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Satisfaction on Blended Learning and Attitude towards Learning Science: A Prediction Model on Motivation to Achieve Academically

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Abstract
The study determines the influence of satisfaction on blended learning and attitude towards learning science on motivation to achieve academically among senior high students in Davao Region. A descriptive correlational research design was employed in a stratified random sampling technique, with a sample of 300 senior high students under Academic Track – Science, Technology, Engineering and Mathematics (STEM) Strand. The results revealed that the levels of satisfaction on blended learning, attitude towards learning science, and motivation to achieve academically were all high. There was a significant relationship and a weak correlation between satisfaction on blended learning and motivation to achieve academically, and attitude towards learning science and motivation to achieve academically. Moreover, the attitude towards learning science has more influence on the motivation to achieve academically. Nonetheless, the motivation to achieve academically helped the teachers to determine interventions on how to implement blended learning effectively in order to have a good attitude towards learning science.

Keywords: Satisfaction on blended learning, attitude towards learning science, motivation to achieve academically, Philippines

1. Introduction

Following the pandemic outbreak, a lot of things have changed. In the field of education, studies revealed that one of the primary challenges is the decline of student motivation (Teodorescu et al., 2021) [1]. The reason for this is that students lack social interaction which is a great factor to boost one's motivation to succeed in life. Abdillah and Sueb (2022) identified that one of the elements impacted by the adoption of blended learning is the motivation of students to learn. [2] With this identified alarming problem, researchers conducted various studies in relation to motivation. This study addresses the 4th Sustainable Development Goal which ensures an inclusive and equitable education for all.

In the study of Gustiani (2020), it was found out that students' motivation toward their learning was intrinsically affected more by their ambition to learn new knowledge and enjoyment in experiencing new learning activities [3]. At the same time, it was also influenced extrinsically by external regulation and environmental condition. His idea was supported by the study of Teodorescu et al. (2021) that lack of motivation is due to poor external support [1]. Most students learn alone since the outbreak began, resulting to loss of motivation in learning. For instance, in Indonesia, schools may resume to limited face-to-face classes, subject to adherence to health protocols and vaccinations initiatives for teachers. This

requirement has influenced how both teachers and students view the transition in learning activities during and after the pandemic. The sudden shift from online and remote learning to a combination of in-person and blended learning could impact student's motivation to learn (Abdillah & Sueb, 2022) [2].

The academic motivation of the students plays a vital role in their academic achievement. As mentioned in the study of Mehndroo (2020), motivation is the main factor for the people's actions, desires and needs. The positive impact of motivation on academic achievement has also been explained in this study. The following explains how motivation affects academic achievement: 1) motivation affects cognitive processes and psychological states, 2) motivation affects learners' achievement level to their environmental perception, 3) motivation affects determination level and energy, and 4) motivation affects behavior and perceptions of learners. This means that motivation, may it be intrinsic or extrinsic, it greatly affects the individual holistically [4].

Blended learning refers to the combination of face-to-face learning and e-learning (Osman & Hamzah, 2020). This learning modality is adapted by most of the schools especially amidst pandemic, since most students cannot be catered at the same time in the school setting. Yet, researches show that with blended learning in school, it gives a positive impact on student's interest and motivation [5]. The study of Zhafirah et al. (2020) agrees with the idea that blended learning can enhance the motivation of the students supported with Google Classroom, Solar System Scope and Discovery learning model [6]. However, as stated by Wyman (2018) in his study, blended students had a difficulty with concepts, vocabulary, physiological processes, anatomy and critical thinking abilities, because most students fail to complete online assignments before attending face-to-face session and activities [7]. The importance of motivation of the students must be strengthen in order for them to continue learning even in difficult times.

Dowdy (2020) viewed blended learning with more opportunities for the students to learn online and face-to-face. It can be deduced that with the integration of technology in learning, 21st century skills can be developed and enhanced, in which many students lack [8]. In the Philippine setting, Tupas and Laguda (2020) perceived blended learning as a helpful modality that positively engages students to learning activities with increased learning behavior towards learning. At the same time, it empowered the students to be good leaders, coaches and mentors to classmates. But the lack of facilities, especially gadgets or computer sets, and even internet connection is the biggest challenge for the Department of Education. This identified concern was communicated to various government agencies and private sectors to support the education sector during the emergence of the pandemic outbreak [9].

Due to the sudden closure of schools amidst pandemic, it can be assumed that the attitude of the students toward learning may have changed. A study of Mirahmadizadeh et al. (2020) indicates that despite the outbreak condition, students still manifested enthusiasm towards learning. For instance, the study of 7 regarding motivation and attitudes of students on Physics subject, it is reflected that there is a positive relationship between motivation and the student attitudes towards the subject [10]. It was confirmed that motivation is very essential in enhancing students' attitude towards learning. It can be inferred that both variables are interconnected to each other.

This study is anchored with Technology Acceptance Model (TAM) by Davis (1989), that would predict the users' willingness when using a specific technology. This will emphasize the attitudes of students towards their specific action, specifically their motivation. The main variables in this model are the perceived usefulness and the perceived ease of use which influence the user behavioral intentions using technology. Also, the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) of Venkatesh et al. (2003) supports the study, which investigate the factors influencing students' intentions towards

Learning Management System (LMS) and its use. Furthermore, it helps to explain students' acceptance on technology based on external factors. The Social Cognitive Theory of Bandura (1986) supports the study that highlights the ongoing interplay between individuals, their actions, and their surroundings. Positive experiences, role models, and encouragement can enhance science self-efficacy, that leads to greater enjoyment and higher likelihood to study science. The Achievement Goal Theory (AGT) by Carol Ames, Carol Dweck, Martin Maehr and John Nicholls (1970) also supported this study. It is a primary theoretical framework for understanding students' motivation to learn. It further explains students' performance because their behavior and motivation can be understood as they engage in the learning activities inside the classroom.

In this study, the independent variables are Satisfaction with Online Learning and Attitudes toward Learning Science. The Satisfaction on Blended Learning of the students determines the key factors of students' satisfaction in terms of perceived usefulness (PU), learner's e-learning self-efficacy (ELSE), perceived ease of use (PEOU), student-instructor interaction in in-class meetings (SII), and instructor's performance (IP). PU determines the behaviors and attitudes of the students in participating in their courses. ELSE predicts whether students try their best to understand the system or not. PEOU refers to the acceptance and satisfaction of the user's expectations with the new learning system. SII refers to the student's interest in learning with their mentor. IP determines the proper skills that fully adapt with the new technological advancements, as well as to properly guide the students [11]. Attitude towards Learning Science of the students focuses on the attitudes of students in terms of science enjoyment (SE), science confidence (SC) and importance of science (IS). SE refers to the pleasure students feel in science class. SC refers to the evaluation of students' perceived abilities and capabilities towards science. IS refers to the importance of learning activities in science class [12]. Motivation to achieve academically is the dependent variable of the study. This variable is dependent on students' satisfaction on blended learning and attitude towards learning science. This focuses on the internal process of the students that energize, direct and sustain their individual behavior in their academics. It will be measured in terms of striving for excellence (SFE), desire to learn (DTL) and personal incentives (PI). SFE refers to the standards, goals, tasks, effort, values and ability. DTL refers to interest, learning from others, and responsibility for learning. PI refer to extrinsic, intrinsic and social rewards [13].

This research study aims to unravel series of questions concerning the experiences and motivations of Senior High students in the context of blended learning. First, it seeks to determine the level of satisfaction on blended learning in terms of perceived usefulness, e-learning self-efficacy, perceived ease of use, student-instructor interaction, and instructor's performance. Second, it seeks to determine the level of attitude towards learning science in terms of science enjoyment, science confidence, and importance of science. Third, it seeks to determine the level of motivation to achieve academically in terms of striving for excellence, desire to learn, and personal incentives. Fourth, it investigates whether there is a significant relationship between students' satisfaction on blended learning and their motivation to achieve academically, as well as between their attitude towards learning science and their motivation to achieve academically. Finally, it aims to determine if satisfaction on blended learning and attitude towards learning science can serve as predictors on motivation to achieve academically.

2. Method

Research Respondent

A total of 318 Senior High School students under the strand of Science, Technology, Engineering and

Mathematics (STEM) who experienced blended learning were taken as respondents of this study from five private institutions in Davao City based on the calculations of Raosoft Sampling Calculator using stratified random sampling. In this study, the criteria of the respondents were: 1) the respondent must be a senior high school student under Academic Track – STEM Strand; and 2) the respondent must have experienced blended learning.

Materials and Instrument

The researcher used a descriptive survey questionnaire adapted from Dinh et al. (2021), Huang et al. (2019) and Njiru (2003). The questionnaire is divided into three parts. The first part pertains to the Satisfaction on Blended Learning that consists of 32 items with six factors. In the original instrument, there was another indicator Perceived Satisfaction (PS) which was excluded by the researcher of this study because it was redundant to the overall satisfaction construct. The second part pertains to the Attitude towards Learning Science that consists of thirty (30) items with three constructs. The third part pertains to the Motivation to Achieve Academically that consists of fifty (50) items with three aspects. The instrument was modified to make it appropriate for the study. The adapted questionnaires were validated by three validators. It was pilot tested to 20 Senior High School STEM students from The University of Mindanao. After the retrieval of the questionnaires, the statistician analyzed the data using Cronbach's alpha 0.7. The result of the pilot testing was, there were no items omitted, all items were retained.

Design and Procedure

This study used a quantitative non – experimental, descriptive – correlational research design to determine the relationship of Satisfaction on Blended Learning and Attitude towards Learning Science, the independent variables, to predict the Motivation to Achieve Academically, the dependent variable. The use of mediation technique is to explore relationships between variables and to identify potential mechanisms underlying those relationships.

The results were analyzed using the following statistical treatments: (1) Mean was used to describe the satisfaction on blended learning, attitude towards learning science, and motivation to achieve academically; (2) Standard Deviation was used to determine how the data is dispersed in relation to the mean; (3) Pearson Product Moment Correlational was used to determine the significant relationship between satisfaction on blended learning, attitude towards learning science, and motivation to achieve academically; and (4) Regression was used to identify the predictors of motivation to achieve academically.

The researcher implements research ethical considerations and standards adherence to the University of Mindanao Ethics Review Committee. All means of communications has been made with approval to conduct the current study from the different private school officials with appropriate documentation. These documents were secured with consent and authorization to gather samples needed in the completion of the study. The data obtained was bounded with privacy and confidentiality to fully protect the participants' rights in compliance with the Data Privacy Act of 2012.

3. Results and Discussion

The Table 1 shows an overall mean of 3.81, indicated as High, with a variability of 0.55. This implies that the Satisfaction on Blended Learning among senior high students were highly manifested, most especially because of the instructor's performance. This result supported the study of Dinh et al. (2021) that instructor's performance plays a significant role to drive students to learn better in blended learning [11]. Therefore, by employing various innovative teaching strategies, and fostering a supportive e-learning

environment, teachers can inspire students to actively participate in the learning process and be satisfied with blended learning.

Table 1: Level of Satisfaction on Blended Learning of Senior High Students

Indicators	SD	Mean	Descriptive Level
Perceived Usefulness	0.81	3.51	High
E-learning Self-efficacy	0.74	3.66	High
Perceived Ease of Use	0.74	3.77	High
Student-instructor Interaction	0.65	4.00	High
Instructor's Performance	0.72	4.13	High
Overall	**0.55**	**3.81**	**High**

Level of Attitude towards Learning Science of Senior High Students

Table 2 shows the overall mean score of 3.79 and a variability of 0.56 indicated a generally high level of positive perception towards science, with a strong consensus among students. These findings suggest that while students enjoy and value science, efforts may be needed to boost their confidence in the subject.

The result conveys that the attitude towards learning science depends on how they find enjoyment in science. Specifically, in doing scientific experiments, as reflected in the questionnaire. This result supports the study conducted by Dhanapal and Shan (2014), that students' attitude in learning science is high especially when hands-on experiment is involved, because they were able to enjoy learning and also build their interest in learning [14]. In essence, by incorporating hands-on experiments in science education, it can lead to a positive effect on their motivation to learn the subject (Janstova & Zdobinska, 2023) [15].

Table 2: Level of Attitude towards Learning Science of Senior High Students

Indicators	SD	Mean	Descriptive Level
Science Enjoyment	0.66	4.04	High
Science Confidence	0.68	3.34	Moderate
Importance of Science	0.60	3.98	High
Overall	**0.56**	**3.79**	**High**

Level of Motivation to Achieve Academically of Senior High Students

Reflected in Table 3 shows the overall mean of 3.98 and a variability of 0.56 indicated a generally high level of motivation and drive among students, with a strong consensus on the importance of striving for excellence and maintaining a desire to learn. These results highlight a positive learning culture where students are eager to excel and are motivated by both internal and external factors. The result indicates that the motivation to achieve academically relies on one's desire to learn. As mentioned in the survey questionnaire, most of the respondents try to learn from others who are better in studies than him/her. This result has supported that students are highly motivated to learn because of their desire to attain achievements in relation to their exams to get high grades (Davidovitch & Dorot, 2023) [16], and its inherent interests, self-fulfillment and enjoyment (Syamsuddin, 2021) [17]. Basically, students want to learn when they feel like it. For instance, the willingness to learn from the teacher, or to someone who knows better than yourself, is predetermined by wanting to explore new things, embracing new adventures,

taking initiatives, engaging in learning, and valuing the journey of the aftermath (Hotifah et al., 2020) [18].

Table 3: Level of Motivation to Achieve Academically of Senior High Students

Indicators	SD	Mean	Descriptive Level
Striving for Excellence	0.59	4.01	High
Desire to Learn	0.57	4.07	High
Personal Incentives	0.65	3.86	High
Overall	**0.56**	**3.98**	**High**

Significance on the Relationship between Satisfaction on Blended Learning and Motivation to Achieve Academically of Senior High Students

As displayed in Table 4 the result of the significance on the relationship between satisfaction on blended learning and motivation to achieve academically of senior high students where the result implies a significant relationship between satisfaction on blended learning and motivation to achieve academically, as reflected by the p-value of .000 and a correlation coefficient of 0.484. Thus, the null hypothesis is rejected. This suggests that general satisfaction on blended learning experience is a significant driver of students' motivation to achieve academically. Based on the result, the SII has the highest correlation coefficient, which signifies that having a good and effective interaction between the student and the teacher contributes in their motivation to achieve academically. This result is supported by the study of Zeqiri et al. (2020) that the most important factor students' satisfaction and performance is the result of student-teacher interaction. With blended learning, it increases the level of interaction of teachers and students, that may lead them to be motivated to achieve academically. There will be an improvement of satisfaction and motivation in the blended learning process [19]. It also conforms with the results of the study of Munawarah and Novianty (2020) that interactions between the lecturers and students, which may include being accessible to them, understanding their feelings, giving support and showing impartiality, may affect student learning motivation [20].

Table 4: Significance on the Relationship between Satisfaction on Blended Learning and Motivation to Achieve Academically of Senior High Students

Satisfaction on Blended Learning	Motivation to Achieve Academically			
	Striving for Excellence	Desire to Learn	Personal Incentives	**Overall**
Perceived Usefulness	.362**	.342**	.314**	.364**
E-learning Self-efficacy	.296**	.317**	.237**	.303**
Perceived Ease of Use	.366**	.374**	.318**	.378**
Student-instructor Interaction	.412**	.386**	.335**	.405**
Instructor's Performance	.382**	.367**	.318**	.381**
Overall	**.480****	**.471****	**.402***	**.484****

Significance on the Relationship between Attitude towards Learning Science and Motivation to Achieve Academically of Senior High Students

As shown in Table 5, the result of the significance on the relationship between attitude towards learning

science and motivation to achieve academically of senior high students is where the result implies a significant relationship between attitude towards learning science and motivation to achieve academically, as reflected by the p-value of .000 and a correlation coefficient of 0.642. Thus, the null hypothesis is rejected. The correlations highlight that students' attitude towards science, especially in enjoyment and recognition of its importance, were key drivers of their academic motivation, encouraging them to strive for excellence and maintain a strong desire to learn. As reflected, IS has the highest correlation coefficient, which signifies that valuing the importance of science in a student's life contributes in their desire to achieve academically. As mentioned in the study of Wood (2019) that in order for the students to value and motivate themselves, they must recognize the relevance of the learning activities. This will enable them to create academic progress and enhance their competence [21]. The study of Capunitan et al. (2023) also affirms that motivation of the students corresponds with their satisfaction and importance of the learning experience of the course [22].

Table 5: Significance on the Relationship between Attitude towards Learning Science and Motivation to Achieve Academically of Senior High Students

Attitude towards Learning Science	**Motivation to Achieve Academically**			
	Striving for Excellence	Desire to Learn	Personal Incentives	**Overall**
Science Enjoyment	.538**	.527**	.424**	.531**
Science Confidence	.491**	.478**	.455**	.510**
Importance of Science	.629**	.656**	.527**	.646**
Overall	**.631****	**.631****	**.536****	**.642****

Significance on the Influence of Satisfaction on Blended Learning on Motivation to Achieve Academically of Senior High Students

The Table 6 showed the result of the significance on the influence of satisfaction on blended learning on motivation to achieve academically of senior high students. As indicated by the F-value of 19.334 with a corresponding p-value of 0.000, the regression model is therefore significant, thus, the null hypothesis is rejected. The study revealed that the standard coefficient of perceived usefulness has the highest beta of .173. It indicates that perceived usefulness has the greatest influence on the motivation to achieve academically of senior high students, compared to student-instructor interaction with .156, instructor's performance with .125, e-learning self-efficacy with .099, and perceived ease of use with .085, respectively. This result is in alignment with the results of several studies conducted. According to Dinh et al. (2021) that perceived usefulness reflects the extent to which individuals believe that using a specific system will enhance their performance [11]. It was a significant predictor to be motivated in their academic achievement. Also, it was supported by the study of Zhafirah et al. (2020) that blended learning has a positive impact to student's motivation, especially when they can use their phone or any application to discover, that is when they were motivated to learn. At the same time, online activities provided were useful for the students that could positively impact the work they completed on their own [6].

Table 6: Significance on the Influence of Satisfaction on Blended Learning on Motivation to Achieve Academically of Senior High Students

Motivation to Achieve Academically				
Satisfaction on Blended Learning	B	β	t	Sig.
Constant	2.094		10.521	.000
Perceived Usefulness	.120	.173	2.940	.004
E-learning Self-efficacy	.076	.099	1.601	.110
Perceived Ease of Use	.065	.085	1.193	.234
Student-instructor Interaction	.135	.156	1.788	.075
Instructor's Performance	.098	.125	1.472	.142

Significance on the Influence of Attitude towards Learning Science on Motivation to Achieve Academically of Senior High Students

Shown in Table 7, the result of the significance on the influence of attitude towards learning science on motivation to achieve academically of senior high students. As indicated by the F-value of 85.192 with a corresponding p-value of 0.000, the regression model is therefore significant, thus, the null hypothesis is rejected. It could be stated that there is a variable that can predict the motivation to achieve academically of senior high students. The results revealed that the standard coefficient of importance of science has the highest beta of .485. It indicates that importance of science has the greatest influence on the motivation to achieve academically of senior high students, compared to science confidence with .153 and science enjoyment with .108, respectively. The result of this study was reinforced by the study of Chan and Norlizah (2017) that female students have higher motivation because they found relevance in their life. Therefore, instructors may conduct their teaching to enhance motivation by establishing relevance. For instance, instructors can demonstrate the relevance of their lessons by using real-life examples and connecting the material to everyday applications, incorporating newsworthy topics, providing local examples, and linking theory to practical situations [23]. Furthermore, the study of AlAli and Wardat (2024) emphasizes that STEM education deals with connection of knowledge with everyday life. It helps learners see how scientific principles, mathematical concepts and engineering practices relate to and can be applied in their everyday lives. This connection boosts students' motivation and engagement with STEM subjects by highlighting their practical importance [24].

Table 7: Significance on the Influence of Attitude towards Learning Science on Motivation to Achieve Academically of Senior High Students

Motivation to Achieve Academically				
Attitude towards Learning Science	B	β	t	Sig.
Constant	1.391		8.361	.000
Science Enjoyment	.092	.108	1.723	.086
Science Confidence	.126	.153	2.628	.009
Importance of Science	.450	.485	8.348	.000

Significance on the Influence of Satisfaction on Blended Learning and Attitude towards Learning Science on Motivation to Achieve Academically of Senior High Students

Table 8 showed the result of the significance on the influence of satisfaction on blended learning and attitude towards learning science on motivation to achieve academically of senior high students. As indicated by the F-value of 118.608 with a corresponding p-value of 0.000, the regression model is therefore significant, thus, the null hypothesis is rejected. The results revealed that the standard coefficient of attitude towards learning science has the highest beta of .546. It indicates that attitude towards learning science has the greatest influence on the motivation to achieve academically among senior high students, compared to satisfaction on blended learning. The result shows that attitude towards learning science influences more the motivation to achieve academically. As mentioned by Bachtiar in Astalini et al. (2019) that students with a positive attitude towards certain subjects tend to be more diligent in their learning which helps them achieve better results. Besides, there is a relationship between motivation and attitude, that if motivation rises, then the attitude also rises [25].

Table 8: Significance on the Influence of Satisfaction on Blended Learning and Attitude towards Learning Science on Motivation to Achieve Academically of Senior High Students

Motivation to Achieve Academically				
Variables	B	β	t	Sig.
Constant	1.288		6.990	.000
Satisfaction on Blended Learning	.166	.163	3.104	.002
Attitude towards Learning Science	.544	.546	10.394	.000

The result of this study indicates that attitude towards learning science has a greater influence on academic motivation than satisfaction with blended learning. For science educators, this means placing emphasis on strategies that inspire curiosity, engagement, and a positive emotional connection to science topics. Educators can prioritize activities that spark students' intrinsic interest in science, like hands-on experiments, real-world applications of scientific concepts, and inquiry-based learning.

4. Conclusion

The findings revealed that the level of satisfaction on blended learning, attitude towards learning science, and motivation to achieve academically is high, as perceived by senior high students in Davao City. The high result is evident in the overall mean score of the indicators. For the attitude towards learning science indicators, science enjoyment and importance of science, the result is high, while science confidence is moderate. For the motivation to achieve academically all indicators obtained a high rating. When correlated, it showed a significant relationship and a low correlation between satisfaction on blended learning and attitude towards learning science on motivation to achieve academically. The attitude towards learning science highly predicts the students' motivation to achieve academically than satisfaction on blended learning.

The result of this study supports the idea of Technology Acceptance Model (TAM) by revealing that learners were satisfied with the said technology when they found it useful. It also contributes in the Social Cognitive Theory (SCT) by revealing that when they found greater enjoyment, they are motivated to learn science, such as to do activities that were meaningful and full of discovery. Lastly, the result of the study

strongly supports the Achievement Goal Theory (AGT) that the primary motivation is to complete a task for self-improvement and learning.

The implication for science teaching is that educators should continue leveraging the strengths of blended learning by ensuring that it remains engaging and effective. In addition, while students enjoy and recognize the importance of science, efforts should be made to build their confidence in scientific skills through supportive, confidence-boosting instructional practices. This can be achieved through hands-on learning, positive reinforcement, and opportunities for students to experience success in scientific activities. On top of that, educators should capitalize on the students' high motivation by fostering a learning environment that challenges them to strive for excellence while nurturing their intrinsic desire to learn.

5. Recommendation

It is essential to enable learners to fully appreciate and make effective use of online platforms as part of their education. In the context of STEM education, acquiring 21st-century skills is crucial. Among these skills, information and communication technology (ICT) skills are particularly important. By familiarizing students with online tools and resources, educators help them develop competencies that are critical for success in the modern world. Mastery of these skills not only enhances their academic experience but also prepares them for future careers where technological proficiency is increasingly important. Thus, integrating and emphasizing the use of online platforms in education supports the development of these essential skills and aligns with the demands of a technology-driven society. Engage the learners to practical activities like hands-on experiments, field trips, and other meaningful activities to build science confidence. Furthermore, to support the Sustainable Development Goal on Quality Education, a critical emphasis must be placed on fostering positive attitudes toward science education. This can be achieved by promoting inquiry-based learning, hands-on experiments, and real-world applications, which engage students and make science more relevant and meaningful.

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