American Journal of Educational Research, 2023, Vol. 11, No. 4, 175-182
Available online at http://pubs.sciepub.com/education/11/4/1
Published by Science and Education Publishing
DOI:10.12691/education-11-4-1

Individual, Motivational, and Social Support Factors Towards Learning Mathematics of University Students in the Blended Learning Approach

Dishelle Anne T. Hufana*, Melanie G. Gurat

School of Graduate Studies, Saint Mary's University, Bayombong, Nueva Vizcaya, Philippines
*Corresponding author: hed-dahufana@smu.edu.ph

Received February 25, 2023; Revised April 02, 2023; Accepted April 10, 2023

Abstract The broad range of emotional factors that affect learning on the sudden change of the learning modality in Mathematics led to this study. This study aimed to compare the level of support factors that greatly affect the students' learning in mathematics in a blended learning approach. Sex, age, and relationship status were considered grouping variables on the individual, motivational, and social support factors towards learning mathematics in the blended learning mode of thirty education students at the tertiary level. This study used a quantitative approach, particularly descriptive-comparative design. It utilized descriptive statistics such as means, standard deviations, and frequency and percent to describe the level of support factors. T-test for independent samples/ Mann Whitney U test was used to compare the level of support factors when grouped by the profile variables. Repeated Measures Analysis of Variance was used to compare the three support factors. The results revealed that the students' level of support factors is high. Moreover, the level of support factors towards learning the subject in the blended learning mode of delivery of the students is the same regardless of their sex, age, and relationship status except in individual factors. Older students are influenced by their self-esteem or study habits more than younger students in learning mathematics in a blended approach. The students are eager to learn Mathematics in a blended learning approach because they are more motivated or are supported by their peers or their self-esteem.

Keywords: *Computer Assisted Instruction (CAI), support factors, self-esteem, study habits, peer factor*

Cite This Article: Dishelle Anne T. Hufana, and Melanie G. Gurat, "Individual, Motivational, and Social Support Factors Towards Learning Mathematics of University Students in the Blended Learning Approach." *American Journal of Educational Research*, vol. 11, no. 4 (2023): 175-182. doi: 10.12691/education-11-4-1.

1. Introduction

Learning mathematics is as important as learning how to eat, breathe and live. Mathematics is the cradle of all creations, and the world cannot move one inch without it. Everyone requires mathematics in their daily lives, whether they are a cook or a farmer, a carpenter or a mechanic, a shopkeeper or a doctor, an engineer or a scientist, a musician or a magician. Even insects employ maths in their daily lives to survive. Meaning, the need to learn and be acquainted with how mathematics works are much needed not only for those who are getting mathematics-related courses but for every student in universities be it an engineer or a student majoring in social sciences [1]. Individuals in today's societies face difficult demands, as they are confronted with the complexity in many aspects of their lives. Individuals must develop a wide range of competencies such as problem-solving skills and critical thinking skills to meet today's complex challenges. Hence, mathematics is needed to prepare them for this [2].

Nowadays, students' affective domain is very common in mathematics education in an ongoing attempt in understanding the students' learning styles and behavior because it greatly affects the students learning in mathematics [3]. Mirahmadizadeh et.al [4] evaluated the students' attitudes and emotions toward learning during the pandemic. They found that despite the closure of schools during the pandemic, students showed enthusiasm toward learning and schools. However, the causes of the students' attitude and emotions toward learning were not explored. Mata et al. [5] also conducted a study to understand how interrelated the support factors such as individual, motivational, and social are in mathematics learning. But the study was conducted in a traditional learning setting which came to change due to the pandemic, from face-to-face to blended learning.

The modality used during the pandemic was called "blended learning". The word blended learning is extremely broad that there is still no exact definition as of today [6]. But for some researchers like Lalima and Lata Dangwal [7], blended learning is described as an innovative concept that embraces the advantages of both traditional teachings in the classroom and ICT-supported

learning including both offline learning and online learning. It has scope for collaborative learning; constructive learning and Computer Assisted Learning (CAI). A compelling early definition was that of Graham [8], who suggested that 'Blended learning systems combine face-to-face instruction with computer-mediated instruction, while Chew, Jones, and Turner [9] also claim that 'blended learning involves the combination of two fields of concern: education and educational technology'. Blended learning was defined by several researchers and authors, but all those definitions share two phrases in common which are "face-to-face instruction" and "CAI". The traditional face-to-face mode of learning from then offers experienced-based instruction to learning. Face-to-face learning allows learners and teachers to have a physical bond that makes learning realistic. Traditionally learning mathematics is much more convenient from the teachers' perspective because discussions using the chalkboard are viewed as an effective way of explaining the process of solving problems. But compared to the blended learning approach, students' learning in mathematics does not only limit them to base their acquired knowledge from books but also, offers a variety of learning resources from the internet. Blended learning is acquiring prominence in Asia. While blended learning is generally welcomed in western culture, it has met with changing levels of accomplishment in Asia due to some extent to the various view of educators and students towards blended learning drawing near. According to Tham and Tham [10], "Despite the positive reports on blended learning at Nanyang Technological University (NTU) in China, the full potential of blended learning is still not tapped by Singapore's higher educational institutes. Concerns were raised by various academics in Singapore that e-learning in Singapore educational institutes is merely the porting of the classroom to the Internet, to reproduce the functionality and "look and feel" of the existing classroom materials in a new operating platform". He also noted that regardless of the positive reports of Blended Learning at NTU, the maximum capacity of blended learning is yet not been tapped by Singapore's higher educational institutes. Looking at the present scenario, the education system has been greatly affected by the Covid-19 pandemic. Around 1.2 billion students in 186 nations are out of school during the pandemic. This Coronavirus changed the instruction scene drastically [11]. Schools and all the other learning institutions are compelled to close down face-to-face classes and depended on the web as well as blended learning at all levels [12]. Public and private universities shifted from traditional face-to-face classes into blended learning in which both students and teachers are enforced to adopt and implement the new learning method. Compared to other Asian countries, blended learning is still a relatively new concept in the Philippine educational system [13]. In the study, Tupas and Linas-Laguda [11] noted that blended learning started in the Philippines in the year 2007 and also in the Higher Education Institutions (HEIs). Similarly, the use of Blended learning is being accepted in teaching Sciences, Language, and Distance learning. The use of blended learning has provided a positive impact on the students' learning and engagement in the lessons. In the country, the Department of Education (DepEd) proposed to utilize online learning, a modular approach, radio-eskwela (the use of radio to air pre-recorded lectures), DepEd TV, face-to-face, and para-teachers for blended learning. The introduction of new learning modalities contributed to the rise of either positive or negative factors that greatly affect learning. However, the increased demand for blended learning comes with concerns and obstacles that should be investigated, particularly in emerging higher education institutions which are noteworthy to investigate which are about how is the emotional state of the students towards learning mathematics in the blended learning approach and more [13]. Moreover, going through an in-depth investigation of the student's perspective on learning, Brezavšček et al. [14], and Jr [13], found that the social aspect of one's life is one of the many factors that greatly affect the students' learning in the subject matter. On the other hand, a study shows that the students' emotions about schools and education were satisfactory during the closure of schools and institutions [4]. This shows that, despite the difficult circumstances, pupils were enthusiastic about learning and schools because of blended learning. Moreover, Yushau [15] found that students have a positive attitude toward mathematics and technology. Except for the computer confidence and fear subscale, analysis of variance showed no statistically significant change in students' attitudes about mathematics and computers. On the contrary, Frazier [16] found that the average mathematics academic achievement of the pupils improved and ambiguous changes in attitudes toward math. More than half of the students were more engaged during blended learning and would take another blended learning course if given the chance. Hence, the need to explore factors such as individual, motivational, and social support factors was deemed important since there was a shift from a face-to-face to a blended learning approach.

First, the individual factors are self-esteem and study habits. Self-esteem mirrors an individual's abstract passionate assessment of their value. It is a judgment of oneself just as a disposition toward oneself [17]. While study habits are the behaviors used when preparing for tests or learning academic materials. Self-esteem along with study habits has been identified as important variables when it comes to learning. Several research showed varied results in exploring if self-esteem and study habits influence academic performance. Julius and Evans [18] found that study habits only and not self-esteem influence academic performance. Moreover, Arshald et al. [17] found that self-esteem and academic achievement are correlated. Study habits and self-esteem were also seen to be related to the motivational and social support factors in learning, students' have varied perceptions when it comes to learning especially in mathematics [5].

Second, the motivational factors can either be intrinsic motivation or extrinsic motivation in Self Determination Theory [19]. Intrinsic motivation is characterized by voluntarily doing something because it is intrinsically interesting and enjoyable, and extrinsic motivation, refers to doing something because it leads to a separable outcome. To comprehend students' behavior, their purposes must be determined [20]. Also, Ryan and Deci [21] focused primarily on psychological needs--namely, the innate needs for competence, autonomy, and

relatedness. They found that social contextual conditions that support one's feelings of competence, autonomy, and relatedness are the basis for maintaining one's intrinsic motivation and becoming more self-determined concerning extrinsic motivation.

To be motivated means to be moved to accomplish something. Most every individual who works or plays with others is, in like manner, worried about inspiration, confronting the subject of how much inspiration those others, or oneself, have for an assignment, and specialists, everything being equal [21]. Lack of motivation and engagement in academic work is an issue of concern among teachers.

Lastly, the support system is much needed for students from zero to university learners for a better result in understanding the subject matter to be learned, no one is excluded in the educational aspect. Social support has the potential to affect the motivation of the students' learning process. In the study of Tezci et al. [22], social support from friends, family, and special people has a significant contribution to the motivation of the students' learning process.

To sum it up, studies have been conducted concerning the use, implications, effects, and many other concepts that are related to blended learning. Some of these were studies conducted by Ahmad et al. [23] and Frazier [16]. Ahman et al. [23] found that students have favorable attitudes toward blended learning. This resulted in the conclusion that using technology can inspire students, and blended learning can be utilized as an alternate technique to teaching and studying mathematics. Frazier [16] also conducted a study due on the students' negative sentiments toward mathematics. Given one-to-one devices and a district-wide initiative to use an online curriculum, the researcher chose blended learning as the intervention in the convergent mixed methods research study. He found that the attitude data was ambiguous, and blended learning is a realistic technique for enhancing mathematics achievement in a high school geometry class. Also, another study showed that blended learning had a significant impact on academic achievement for seventh-grade students, with no differences in achievement based on gender or ability. Moreover, for seventh-grade pupils, the blended learning approach had a considerably favorable effect on their attitude toward mathematics [24]. These studies focused on blended learning but failed to cater to the need to analyze the relationship of individual, motivational, and social support factors towards learning mathematics in the blended learning mode of education.

Studies were also conducted about individual, motivational, and social support factors and analyzed the difference of the following variables in learning mathematics when grouped according to sex, grade, and math performance [5]. Testing the differences in learning mathematics between sex mostly give researchers a result of males having a greater positive interest in the subject than females. But a study conducted by Eriksson [25] has shown otherwise Also, having someone to learn with and to have with during the learning process, especially in these times could be of great help to the students' learning and social support. It can be from a peer or from someone dear to the student where they can gain confidence in learning the subject. A study conducted reveals that studying mathematics through peer tutoring is a great help in attaining outcomes [26]. Attitudes of the students are deeply related to motivation and social support and student engagement could be of vital importance in improving mathematics learning and performance [5]. Tending to the holes from the past studies led, this study sought to compare the level of individual, motivational factors, and social support factors of university students towards learning mathematics in the new learning modality, the blended learning approach when grouped by their sex, age, and relationship status. The results would serve as one of the bases for the enhancement of the students' learning styles for effective and efficient learning of the subject in the blended learning mode of education in Higher Educational institutions.

1.1. Statement of the Problems

This study aimed to compare the level of individual, motivational, and social support factors of college and university students in the blended learning approach when grouped by the students' sex, age, and relationship status.

1. What is the level of individual, motivational, and social support factors towards learning mathematics of university students in the blended learning approach?
2. Is there a significant difference in the mean score of the level of individual, motivational, and social support factors towards learning mathematics of university students in the blended learning approach when grouped according to the profile variable sex, age, and relationship status?
3. Is there a significant difference between and among the three support factors toward learning Mathematics in the blended learning approach?

1.2. Statement of the Hypothesis

There is no significant difference in the mean score of the level of individual, motivational, and social support factors toward learning mathematics of university students in the blended learning approach.

There is no significant difference between and among the three support factors toward learning Mathematics in the blended learning approach.

2. Research Methodology

2.1. Research Design

The researcher utilized the descriptive-comparative method using the quantitative approach in gathering data and information. This study described the level of support factors such as individual, motivational, and social. This study was comparative since the level of support factors was compared when grouped by sex, age, and relationship status. The significant difference between and among the three support factors was also explored.

2.2. Research Environment

The study was conducted at Isabela State University, Main Campus (ISU-E) in San Fabian, Echague. Isabela.

Isabela State University is a university in the province of Isabela, Cagayan Valley, Philippines mandated with providing advanced education in the arts, agricultural and natural sciences, as well as technological and professional fields.

2.3. Research Respondents

The respondents were students from the Teacher Education Department of Isabela State University-Main Campus, Echague, Isabela. Table 1 shows the profile of the respondents.

Table 1. Profile of the Respondents

Profile	Categories	Frequency	Percent
Sex	Male	8	25.8%
	Female	23	74.2%
Relationship Status	In a relationship	15	48.4%
	Not in a relationship	16	51.6%
Age	16-20 yrs old	14	45.2
	21-25 yrs old	17	54.8
Total		31	100

As shown in Table 1, there were more female respondents (74.2%), not in a relationship (51.6%) and 21 to 25 years old respondents.

2.4. Research Instruments

The questionnaire was composed of 2 parts, the first part dealt with the personal profile of the respondents in terms of sex, age, and relationship status. While the second part dealt with the individual, motivational, and social support factors affecting the students' learning in mathematics in the blended learning approach. The second part was a four-point Likert scale researcher-made questionnaire encoded in a google form as its research instrument. Originally, the questionnaire consisted of 4 items for individual factors, 3 items for motivational factors, and 4 items for social factors. However, after the pilot testing, one item in social factors was deleted to increase Cronbach's Alpha reliability index from 0.688 to 0.725.

2.5. Data Gathering Procedure

The data relevant to the study was gathered through primary sources using a survey questionnaire (four-point Likert scale questionnaire) that was encoded through google Forms and forwarded to the selected respondents thru the google form link via messenger.

2.6. Treatment of the Data

Descriptive statistics such as frequency count and percent were considered for the summary of the level of individual, motivational, and social support factors affecting the students' learning in mathematics. The overall level was described through the mean. The mean was interpreted as Very Low (1.00-1.49); Low (1.50-2.49), High (2.50-3.49), and Very High (3.50-4.00).

To know if there is a difference in their individual, motivational, and social support factors when grouped according to the profile variables, assumptions of the test for comparisons were checked. Table 2 shows the Shapiro-Wilk test for normality results.

Table 2. Shapiro Wilk Result on Normality

Profile	Factors	Categories	Test Statistic
Sex	Individual	Male	S-W(8)=.922, p=.446
		Female	S-W(23)=.966, p=.591
	Motivational	Male	S-W(8)=.882, p=.197
		Female	S-W(23)=.911, p=.044 (Skewed)
	Social	Male	S-W(8)=.907, p=.332
		Female	S-W(23)=.927, p=.094
Age (yrs)	Individual	16-20	S-W(14)=.928, p=.287
		21-25	S-W(17)=.936, p=.272
	Motivational	16-20	S-W(14)=.861, p=.032 (Skewed)
		21-25	S-W(17)=.809, p=.003 (Skewed)
	Social	16-20	S-W(14)=.861, p=.031(Skewed)
		21-25	S-W(17)=.911, p=.102
Relationship Status	Individual	Not in a relationship	S-W(16)=.943, p=.381
		In a relationship	S-W(15)=.958, p=.663
	Motivational	Not in a relationship	S-W(16)=.846, p=.012 (Skewed)
		In a relationship	S-W(15)=.890, p=.068
	Social	Not in a relationship	S-W(16)=.891, p=.057
		In a relationship	S-W(15)=.930, p=.274

As shown in Table 2, motivational factor was not normally distributed when grouped by sex (p=.044), age (p=.032; p=.003), and relationship status (p=.012). Moreover, the social factor group was not also normally distributed (p=0.031). T-test for independent samples was used in determining if significant differences exist except for the not normally distributed variables.

Repeated Measures ANOVA was used to determine if a significant difference between and among the support factors exists. Mauchly's statistic was significant and thus, the test of an assumption of the univariate approach to repeated measures ANOVA was violated, Mauchly's W=.441, p<0.01. Moreover, since the epsilons were less than 0.75, hence the Greenhouse-Geisser epsilon was reported.

Table 3. Test of Assumption

Mauchly's W	Sig.	Epsilon[b]		
		Greenhouse-Geisser	Huynh-Feldt	Lower-bound
.441	.000	.642	.658	.500

2.7. Ethical Considerations

The researchers sought approval from the respondents before the conduct of the study. The systematic procedure was explained to the respondents, as well as the output of

the study. The data gathered from the respondents were treated with the utmost confidentiality. There is no known conflict of interest in this study. There is no known risk or benefit to participation in the study.

3. Result and Discussions

The descriptive statistics of the students' level of individual, motivational, and social support factors of university students towards learning mathematics are presented in Table 4 and the mean percent score, standard deviation, and qualitative description of the level of individual, motivational, and social support factors are presented in Table 5. To identify the level of the support factors of the university students in learning mathematics, the frequency, percent, and overall level of support factors were presented using descriptive statistics and the students' overall level of support factors is High (73.33%) as shown in Table 4.

Table 4. Level of Individual, Motivational, and Social Support Factors of University Students towards Learning Mathematics in the Blended Learning Approach

Level	Individual		Motivational		Social	
	f	%	f	%	f	%
Very Low	0	0	0	0	1	3.2
Low	2	6.5	0	0	6	19.4
High	17	54.8	16	51.6	18	58.1
Very High	12	38.7	15	48.4	6	19.4
Total	31	100.0	31	100.0	31	100

As shown in Table 3, majority of the students have a High level of Individual, motivational, and social support factors [27] towards learning mathematics in the blended learning approach. The result also reveals that the level of support factors of the students varies. Some students have low individual motivation factors (6.5%) and social factors (19.4%). Some have very high individual (38.7%), motivational (48.4%), and social (19.4%) support factors. The level of individual, motivational, and social support factors was presented per item containing the statements in the survey in Table 5. The students were asked to determine the level of their support factors in learning mathematics during the blended learning approach by giving their rate on each of the items of the questionnaire.

It can be seen in Table 5, that the students rated all the items "high" except for one item under motivational factor. This item states that "I always do my best to accomplish my math activities because I want to have a better performance in the subject". On average, the students have a high level of individual (m=3.19, s=.51), motivational (m=3.47, s=.39), and social factors (m=2.94, s=.727).

This suggests that the students have a strong support system coming from their selves [28]. They became active learners during their blended learning classes because they were expected to engage in self-directed and responsible learning [29]. They have high self-esteem; interest and they have focused on studying. However, Bringula et al. [30] pointed out that one of the challenges encountered by students during blended learning was difficulties that students have to deal with personal concerns such as lack of focus, less productivity, and procrastination.

Table 5. Mean Percent Score, Standard Deviation, and Qualitative Description of the Level of Individual, Motivational, and Social Support Factors

Statements	Mean Percent Score	Standard Deviation	Qualitative Description
Individual			
1. I think I am pretty good at math activities.	2.87	0.68	High
2. I think I am doing my best in my math activities if I am interested in the lesson.	3.45	0.72	High
3. Math activities are valuable and interesting to me.	3.12	0.73	High
4. Math activities are easy to do for me when I focus on studying.	3.32	0.65	High
Overall Individual	3.19	.51	High
Motivational			
5. I always do my best to accomplish my math activities because I want to have a better performance in the subject.	3.61	0.56	Very High
6. I think I will perform better in math if I am motivated to do my activities.	3.45	0.62	High
7. I think I will perform better in math if I find the subject important and related in my daily living.	3.36	0.61	High
Overall Motivational	3.47	.39	High
Social			
8. I think I only do good in math activities if I have a peer or partner to learn with.	3.19	0.83	High
9. I only do math activities if my teacher assisted me to do.	2.65	0.95	High
10. I think I can do math activities better if I have someone in my family who can lend a hand.	3.03	0.80	High
Overall Level of Social Factors	2.94	0.727	High

They are also doing their mathematics activities because they were motivated to learn during the blended learning approach. The students were motivated because they want to have a better performance, or they were aware of the importance of mathematics subject and its function in daily living. Enu et al. [31] ascertained that the success of the students in mathematics was influenced by the students' factors and one of these was motivation. In order for pupils to grow academically at different levels, there needs to be strong motivation that may encourage both individual and group [32]. They were also doing their mathematics activities because of their peers, family, or teachers who assist or help them [33]. However, a study revealed that teachers struggle to motivate their students through online learning [34]. Blended learning improves the interaction among peers, and between students and teachers. Students benefit from group discussion and collaborative learning [24]. However, Bringula et al. [30] found that students encountered difficulty in seeking clarification from teachers, classmates, and friends. In contrary, a study revealed that teachers did a good job of responding to the call to action during the pandemic by offering a variety of teaching methods and resources for students who are learning at home [33].

Associating computer-based learning in the country has been of great impact on students, especially those who are struggling to have access to the internet [35], but despite their struggles, students at the university level have adapted to the current situation and in the blended learning mode of education. As the results show, students are slowly adapting and showing a high support factor that may affect their education in the blended learning approach. Also, Aquino et al. [36] found that students were more satisfied with the methods used such as blended learning when more frequently used in teaching. However, in the same study, they found that students prefer methods used before the pandemic than those utilized during the pandemic. This contradicts the findings of Indrapangastuti et al. [37] who found that blended learning is far more effective than traditional learning in improving students' achievement in mathematics. Generally, the high-level social support revealed in this study was favorable because support factors such as motivation are associated with students' attitudes towards mathematics, and this may also support the achievement of the students in the subject [38].

To better understand the result, sex, age, and relationship status were used as grouping variables to compare the motivation of the students. Table 6 shows the result of the t-test for independent samples.

As gleaned from Table 6, there was no significant difference in the individual factor when grouped by sex and relationship status. Significant difference exists in the individual factor when grouped by age. Respondents aged 21-25 years old (m=3.38, s=.425) claimed that individual factor affects their performance in the blended learning approach more than those who belong to 16 to 20 years old (m=2.96, s=.518). This indicates that the individual support factors of the students were higher for older respondents than younger respondents. In the study of Julius et al. [18], individual factors refer to study habits and self-esteem. Since the individual support factor was generally high regardless of the profile variables of the students, this means that students may also have favorable performance since study habit influences academic performance and self-esteem is related to academic achievement [17]. However, a study revealed that academic success was only significant for peer selection procedures in the academic environment [39].

Table 7 shows the result of the Mann-Whitney U test on motivational factors grouped by the profile variables.

The table shows that there was no significant difference in the level of the motivational factor of the university students when grouped by sex (U=.65, p=237), age (U=76, p=.092), and relationship status (U=112, p=.770). The students have the same level of motivational factors regardless of their sex, age and relationship status. This means that generally, students have a high level of motivational support factor. One possible motivation is the blended learning environment [24]. Blended learning promotes active learning and interaction between learners and the mediator in the learning environment. Furthermore, the utilization of blended learning contributes to the diversification of mathematics educational delivery, as well as investigating the advantages of web-based technology in mathematics education [40].

Table 8 shows the t-test result on social factors when grouped by the profile variables.

Table 6. T-test for Independent Samples Result on Individual Factor Grouped by the Profile Variables

Profile	Category	N	Mean (SD)	Test Statistics
Sex	Male	8	3.22(.647)	t(29)=.616, p=.874
	Female	23	3.18 (.466)	
Age	16-20 yrs old	14	2.96 (.518)	t(29)=-2.471, p=.020*
	21-25 yrs old	17	3.38 (.425)	
Relationship Status	In a relationship	15	3.18(.457)	t(29)=.107, p=.916
	Not in a relationship	16	3.20(.564)	

*significant at 0.05 level.

Table 7. Mann-Whitney U test Result on Motivational Factor Grouped by the Profile Variables

Profile	Category	N	Mean Rank	Test Statistics
Sex	Male	8	19.38	U=65, p=.237
	Female	23	14.83	
Age	16-20 yrs old	14	12.93	U=76, p=.092
	21-25 yrs old	17	18.53	
Relationship Status	In a relationship	16	15.50	U=112, p=.770
	Not in a relationship	15	16.53	

*significant at 0.05 level.

Table 8. T-test for Independent Samples Result on Social Factor Grouped by the Profile Variables

Profile	Category	N	Mean(SD)/ Mn Rank[a]	Test Statistics
Sex	Male	8	2.87(1.083)	t(29)=-.364, p=.719
	Female	23	2.99(.590)	
Age	16-20 yrs old	14	14.86[a]	U=.544
	21-25 yrs old	17	16.94[a]	
Relationship Status	In a relationship	16	2.93(.670)	t(29)=.172, p=.865
	Not in a relationship	15	2.98 (.802)	

*significant at 0.05 level.

There was no significant difference in the social factor when grouped by the sex, age, and relationship status of the university students. This means that the dependency of the students on their teachers, peers, classmates, and family was the same regardless of their age, sex, and relationship status.

Table 9 shows the result of the repeated measures ANOVA to compare the means of the factors.

Table 9. Repeated Measures ANOVA Result

Factors	Mean(SD)	Greenhouse–Geisser
Individual	3.19 (.507)	F(1.283)=8.277, p=0.004**
Motivational	3.47(.392)	
Social	2.96(.729)	

**significant at 0.01 level.

The result shows that there was a significant difference between and among the support factors, F(1.283)=8.277, p=0.004. Further test was conducted through a post-hoc comparison test. Bonferroni test was conducted to determine the significant difference. Table 10 shows the Bonferroni test result.

Table 10. Bonferroni Test Result

(I) factor1	(J) factor1	Mean Difference (I-J)	Std. Error	Sig.
Individual	Motivational	-.280*	.064	.000
Motivational	Social	.516*	.152	.006

In Table 10, the motivation factor was significantly higher than individual and social factors. Mata et al. [5] explored the same factors but considered finding a correlation and not comparing the factors. They found that individual factors such as study habits and self-esteem were related to the motivational and social support factors in learning. This finding supports the claim of [27] that the biggest obstacle to creating socio-mathematical norms supportive of inquiry-based learning in a distant learning environment was the absence of peer support and collaborative work.

While these are just some of the factors that might influence the students in learning Mathematics in a blended learning approach, other factors such as device ownership, personal learning space, internet speed, and mathematics learning autonomy were some of the other factors identified in the study of Bringula et al. [30]. These factors were identified as factors that influence individual learners during the CoViD-19 pandemic.

4. Conclusions and Recommendations

The students' level of individual, motivational, and social factors are high. Students learned mathematics with a blended approach because they have high self-esteem, focus, and interest in the subject. They were motivated to learn, and they get support from their family, peers, and teachers. The motivation, and the support they get from peers, family, and teachers were the same regardless of their age, sex, and relationship status. The influence of the students' self-esteem or study habits to learn mathematics in a blended learning approach, were the same regardless of sex and relationship status. However, older students were more influenced by their self-esteem or study habits compared with younger students. Among the three support factors, the students were more influenced by their motivation than by their individual or social factors. Since, the result of the study revealed some positive points about using blended learning, blended learning may still be used. Yet, pure distance learning may not be applicable.

Acknowledgements

We are thankful for the graduate program scholarship provided by the Department of Science and Technology - Science Education Institute (DOST-SEI) through the Capacity Building Program in Science and Mathematics Education (CBPSME).

References

[1] Amerigog, G. (2015, August 3). The importance of maths in everyday life. *The Times Of India*. https://timesofindia.indiatimes.com/city/guwahati/the-importance-of-maths-in-everyday-life/articleshow/48323205.cms.

[2] Gurat, M. & de Gracia, R. (2016). Predictors of Students' Competence in Applying Mathematics in Real World Problems. *Journal of Studies in Social Sciences*, 15 (2): 49-62. ISSN 2201-4624.

[3] Pantziara, M., & Philippou, G. N. (2015). Students' Motivation in the Mathematics Classroom. Revealing Causes and Consequences. *International Journal of Science and Mathematics Education*, *13*(January), 385-411.

[4] Mirahmadizadeh, A., Ranjbar, K., Shahriarirad, R., Erfani, A., Ghaem, H., Jafari, K., & Rahimi, T. (2020). Evaluation of students' attitude and emotions towards the sudden closure of schools during the COVID-19 pandemic: a cross-sectional study. *BMC Psychology*, *8*(1), 1-7.

[5] Mata, M. de L., Monteiro, V., & Peixoto, F. (2012). Attitudes towards Mathematics: Effects of Individual, Motivational, and Social Support Factors. *Child Development Research*, *2012*, 1-10.

[6] Oliver, M., & Trigwell, K. (2005). Can 'Blended Learning' Be Redeemed? *E-Learning and Digital Media*, *2*(1), 17-26.

[7] Lalima, Dr., & Lata Dangwal, K. (2017). Blended Learning: An Innovative Approach. *Universal Journal of Educational Research*, *5*(1), 129-136.

[8] McGrath, V. (2013). The Handbook of Blended Learning: Global Perspectives, Local Designs Memorial. *Canadian Journal of University Continuing Education*, *33*(1).

[9] Chew, E., Jones, N., & Turner, D. (2008). Critical review of the blended learning models based on Maslow's and Vygotsky's educational theory. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *5169 LNCS*, 4-53.

[10] Tham, K. & Tham, C. (2011). Blended Learning-A Focus Study on Asia. *International Journal of Computer Science Issues*, *8*(2), 136-142.

[11] Tupas, F. P., & Linas-Laguda, M. (2020). Blended learning - An approach in philippine basic education curriculum in new normal: A review of current literature. *Universal Journal of Educational Research*, *8*(11), 5505-5512.

[12] Rotas, E., & Cahapay, M. (2020). Difficulties in Remote Learning: Voices of Philippine University Students in the Wake of COVID-19 Crisis. *Asian Journal of Distance Education*, *15*(2), 147-158.

[13] Jr, A. V. A. (2020). Learning from the problems and challenges in blended learning: Basis for faculty development and program enhancement. *Asian Journal of Distance Education*, *15*(2), 2020.

[14] Brezavšček, A., Jerebic, J., Rus, G., & Žnidaršič, A. (2020). Factors influencing mathematics achievement of university students of social sciences. *Mathematics*, *8*(12), 1-24.

[15] Yushau, B. (2006). The Effects of Blended E-Learning on Mathematics and Computer Attitudes in Pre-Calculus Algebra Let us know how access to this document benefits you. 3(2). https://scholarworks.umt.edu/cgi/viewcontent.cgi?article=1048&context=tme

[16] Frazier, A. Y. (2020). Scholar Commons The Impact of Blended Learning Upon Mathematics Attitudes and Academic Achievement: An Action Research Study ATTITUDES AND ACADEMIC ACHIEVEMENT: AN ACTION. *(Doctoral Dissertation)*. https://scholarcommons.sc.edu/etd/6144.

[17] Arshad, M., Muhammad, S., & Mahmood, K. (2015). Self-Esteem & Academic Performance Among University students. *Journal of Education and Practice*, *6*(1), 156-162.

[18] Julius, M., & Evans, A. S. (2015). Study of the relationship between study habits and academic achievement of students: A case of Spicer Higher Secondary School, India. *International Journal of Educational Administration and Policy Studies*, *7*(7), 134-141.

[19] Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*.

[20] Hannula, M. S. (2006). Motivation in mathematics: Goals reflected in emotions. *Educational Studies in Mathematics*, *63*(2), 165-178.

[21] Ryan, R. M., & Deci, E. L. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, *25*(1), 54-67.

[22] Tezci, E., Sezer, F., Gurgan, U., & Aktan, S. (2015). A study on social support and motivation. *Anthropologist*, *22*(2), 284-292.

[23] Ahmad, W. F. W., Shafie, A., & Janier, J. B. (2008). Students' perceptions towards Blended Learning in teaching and learning Mathematics: Application of integration. *13th Asian Technology Conference in Mathematics 2008*, 7.

[24] Lin, Y. W., Tseng, C. L., & Chiang, P. J. (2017). The effect of blended learning in mathematics course. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(3), 741-770.

[25] Eriksson, K. (2020). *Gender Differences in the Interest in Mathematics Schoolwork Across 50 Countries*. *11*(November), 1-9.

[26] Thurston, A., Roseth, C., Chiang, T., Burns, V., & Topping, K. J. (2020). International Journal of Educational Research Open The influence of social relationships on outcomes in mathematics when using peer tutoring in elementary school. *International Journal of Educational Research Open*, 1 (May), 100004.

[27] Kalogeropoulos, P., Roche, A., Russo, J., Vats, S., & Russo, T. (2021). Learning Mathematics From Home During COVID-19: Insights From Two Inquiry-Focussed Primary Schools. *Eurasia Journal of Mathematics, Science and Technology Education*, 17(5), 1-16.

[28] Mazana, M. Y., Montero, C. S., & Casmir, R. O. (2018). Investigating Students' Attitude towards Learning Mathematics. *International Electronic Journal of Mathematics Education*, *14*(1), 207-231.

[29] Chen, Y., Lou, H., & Luo, W. (2001). Distance learning technology adoption: A motivation perspective. The Journal of Computer Information Systems, 42(2), 38.

[30] Bringula, R., Reguyal, J.J., Tan, D.D. *et al.* Mathematics self-concept and challenges of learners in an online learning environment during COVID-19 pandemic. *Smart Learn. Environ.* 8, 22 (2021).

[31] Enu, J.; Agyman, O.; Nkum, D. Factors influencing Students' Mathematics Performance in some selected Colleges of Education in Ghana. Int. J. Educ. Learn. Dev. 2015, 3, 68-74.

[32] Briones, S. K. F., Dagamac, R. J. R., David, J. D., & Landerio, C. A. B. (2022). Factors Affecting the Students' Scholastic Performance: A Survey Study. *Indonesian Journal of Educational Research and Technology*, *2*(2), 97-102.

[33] Mijares, B. (2022). FACTORS AFFECTING THE ACADEMIC PERFORMANCE OF LEARNERS IN MATHEMATICS AMIDST PANDEMIC. 624-637.

[34] Reich, J., Buttimer, C., Coleman, D., Colwell, R., Faruqi, F., & Larke, L. (2020). What's lost, what's left, what's next: Lessons Learned from the Lived Experiences of Teaching during the Novel Coronavirus Pandemic. *Teaching System Lab*, 1-28.

[35] Baticulon, R. E., Sy, J. J., Alberto, N. R. I., Baron, M. B. C., Mabulay, R. E. C., Rizada, L. G. T., Tiu, C. J. S., Clarion, C. A., & Reyes, J. C. B. (2021). Barriers to Online Learning in the Time of COVID-19: A National Survey of Medical Students in the Philippines. *Medical science educator*, *31*(2), 615-626.

[36] Aquino, E.T.M., & Gurat, M.G. (2023). Satisfaction of Students in the Methods Used in Mathematics in the Modern World in a New Normal. American Journal of Educational Research. 2023; 11(3): 144-150.

[37] Indrapangastuti, D., Surjono, H.D., Sugiman, &. Yanto, B.E. (2021). Effectiveness of the Blended Learning Model to Improve Students' Achievement of Mathematical Concepts. *Journal of Education and e-Learning Research*, 8(4): 423-430.

[38] Oyedeji, S. O. (2017). The effects of students' motivational factors on their attitudes toward mathematics. International Journal of Evaluation and Research in Education, 6(4), 277-287.

[39] Garrote, A. (2020). Academic Achievement and Social Interactions: A Longitudinal Analysis of Peer Selection Processes in Inclusive Elementary Classrooms. *Frontiers in Education*, 5 (February), 1-10.

[40] Awodeyi, A. F., Akpan, E. T., & Udo, I. J. (2014). Enhancing teaching and learning of mathematics: adoption of blended learning pedagogy in University of Uyo. International Journal of Science and Research, 3(11), 40-45.