderate relationship, -0.9 to -0.5 or +0.5 to +0.9 = strong relationship, -1.0 to - 0.9 or +0.9 to +1.0 = very Strong relationship.*

A significant relationship between Academic Motivation and Science Process Skills

The *Science Process Skills* had the highest level of correlation, a significantly positive and strong relationship, towards *Science Process Skills, using scientific knowledge r (86) =* 0.947.

Table 4 illustrates the correlation matrix among Academic Motivation, Science Process Skills, and Study Habits among BSEd science students. The correlation between Academic Motivation and science processing skills is 0. 673. It reveals that academic motivation in interest, factors, and positive perspective in learning science is significantly related to students' Science Process Skills. The study by Maison et al. [9] concluded that science process skills are related to students' interests.

A significant relationship between Academic Motivation and Study Habits

Academic Motivation and Study Habitscorrelate 0.613, which reveals that they have a strong relationship. Students' Study Habits are also affected by their interest in learning science, what motivates them, and how positive they are about it. In parallel with the study of Ebele &Olofu [10], there is a significant relationship between Study Habits and students' academic performance. Looyeh et al. [11] investigated the relationship between Study habits and Academic performance of Medical Sciences Students. They founda significant relationship between students' study habits and academic performance.

A significant relationship between Science Process Skills and Study Habits

Science Process Skills and Study Habits correlates 0.692. It shows that students' Science Process Skills using scientific knowledge and Science Process Skills using data are significantly related to Study Habits. Students must acquire basic process skills to attain good study habits.

A significant interrelationship between Academic Motivation, Science Process Skills, and Study Habits

The correlation between Academic Motivation and Science Processing Skills is strong, with a 0.673 coefficient. Academic Motivation and Study Habits correlateby 0.613, while Science Process Skills and Study Habits correlateby 0.692. Therefore, it reveals a significant result of the interrelationship among Academic Motivation, Science Process Skills, and Study Habits. In addition, they have a strong interrelationship since their correlation coefficient rate is +0.673, and Cohen's scale shows that the relationship is vital if the value is +0.5 to +0.9.

5. Conclusion

The findings showed that BSEd Science students had high Academic Motivation, which means that students are highly motivated to learn science. They also manifested high levels of science process skills, which means they can record data accurately, use scientific knowledge to form questions and analyze the results of a scientific investigation. Likewise, Study Habits are high because students devote sufficient time to each course and systematically review and edit their notes.

Moreover, we found a significant relationship between the student's level of academic motivation, science processing skills, and study habits in learning science. Therefore, the results of this study reveal that if the interests of the students surge, so do their levels of science processing skills and study habits.

6. Recommendation

This study revealed the interrelationship among Academic Motivation, Science Process Skills, and Study Habits among BSEd Science Students. Thus, the following recommendations are at this moment presented

1. The teachers may ensure that the lesson and contents in the science teaching-learning process are delivered effectively by initiating hands-on activities that relate to students' goals, help their careers, and boost their confidence to do well in science tests.
2. To maintain the students' high level of Science Process Skills, the school may conduct similar research that can help to monitor the scientific process of science education students, such as making new guide practical and repairing the facilities and infrastructure in the laboratory to improve students' Science Process Skills and to undertake and promote programs that uphold and enhance students'

Academic Motivation, Science Process Skills and, Study Habits in learning Science.

3. For the students to sustain their Study Habits, the parents may continue to support their children in their studies, including supervision and updates on their daily tasks and activities, and also for students to be responsible in their studies, avoid procrastination, and focus on the class.

4. For future researchers, we recommend having a broader scope study with a bigger sample size for more representative and conclusive findings. Additionally, to conduct research that investigates the same variable beyond the quantitative approach to document students' actual experiences,

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