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LEARNING ATTITUDE, ACADEMIC INTEREST AND SELF-EFFICACY TOWARDS PHYSICS SUBJECT OF GRADE 12 SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS STUDENTS

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ABSTRACT

The search for the best ways to improve students' learning attitude and academic interest in physics to understand its complexity was done even before the adaptation of blended learning. With this, students' self-efficacy in learning this subject matter becomes an interesting variable to explore, given that there is a change in the instruction delivery. The general purpose of this study is to determine which indicators of learning attitude and academic interest significantly influence the self-efficacy of students in the Science, Technology, Engineering, and Mathematics (STEM) strand. It also explores the significant link between learning attitude and academic interest to self-efficacy in Physics that will have an impact on students' learning towards the subject. The researchers utilized a non-experimental particularly a descriptive correlational design in quantitative research using statistical tools such as mean, Pearson product moment correlation of coefficient, and linear regression. To answer the main objective of this study, a modified survey questionnaire was provided to the 100 invited respondents having a Likert 5-point scale. It was found out that negative attitudes under learning attitude and perceived ease of use with learner's involvement for academic interest significantly influenced students' self-efficacy in learning Physics. It further shows that academic interest is highly correlated with learning self-efficacy in this subject matter. Learning attitude is sometimes evident among the respondents while academic interest and self-efficacy showed often observable. From these results, teachers should design effective learning strategies and continue motivating their students to engage in class discussion, as they express that they can get good results in learning Physics. Students should also develop a liking for this subject matter to learn actively without having any second thoughts even though it is challenging for them. Lastly, the findings of this study have significant implications for future research in the field of Physics education. Building upon the findings, future researchers can explore other factors that influence students' behavior and identify additional variables that contribute to the learning process. By doing so, future studies can be strengthened, leading to a more comprehensive understanding of the topic.

KEYWORDS: *Learning attitudes, academic interest, self-efficacy, learning Physics, and learners' involvement.*

INTRODUCTION

The field of physics has long been recognized as a challenging and complex subject among students in the realm of science. Due to its complexity which requires a high level of mathematical and conceptual understanding, many students have a hard time learning the Physics which results in decreasing their self efficacy towards the subject. This difficulty presents a significant obstacle for students at the secondary and tertiary levels, as well as adults pursuing graduate education. In Malaysia, according to Izaak (2015), students' attitudes towards Physics are somewhat unsatisfactory. Malaysian students generally struggle to excel in Physics due to a lack of interest in the subject, as interest in Physics tends to decline throughout the various stages of study. These students find Physics to be a challenging subject, primarily because it requires learners to engage with various forms of representation, including formulas, calculations, graphics, and abstract concepts. This complex learning process can make Physics appear difficult and unappealing to students.

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The findings of Lumintac (2014) in Surigao, Philippines, are consistent with the challenges faced by students in Malaysia. The negative attitude towards physics among students in the Philippines can be attributed to similar reasons, including the complex and abstract nature of the subject, the lack of hands-on activities and experiments, and inadequate teacher support. In order to improve teaching and learning in Physics, a measurement of students' attitudes towards the subject must be evaluated. Her study found that learners have a negative attitude toward physics and that their student performance in the subject is very low.

A study conducted in Digos City, Philippines, revealed that students with low self-efficacy towards a particular subject are likely to fail in it (Randy et al., 2014). These authors highlight that students who have low self-efficacy in Mathematics, a subject closely related to Physics, tend to experience lower academic achievement in both subjects. It suggests that the development of self-efficacy in Mathematics can positively impact academic success in related subjects, such as Physics.

Statement of the Problem

This study determined the association of learning attitude, academic interest and self-efficacy towards Physics subject of Grade 12 STEM students. It sought to answer the following questions :

1. What is the level of learning attitude of Grade 12 STEM students in terms of:
    1.1. Positive Attitude
    1.2. Negative Attitude
2. What is the level of academic interest of Grade 12 STEM students in terms of:
    2.1. Study Habits
    2.2. Perceived Ease of Use
    2.3. Learner's Involvement
3. What is the level of self-efficacy of Grade 12 STEM students in terms of:
    3.1. Mastery
    3.2. Problem Solving
    3.3. Testing
4. Is there a significant relationship between the learning attitude and self-efficacy towards Physics of Grade 12 STEM students?
5. Is there a significant relationship between academic interest and self-efficacy towards Physics of Grade 12 STEM students?
6. Is there a domain in learning attitude and academic interest that significantly predicts self-efficacy towards Physics subject of Grade 12 STEM students?

Hypotheses

The study was tested at 0.05 significance.

Ho1: There is no significant relationship between the learning attitude and self-efficacy of Grade 12 STEM students towards Physics.

Ho2: There is no significant relationship between the academic interest and self-efficacy of Grade 12 STEM students towards Physics.

Ho3: There is no domain in learning attitude and academic interest that significantly predicts self-efficacy towards Physics of Grade 12 STEM students.

Scope and Delimitation of the Study

The scope of this study is to investigate the relationship between the learning attitude, academic interest, and self-efficacy of Grade 12 STEM students towards the Physics subject and which indicators influence self-efficacy of the student's learning outcomes toward the subject.

The study is limited to current Grade 12 STEM students. The main objective of this study is to point out if there is a domain in learning attitude and academic interest that will significantly influence the self-efficacy of the students towards physics, and to determine whether these learning attitudes and academic interests hinder self-efficacy. Only the entire population of Grade 12 students who have chosen STEM as their strand or track and who take physics as one of their specialized subjects were focused on in this study.

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Definition of Terms

Learning attitude – a range of consistent learning behaviors which demonstrate the aspiration to achieve their best.
Academic interest – broadly defined as personal orientations towards activities that are intended to develop one's academic skills and knowledge
Self-efficacy – refers to an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments
Physics – is the branch of science that deals with the structure of matter and how the fundamental constituents of the universe interact
Learners' involvement – a measure that reflects the quantity and quality of a learner's participation in their courses and every other aspect of their educational program.

Review of Significant Literatures

Learning Attitude

According to Kapucu (2017), attitude is a mental preparation for action that determines physical actions based on one's belief, which determines what a person sees, thinks, hears, and does. It can also be defined as a belief that is embedded in people, similar to knowledge that aids in thinking and assessing external factors. An attitude can be either positive or negative.

Positive Attitude. Positive student attitudes toward Physics will have a sense of fun when the learning process takes place (Manasi et al., 2015). These authors stated that the pleasure of students in learning will have a more intensive character in learning. Students who have a great pleasure in learning Physics will affect Physics results. The enthusiasm for learning Physics among students can have a significant impact on their Physics performance. The positive correlation between students' enjoyment and their academic achievements in Physics indicates the predictive value of pleasure in the process of learning.

Negative Attitude. Mbonyiryivuze et al., (2021) highlights that many students find Physics to be a challenging subject and may struggle to understand the concepts or the mathematical equations involved can lead to a lack of attitude on their part, is a common perception among learners. When students find it hard to comprehend the subject or perceive it as too challenging, they may lose motivation and interest in Physics, which can lead to a pessimistic view of the subject. This negative outlook may pose a challenge to reversing their attitude towards Physics.

Academic Interest

Individual's interest is known to be an important internal factor that influences learning (Eryilmaza et al., 2017). Personal interest is known to be linked to one's own internal motivations. An internally motivated student likes to put his or her efforts into studying the subject he or she likes. Students with an interest in a subject like Physics are likely to be more motivated to manage their own learning and develop the requisite skills to become effective learners of Physics. Hence, interest in Physics is relevant when considering the development of effective learning strategies for Physics.

Study Habits. The study by Elwan et al. (2013) highlights the importance of effective study habits in learning Physics. The results indicate that high school students can improve their academic performance in Physics by adopting effective study habits, including reviewing lecture notes, practicing problem-solving, and seeking assistance from teachers as required. These habits are crucial for establishing a strong foundation in Physics.

Perceived ease of use. In the context of learning Physics, perceived ease of use is a critical factor that can affect students' attitudes towards the subject (Angell et al., 2014). These authors provide insights into the evolving focus of policy recommendations on how science education, including Physics, can be made relevant to students. The authors highlight the importance of making science education relevant to students' lives and helping learners understand scientific phenomena and cope with challenges in life.

Learners Involvement. According to Rotgans and Schmidt (2012) states that learner's involvement or "student's engagement" is a key element in motivating them to put out consistent effort during learning situations. To support, Cacioppo et al., (2014) states that educators who establish a positive and encouraging atmosphere for learning can

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improve students' academic performance. These instructors employ various approaches, such as delivering feedback, establishing high standards, and encouraging interactive learning, to stimulate and inspire their students.

Self Efficacy

Self-efficacy pertains to an individual's belief in their capability to execute a particular actions to accomplished a certain task. It is a constantly evolving aspect of an individual's self-concept that interacts with other elements such as their potential, accomplishments, motivations, and self-control tactics. Their academic achievement is higher because they are better at overcoming challenges, have higher goals, and are more self-assured (Gülten & Soytürk, 2013).

Mastery. According to McDermott et al. (2013), if students solely concentrate on problem-solving, they may prioritize algorithms over conceptual comprehension. This could impede their ability to apply Physics principles to practical situations. In essence, being able to solve problems alone does not ensure a profound level of understanding.

Problem Solving. Students who develop high problem-solving skills in Physics often feel more confident in their capabilities to learn (Adair & Polya, 2017). The ability to solve problems effectively is not a natural talent and can be improved through regular practice and receiving guidance. Physics teachers can facilitate the growth of these skills by creating learning activities that urge students to use their knowledge in real-life scenarios, prompt them to contemplate their problem-solving methods, and offer useful feedback on their progress.

Testing. Akin and Kurbanoglu (2012) suggest that testing is a critical component in the process of evaluating students' comprehension and utilization of essential concepts, mathematical skills, and problem-solving abilities in the realm of Physics education. Physics tests generally comprise a mix of multiple-choice, short-answer, and long-answer questions that assess students' understanding of theories, principles, and equations, and their capacity to apply them in diverse scenarios. The authors also emphasize that testing offers valuable feedback to both students and educators, enabling them to recognize areas of proficiency and deficiency and modify their teaching and learning methods correspondingly.

Theoretical/Conceptual Framework

This study was anchored from the Self-efficacy Model which was authored by Bandura in 1996. It explains here how a person's beliefs about their ability to succeed in a task or activity can affect their behavior, motivation, and achievement. The model suggest that students who have high self-efficacy beliefs are more likely to engage in the subject resulting to increased academic success whereas those with low self-efficacy are more likely to fail or avoid challenges in Physics. By developing self-efficacy through successful experiences, and positive feedback, students can increase their confidence to pursue challenging task and succeed in learning Physics.

Another supporting theory of this study was the 5E Inquiry-Based Instructional Model by Bybee and Landes in 1990. The 5E comprises five phases namely; Engage, Explore, Explain, Elaborate, and Evaluate. This instructional model suggests that with the help of task and problem-solving-based activities, students are actively engaged in the learning process, this is because it gives students the chance to explore the lesson that are interesting and relevant to them, which leads to more favorable attitudes and engagement with the subject.

METHODOLOGY

Research Design

The research design used in this study was a non-experimental quantitative approach, specifically the descriptive-correlation technique. This approach was chosen because the data collected naturally had existing attributes, and no manipulations or changes were introduced. Probability sampling, particularly the simple stratified sampling technique, was used to select 100 Grade 12 STEM students as respondents. Stratified sampling was chosen to increase the efficiency of the sample design with respect to survey costs and estimator precision. The researchers collected data using a modified survey questionnaire from similar studies on students' learning attitudes, academic interest, and self-efficacy, such as the Conception of Learning Physics and Self-Efficacy by Suprapto (2015) and Relationship Between Students' Interest and Self-Efficacy by Amedahe and Gyimah (2014), with a 5-Likert scale was used to interpret the findings; 5 as strongly agree; 4 as agree; 3 as neutral; 2 as disagree; and one as strongly disagree. The independent variables research instrument has 25 questions, consisting of 10 items in the student's learning attitude and 15 items

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in academic interest. There were 15 questions, or five problems in each indicator for the dependent variable. In general, there were 40 questions or items answered in the survey

Data Collection

In this study, the researchers sought permission from the school principal to conduct their research in the school as their chosen locale. To collect data for analysis, the researchers created Google Forms that included a clear explanation of the study's purpose, informed consent, and a rubric to guide participants. In order to minimize class disruption, the questionnaire was administered during vacant periods in each classroom. To ensure anonymity and confidentiality, each respondent was assigned a unique identification code, and their profiles would not be revealed or published. After one day of completion, the researchers used the tools provided by Google Forms to analyze the data. All answered questionnaires were kept confidential, and the data collected for the independent and dependent variables were combined and tabulated.

RESULTS AND DISCUSSION

CONCLUSION

This study aims to investigate the relationship between learning attitude, academic interest, and self-efficacy of Grade 12 STEM students towards Physics. The findings showed that the level of learning attitude was moderate, indicating that it was sometimes evident. Positive attitude had a high level of learning attitude,while negative attitude had a moderate level. Academic interest, study habits, and perceived ease of use had a high-level description, indicating they were often evident, while learners' involvement had a moderate description, indicating it was sometimes evident. The overall mean for self-efficacy towards Physics was high, indicating that it was often evident. Mastery, problem-solving, and testing had a high-level description and were often evident in self-efficacy. The Pearson Moment Correlation Coefficient analysis revealed that there is no significant relationship between the learning attitude and self-efficacy of the Grade 12 students towards Physics. The researchers then were not able to reject the null hypothesis, implying that a student’s attitude does not necessarily affect their self efficacy towards this subject. On the other hand, it was found out that there is a strong significant relationship between the academic interest and self-efficacy, thus the null hypothesis was rejected, indicatingthat students who have higher level of interest will also have higher level of self-efficacy in learning Physics.

The Linear Regression analysis showed that perceived ease of use, and learners' involvement significantly influenced self-efficacy of the students towards Physics, and the null hypothesis was rejected. Conversely, positive attitude and study habits showed no significant link with self-efficacy.

Recommendations

The researchers make the following recommendations based on the findings and inferences made from the study. DepEd officials should organize workshops, in-service training, and refresher courses to improve the learning experience of students and Physics teachers. School head should design after-school programs tailored to students' needs to help them overcome challenges and excel in Physics. Physics teachers should develop a variety of learning activities to cater to different learning styles and abilities, create a supportive learning environment, provide positive feedback and convey that learning Physics can be enjoyable and rewarding. Parents should play a key role in supporting their children's learning, including Physics, by providing a supportive home environment, encouraging questions, providing access to resources, modeling a positive attitude, and seeking help from teachers or online resources. Student’s active participation in class discussions and asking questions can help students develop a liking for Physics and learn more actively even though it is challenging for them. Future researchers can explore other factors that influence students' engagement and identify additional variables that contribute to the learning outcomes of the students. By doing so, future studies can be strengthened, leading to a more comprehensive understanding of the topic.

REFERENCES

1. *Abdu, M. A., & Sulaiman, M. A. (2017). An overview of Nigeria's national policy on education and the millennium development goals. Journal of Education and Practice, 8(2), 17-25*
2. *Adair, J. & Polya G. (2017). Decision Making and Problem Solving (Translated by N. Kalayci). Ankara: Gazi Bookstore. https://doi.org/10.5539/jel.v7n4p191*

3. *Akin, A., & Kurbanoglu, N. (2017). The relationship between math anxiety, math attitude and self-efficacy: A structural equation model. Studia Psychologica, 53(3), 263-273. the relationships between math anxiety, math attitudes, and self-efficacy: a structural equation model*
4. *Amedahe, F.K. & Gyimah, K. (2014). Introduction to research methods in education. Unpublished. Cape Coast: University Presshttps://www.researchgate.net/publication/342453651_Relationship_betwe en_Students'_Interest_and_Academic_Performance_in_Mathematics_A_ Study_of_Agogo_State_College*
5. *Angell, C., Guttersrud, Ø., Henriksen, E. K. & Isnes, A. (2014). Physics: Frightful, but fun, Pupils' and teachers' views of physics and physics teaching (Electronic version). Science Education, 88, 683-706. https://files.eric.ed.gov/fulltext/EJ1095264.pdf*
6. *Bandura, A. (1996). Analysis of self-efficacy theory of behavioral change. Cognitive Therapy and Research, 1(4), 287-310. https://link.springer.com/article/10.1007/BF01663995*
7. *Bersano, C. (2016). Online participation in authoritarian contexts: A review of the literature. Information, Communication & Society, 19(6), 747-764.*
8. *Bybee, R., & Landes, N. M. (1990). Science for life and living: An elemtary school science program from Biological Science Improvement Study (BSCS). The American Biology Teacher, 52(2), 92-98.*
9. *Cacioppo, J., Petty RE, Feinstein JA, Jarvis WBG (2014). Disposition differences in cognitive motivation: the life and times of individuals varying in need for cognition. Psychological Bulletin. 1996; 119:197-25. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5569131*
10. *Darmaji, D., Dwi, A., Kurniawan, I., & Irdianti. (2019). Physics education students' science process skills. International Journal of Evaluation and Research in Education (IJERE), 8(2), 293–298.*
11. *Elwan, A. A. Serage, M. & Alwan, A. (2013). The institutional factors affecting the achievement in Physics in Tripoli, Libya https://vfast.org/journals/index.php/VTESS/article/view/46*
12. *Eryilmaz, A., Yildiz, I. & Akin, S. (2017). "Investigating of Relationship between Attitudes towards Physics Laboratories, Motivation and Amotivation for the Class Engagement". Eurasian Journal of Physics and Chemistry Education. 59-64.*
13. *Gülten, D. and Soytürk, I. (2013). Elementary 6th grade students' relationship between geometric self-efficacy and academic achievement grade averages. Mehmet akif Ersot University Faculty of Education Magazine, 13(25), 55-70. https://socratesjournal.org/index.php/pub/article/download/37/31*
14. *Guido, R. M. (2012). Attitude and Motivation towards Learning Physics. International Journal of Engineering Research & Technology, 2087-2094. https://www.researchgate.net/publication/325008799_Attitude_and_Motivation_towards_Learning_Physics*
15. *Izaak, H. W. (2015) The correlation study of interest at Physics and knowledge of mathematics basic concepts toward ability to solve Physics problems of 7th grade students at junior high school in Ambon Maluku Province, Indonesia. Education Research International, 1-6. http://dx.doi.org/10.1155/2015/396750*
16. *Jong, A. L. M., & Hessler, M. G. M. (2012). Knowledge of Problem Situations in Physics: A Comparison of Good and Poor Novice Problem Solvers. Learning and Instruction, 1(4), 289-302. https://doi.org/10.1016/0959-4752(91)90010-6*
17. *Kapucu, Serkan. (2017). Predicting physics achievement: Attitude towards physics, self-efficacy of learning physics, and mathematics achievement. Asia-Pacific Forum on Science Learning and Teaching. 18. https://doi.org/10.1126/science.aaa6760*
18. *Kohl, P. B., Rosengarnt, D., & Finkelstein, N. D. (2014). Comparing Explicit and Implicit Teaching of Multiple Representation Use in Physics Problem Solving. Physics Education Research Conference, 883, 145-148 https://doi.org/10.1063/1.2508713*
19. *Lumintac, M. T. (2014). Students' Negative Attitude to Physics Influences Low Academic Achievement. IAMURE International Journal of Education, 12(1). https://doi.org/10.7718/iamure.ije.v12i1.942*
20. *Manasi Echaune, J. Ndiku, & Sang, A. (2015). Parental Involvement in Homework and Primary School Academic Performance in Kenya. Journal of Education and Practice. https://www.semanticscholar.org/paper/Parental-Involvement-in-Homework-and-Primary-School-Echaune-Ndi/5931a6183dd23d956a8441f5065104e3d306218f*
21. *McDermott, L., D. P. and Simon, H. A. (2013). Expert and novice performance in solving physics problems. Science 208, Pp. 1335-1342. https://www.researchgate.net/publication/232964086_Exploring_the_Development_of_Conceptual_Understanding_throug h_Structured_Problem-solving_in_Physics*
22. *Mbonyiryivuze, A., Yadav, L. L., & Amadalo, M. M. (2021). Students' attitudes towards physics in Nine Years Basic Education in Rwanda. International Journal of Evaluation and Research in Education (IJERE), 10(2), 648. https://doi.org/10.11591/ijere.v10i2.21173*
23. *Rotgans, J.I. & Schmidt, H.G. (2012). The role of teachers in facilitating situational interest in an active-learning classroom. Teaching and Teacher Education, 27, 37-42. https://doi.org/10.1016/j.tate.2010.06.025*

24. *Suprapto, N., & Chang, T.-S. (2015). Research on university student's self- efficacy scale in science education: A systematic review. Proceeding of International Conference on Science and Science Education (IConSSE 2015) (pp 120-129), Faculty of Science and Mathematics, Satya Wacana Christian University, Indonesia 2015). Parental Involvement in Homework and Primary School Academic Performance in Kenya. Journal of Education and Practice.*
25. *Ugwu, D. U., Fagbenro, A. B. & Akano B. U. (2019). Assessment of the effectiveness of Physics teaching in senior secondary schools, Owerri Education Zone of Imo State. International Journal of Education and Evaluation, 5(5), 1-9. https://www.iiardjournals.org/get/IJEE/VOL.%205%20NO.%205%202019/ASSESSMENT%20OF%20THE%20EFFECTIVENESS.pdf*
26. *Veloo, R. N. (2015). Attitude towards Physics and Additional Mathematics Achievement towards Physics Achievement. International Education Studies, 35-43. https://files.eric.ed.gov/fulltext/EJ1060855.pdf*
27. *Woo, S. E., Harms, P. D., & Kuncel, N. R. (2017). Integrating personality and intelligence: Typical intellectual engagement and need for cognition. Personality and Individual Differences, 43(6), 1635–1639. https://doi.org/10.1016/j.paid.2007.04.022*