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Blended Learning Implementation in Sulu HEIs: Investigating Teacher and Student Factors Influencing Learning Outcomes

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Abstract

This study explored the implementation of blended learning in higher education institutions (HEIs) in Sulu, focusing on the influence of teacher- and student-related factors on learning outcomes. A total of 378 participants—comprising 333 students and 45 instructors from five HEIs—were selected using convenience sampling. Descriptive statistics, including weighted mean and standard deviation, were employed to identify the most prevailing teacher and student factors contributing to blended learning outcomes. The study also assessed blended learning outcomes in terms of student satisfaction, engagement, and academic performance. Multiple regression analysis was conducted to determine the predictive influence of these factors on the identified outcomes. Results indicated that teaching competencies were perceived as highly beneficial in delivering blended instruction. Among student-related factors, learning style emerged as the most prevalent characteristic valued in the blended learning environment. Students reported high levels of engagement and satisfaction, with average academic performance reflected in GPAs ranging from 80 to 85. Regression analysis revealed that teacher adaptive skills negatively predicted academic performance, whereas technical skills showed a positive effect. Student motivation positively influenced satisfaction but was unexpectedly a negative predictor of academic performance. Student learning style, despite its perceived importance, was not a significant predictor in any model. These findings suggest the need for further investigation into the paradoxical relationship between motivation and performance. A mixed-methods approach is recommended to gain deeper insights into student experiences and to better understand the complex dynamics of blended learning environments.

Keywords: *Blended Learning, Higher Education Institutions (HEIs), Flexible Learning, Online Learning, Hybrid Learning, Distance Education, E-Learning*

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Introduction

Blended learning is an ongoing convergence of two different teaching and learning modality (Dziuban et al, 2018).With the fast-growing technology, the constant changing needs of students, and its influence on education led the way towards rethinking the purpose of teaching and learning. Higher educational institutions (HEIs have incorporated technology to improve instruction and have used substantial resources to integrate technological infrastructure into existing classroom facilities (Rajkoomar and Raju, 2016).

Graham (2019) defined blended learning as a combination of instructional or delivery media; a combination of face-to-face instruction with computer-mediated instruction. While, Heinze and Proctor (2006) defined it as "learning that is facilitated by the effective combination of different modes and models of teaching and styles of learning; founded on transparent communication amongst all parties involved with the course". It is an approach to education that combines online educational materials and opportunities for interaction online with traditional place-based classroom methods. In a blended learning modality, students have a control over time, place, pace, and direction for learning (Lawless, 2019). It is intended to promote learning by facilitating the integration of visual cues and educational concepts. It also aims at using modern technology in teaching without abandoning the usual educational situation and classroom attendance. It focuses on direct interaction in the classroom through the use of laboratory equipment (Newey, 2018), modern communication mechanisms such as computers, networks, and internet portals (Oweis, 2018). It is an innovative concept that embraces the advantages of both traditional teaching in the classroom and ICT supported learning including both offline and online learning (Hinampas, 2018).

While these definitions are useful in describing blended learning, the Commission on Higher Education extends its concepts to more than just a combination of face-to-face learning and e-learning. The CMO No. 4 series of 2020 promulgated this learning modality that aims to reach all remote areas in the Philippines by utilizing different modes of learning. They simply termed it as Flexi-learning. "Flexible learning is a pedagogical approach allowing flexibility in time, place, and audience including, but not solely using of technology… commonly uses distance education methods and facilities in education technology, this may vary depending on the levels of technology, availability of devices, internet connectivity, level of digital literacy and approaches". Furthermore, it consists of online, offline, and blended learning approach. These three concepts are defined under the memorandum order: 1.) Online modality means the use of online platforms in delivering the content materials, such as the use of google classrooms, messenger chat rooms, google meet, etc; 2.) Offline modality means the use of modules for self-instruction, audio, tapes, TV, and radio; and 3.) Finally, blended learning in flexible learning means the combination of the two modalities, the online and offline.

Blended learning has many benefits to the learner, the instructor, and the school. Some researchers suggest that blended learning gives learners a more comprehensive understanding of the course content (Norvig, Petersen, & Balle 2016). It also supports social learning, because it allows learners to interact with instructors and fellow learners. It allows updated information suiting learners' need and different learning styles (Yadav and Pavlou, 2020), and provides simulation, animation, practical events, exercises and practical applications (Khader, 2016). In addition, it aims to reach and appeal to a wider variety of learning styles, allows to deliver high quality training to a large number of learners all over the world at a low cost, reduces educational costs by putting classrooms in online space and replaces pricely textbooks with electronic devises (Yadav and Pavlou, 2020). Overall, it facilitates independent and collaborative learning by engaging in all activities, thus, increases motivation and behavior towards learning (Rajkoomar and Raju, 2016).

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Statement of the Problem

The emergence of technology has become a competitive advantage for higher education institutions as it is believed to provide an alternative approach for quality learning (Abdul Rahman, Hussein, and Aluwi, 2015). This change in the educational system reveals a constant change in the needs of students which leads to rethinking the teaching and learning practices (Rajkoomar and Raju, 2016). It has also posed different challenging levels, especially in remote areas of the world. These challenges are noted as barriers to effective blended learning (Ali, Hussain, and Ahmed, 2018).

UNESCO report 2020 noted that one and a half billion of students around the world were engaged in remote learning at the height of the COVID-19 pandemic in March 2020. Not all students were able to access the Internet. There were 73.91 million internet users in the Philippines in January 2021, but 74% of public schools do not have access to internet (Kemp 2021).

In addition to lack of facilities and internet connectivity as main concerns for effective blended learning implementation in the Philippines (Magsambol, Tupas and Laguda 2020), it is also believed that increase in payment charges for internet subscriptions, literacy skills and readiness of the teacher and learners, mindset and behaviors towards blended learning, and educational strategies were also barriers towards effective blended learning outcomes (Malindog-Uy 2020).

The result of this study will be beneficial to the students, teachers, and administrators. This will contribute to the knowledge and theory on developing institutional academic model of blended learning. Such as development of an adaptive learning frameworks which focus not only on the teacher and the students but also on institutional factors such as support to infrastructure, learning management systems, remote learning facilities, and student online platform academic support.

This study aims to determine the Framework for HEIs using the Blended Learning in Teaching. Specifically, this seeks to answer the following questions.

1. What is the prevailing teacher's factor beneficial in blended learning in terms of:
    a. teaching competence;
    b. technological skills; and
    c. adaptive skills?
2. What is the leading student factor useful in blended learning in terms of:
    a. learning style; and
    b. motivation?
3. What is the extent of outcome of blended learning of HEIs in Sulu in terms of students':
    a. satisfaction on learning;
    b. engagement; and
    c. performance (GPA)?
4. Does teacher factor influence blended learning outcomes?
5. Does student factor influence blended learning outcomes?

METHODS

This study employed a quantitative- descriptive research method. The study was conducted particularly in only five of the higher education institutions in Sulu. Namely, Sulu State College, Mindanao State University, Sulu College of Technology, Southern Mindanao Islamic Institute and Notre Dame of Jolo College. Through a convenience sampling method, primary data were collected from a total 378

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respondents; of which of them composed of 333 students enrolled in the said HEIs in the present school year 2021- 2022, 1st semester and 45 of which were teachers respectively.

The study made use of a self-devised questionnaire. It was composed of two sets; A separate questionnaire for the teachers and for the students- The teacher questionnaire was used in assessing the teacher factor with four subscales; Teaching Competence with 16 items, technical skills with 12 items, and adaptive skills with 12 items. This part of the questionnaire utilized a five-point Likert scale being 1 as the lowest (strongly disagree) and 5 as the highest (strongly agree). On the other hand, the students' survey questionnaire is composed of four parts. Part I was on the socio-demographic profile of students; Part II was on the student factors with two subscales; motivation with 5 items and learning style with 8 items. Part III was on the blended learning outcomes- student satisfaction with 5 items, and student engagement with 4 items. A five-point Likert scale was also used to rate the responses in part II and part III. The last part of the questionnaire was to rate the student GPA average which ranged from below 75 to 100.

The quality of the questionnaire was rated by three experts in the field of education, particularly one administrative official (dean), faculty, and ICT expert with a minimum Master's degree earned. They were asked to validate the questionnaire for the contents' appropriateness and relatedness. To establish the internal validity, the questionnaire was subjected to a pilot study and item analysis. Item revisions were made before the conduct of the study.

Participants were identified during the actual survey via direct contact, while observing minimum health protocols. A consent form was attached to the survey questionnaire stating the rationale of the study, procedures to be conducted, and data to be collected. Data collection followed after consent has been secured and data were analyzed and interpreted. The researcher first attempted to obtain data via online using the google form; however, it was difficult for the respondents to answer the questionnaire due to issues in internet connectivity and load balance available. Only few answered the online survey. The researcher decided to conduct it face to face instead. Both data gathered from online and offline was analyzed and interpreted using the statistical software package.

Statistical Treatment

To facilitate the data analysis, data software was used. An exploratory factor analysis was conducted using the principal axis factoring extraction method to discover the underlying factors. While weighted mean, and standard deviation were used to determine the prevailing teachers' factors, the useful leading student factor, the extent of outcome of blended learning of HEIs in Sulu in Terms of Students' satisfaction on learning, GPA and learning engagement.

Multiple regression analysis was used to determine significant predictors for the outcome variable. It is a statistical test used to analyze the relationship between a single dependent variable and several independent variables. It allows a researcher to assess the strength of the relationship between an outcome and several predictor variables as well as the importance of each of the predictors to the relationship, often with the effect of other predictors statistically eliminated.

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RESULTS AND DISCUSSIONS

Prevailing Teacher Factors Beneficial in Blended Learning

The determinants that are beneficial for teachers in blended learning consist of 38 items. After the exploratory factor analysis, only 16-item measure. The final results of the exploratory factor analysis are presented in Table 1. Factor 1 consists of 6 items, named as the technical or technological skills of teachers with Cronbach alpha of .867 indicating a high reliability; Factor 2 is named as the teachers' teaching competence has a reliability of .899; and the last factor is called adaptive skills of teachers as employed in blended learning has a reliability of .840. Together, the 3-factor model has an overall Cronbach alpha of .883, indicating that all items collectively measure the construct.

Rahmatullah (2016) supported the items constructs of the findings of teachers' competence in blended learning. He described this in terms of mastery of the subject matter, knowledge on teaching, effective skills in classroom management, and effective use of assessment methods. Graham (2019), added that blended teaching competencies are composed of the ability to integrate online activities, ability to use digital tools for instruction, customization of learning contents, and facilitating online interaction. These competencies determine the quality of learning being transferred to the learners.

Several authors also described technical skills in blended learning. Bigari (2019) described it as using several devices to facilitate the blended learning. While Chen described it as mastering the usefulness of different tools essential for learning. Being a Tech-savy instructor allows the teacher to cope up with the trends in the educational system that is with the use of different online platforms and the ability to adapt to situations that may arise. Being digitally able is essential for effective delivery of course content even students are remotely learning.

Adaptive skills are the capacity to innovate the classroom from virtual to offline modes. This concerns the customization of learning content and the communication and feedbacks to students. It is quite important to possess these skills to be able to personalize learning and adapt to situations as it may arise from the learning environments.

The findings suggest that all three dimensions of teacher factors are beneficial in blended learning. It connotes that if one of these is missing, a possible defect in the delivery of content to learners tend to decrease. It also denotes if any of these is lacking or absent a possible decrease or interruptions in the learning outcomes may arise.

It is therefore necessary that teachers in the blended learning must master all of these skills to become effective blended learning teachers.

Table 1. Teacher Factors in Blended Learning Questionnaire

Item	Factor Loading		
	1	2	3
Factor 2 - Teaching Competence (α = .899) (.73)			
1. I have a mastery of the subject matter I am teaching.	0.07	0.81	0.04
2. I establish clear learning objectives for my lessons in BL.	0.03	0.81	0.04
5. I use different teaching methods in BL.	0.04	0.81	0.15
7. I vary the level of difficulty in assessment of learning of my students.	0.07	0.75	0.31
8. I regularly conduct formative and summative assessments.	0.02	0.73	0.36
Factor 1 - Technical/Technological Skills (α = .867)			

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4. I manage online and offline components of my lessons' organization.	0.62	0.17	0.08
7. I provide assistive technologies to students to facilitate learning.	0.56	0.21	0.16
8. I use digital devices such as laptop, table and LCD for instruction.	0.68	-0.02	0.08
10. I can retrieve online data with ease and confidence.	0.73	0.04	0.27
2. I seek assistance from ICT experts with technological issues in blended learning.	0.78	0.20	-0.04
6. I use digital technology to interact with my students.	0.85	0.11	0.06
Factor 3 - Adaptive skills (α = .840)			
3. I customized learning pathways for my students in blended learning.	0.41	0.32	0.72
15. I use students, parents and colleagues' feedback to improve my instruction delivery.	0.22	0.11	0.82
6. I connect learners to sources beyond classroom, teacher and textbook.	0.17	-0.16	0.83
9. I regularly communicate the results of students' performance in blended learning.	0.01	0.21	0.87
12. I establish open communication for students, educators and administrators.	0.02	-0.02	0.57

To examine the leading factor or determinant beneficial for teachers in blending learning, the weighted mean of each factor was computed. Table 2 summarizes the results.

The teachers believed that their teaching competencies are very essential in blended learning as revealed by the weighted mean of 4.67 *(SD=0.41)* described as very highly beneficial in blended learning instruction. They also recognized that their adaptive skills *(WM=4.53, SD=0.46)* and technical skills (WM=4.52, SD=0.47) are important capabilities to augment their teaching competencies. The overall weighted mean of 4.57 described as very highly beneficial in blended learning, implies that teachers generally possessed a set of professional skills or competencies (e.g. knowledge, skills and values in teaching) that permit them resolve properly practical teaching situations. This means that teachers exhibit mastery of course content, adequate knowledge of pedagogy and assessment of student's learning. The data further suggest that the adaptive and technological skills play a complementary role to boost the teachers' competency which makes them confident in executing their teaching tasks to ensure the quality learning of their students.

Nbina (2012) supports the above findings when she highlighted that the "intellectual" capability is the key asset of teachers which would determine the quality of learning of students gained in school. Okwumelu, Oyibe and Oketa (2015) concluded that adaptive skills of teachers are essential to craft intervention such as "remediation and compensatory approaches to address students' individual differences in learning.

The findings above illustrate the importance of teachers' competence in the teaching-learning continuum. This suggests that teachers should continue to find ways to refine his/her mastery of the subject content, pedagogical skills including skills for the assessment of students' learning. Further, the academic

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supervisor should also conduct evaluation and process evaluation data to have an empirical basis for informed intervention.

Table 2. Prevailing Teacher Factor in Blended Learning

Factors	WM	SD	Verbal Description
Teaching Competency	4.67	0.41	Very Highly Beneficial in BL
Adaptive Skills	4.53	0.46	Very Highly Beneficial in BL
Technical Skills	4.52	0.47	Very Highly Beneficial in BL
Overall Weighted Mean	4.57		Very Highly Beneficial in BL

Verbal Interpretation Scale: 4.50 – 5.00 –Very Highly Beneficial in BL; 3.50 – 4.49 –Highly Beneficial in BL; 2.50 – 3.49 –Moderately Beneficial in BL; 1.50 – 2.49 –Less Beneficial in BL; 1.00 – 1.49 –Not at All Beneficial in BL

Leading Student Factor Useful in Blended Learning

The student factor construct consists of two dimensions, the motivation and the learning style. The motivation dimension is measured with four indicators and the learning style dimension is measured with five indicators. To assess the leading factor considered useful by students when engaging in blending learning, the weighted mean of each factor was computed. The statistical summary is depicted in Table 3.

The data show that both dimensions appeared as highly useful requisite for students when they engage in blended learning mode of instruction delivery. Particularly, the students learning style prevailed as the leading characteristic valuable in blended teaching-learning processes as revealed by the weighted mean of 4.25 (SD=0.52). Their intrinsic motivation (M=3.73, SD=0.59) somewhat supports their learning style to prosper in blended learning scheme. The overall weighted mean of 3.99 described as highly useful in blended learning implies that generally the learning style of students is the predominant factor essential in blended learning. This means that students would be able to maximize their learning when teachers would prepare learning activities that fit to the learning preference of the students.

Extant literatures have differing accounts about the connect between blending learning and learning style of students. However, Cheng and Chau (2016) findings support the above findings when they emphasized that students are encouraged to participate in blended learning activities when these activities fit with their learning preferences. Vasileva-Stojanovska, Malinovski, Vasileva, Jovevski, and Trajkovik (2015) further explain that in diverse learning situations, such as in face-to-face and in technology-mediated learning, teachers need to design learning materials and activities according to the learning styles of students to profitably get the most learning or educational outcome. Shah, Ahmed, Shenoy, & Srikant (2017) concluded that the awareness of teachers on students' learning style could help students solve problem they face in learning. Sabagh (2021), concluded that learning style helps the student stay engaged in the learning process and Keshavarz and Hulus (2021), noted that it is a predictor of student motivation in blended learning. Additionally, Tham (2016), suggested that respondents of his study showed high motivation towards blended learning. Motivating student to learn is an important factor to determine their degree of engagement, retention of content, and degree of academic achievement. Zavyalova (2020), added that success of blended learning depends on both teaching approaches and motivation of students. Teachers, therefore, should match the educational material to learning preference of students to learn more efficiently.

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The findings recommend that teachers should design suitable learning materials and activities based on the students' preferred mode of learning to motivate them participate in the learning process. Learning preferences influences learning and behavior towards learning.

Table 3. Student's Factor Useful in Blended Learning

Factors	WM	SD	Verbal Description
Motivation	3.73	0.59	Highly Useful in BL
Learning Style	4.25	0.52	Highly Useful in BL
Overall Weighted Mean	3.99		Highly Useful in BL

Verbal Interpretation Scale: 4.50 – 5.00 –Very Highly Useful in BL;3.50 – 4.49 –Highly Useful in BL; 2.50 – 3.49 –Moderately Useful in BL; 1.50 – 2.49 –Less Useful in BL; 1.00 – 1.49 –Not at All Useful in BL

Extent of Outcome of Blended Learning of HEIs in Sulu

Blended learning outcomes among student-respondents were assessed in terms of satisfaction, engagement, and academic performance (measured by general point average or GPA). These outcomes were analyzed using mean scores and interpreted based on a predefined verbal description scale. A summary of the statistical results is presented in Table 4.

Findings revealed that student-respondents reported high levels of engagement (M = 4.17, SD = 0.66) and high satisfaction (M = 3.71, SD = 0.72) with the blended learning experience. However, these positive perceptions were not fully translated into exceptional academic performance, as the respondents' GPA ranged from 80 to 85, which corresponds to an "average" performance category. This gap suggests that, despite favorable attitudes toward blended learning, further strategies may be necessary to enhance learning effectiveness and raise academic achievement.

These results highlight the multidimensional nature of blended learning outcomes. Kintu and Zhou (2018) identified key components of blended learning success, which include intrinsic motivation, learning satisfaction, knowledge construction, and academic performance. Consistent with this framework, the present findings confirm that affective (satisfaction and engagement) and cognitive (GPA) outcomes are relevant indicators of the success of blended learning implementation.

Ko and Chung (2012) defined learning satisfaction as the degree of contentment learners feel toward their learning experience. Similarly, Kintu, Zhu, and Kagambe (2017) found that blended learning significantly enhances student satisfaction. Supporting this, Yu (2010) argued that learner satisfaction is an important measure of instructional effectiveness. Abbas (2019) also reported that students in a blended learning environment generally express favorable satisfaction levels.

However, some studies offer contrasting insights. Manwaring et al. (2017) suggested that blended learning can pose challenges for learners due to factors such as poor self-regulation, inadequate learning strategies, or limited access to digital tools. They also noted that course design and student perceptions of instructional activities were more influential on engagement than modality alone.

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Despite these concerns, research by Noeled et al. (2020) affirmed that blended learning models are effective in enhancing both student satisfaction and engagement. Furthermore, studies by Hinampas (2018), Austria (2020), and Utami et al. (2017) have established a positive relationship between blended learning and improved academic performance, supporting the potential for long-term gains when properly implemented.

In the current study, engagement yielded the highest mean score among all variables, suggesting that student involvement is a significant contributor to blended learning success. These findings also demonstrate that the implementation of blended learning in higher education institutions (HEIs) in Sulu has been effective, as reflected in the high levels of satisfaction, engagement, and passing GPA reported across the sample.

While these outcomes are promising, they also imply the need to further sustain and strengthen blended learning practices. Institutions should invest in continuous professional development for faculty, refine instructional design, and enhance student support systems to ensure that the positive effects of blended learning are not only maintained but also translated into higher academic achievement.

Table 4 . Extent of Blended Learning Outcomes

Variables	M	SD	Verbal Description
Satisfaction	3.71	0.72	Highly Satisfied
Engagement	4.17	0.66	Highly Engaged
GPA	2.37	0.82	Average

Verbal Description Scale: 1.00 - 1.79 – Not at all Satisfied (NS)/Engaged (NE); 1.80 - 2.59 – Less Satisfied (LS)/Engaged (LE);2.60 - 3.39 – Moderately Satisfied (MS)/Engaged (ME); 3.40-4.19 – Highly Satisfied (HS)/Engaged (HE); 4.20 - 5.00 – Very Satisfied (VS)/Engaged (VE) GPA Verbal Description: 1.00 - 1.79 – (75-79) Fair; 1.80 - 2.59 – (80-85) Average;2.60 - 3.39 (86-90) Good; 3.40-4.19 – (91-95) Very Good; 4.20 - 5.00 – (96-100) Excellent

Teacher Factors and Blended Learning Outcomes

As summarized in Table 5, 3 regression models are tested using the **teacher factor dimensions** such as teaching competence, adaptive and technical skills as the predictors.

Satisfaction Model

The regression analysis for the satisfaction model was not statistically significant, $F(3, N) = 0.587$, $p = .740$, with an R^2 of .011, indicating that the predictor variables (teaching competence, adaptive skills, and technical skills) explained only 1.1% of the variance in student satisfaction. Specifically, the effect of teaching competence ($\beta = 1.004$, $t = 0.327$, $p = .744$) and adaptive skills ($\beta = -1.337$, $t = -0.557$, $p = .578$), and Technical skills ($\beta = 2.685$, $t = 0.713$, $p = .476$), on student satisfaction was not statistically significant.

These results suggest none of the predictor variable had an effect on student satisfaction. Furthermore, it is suggested that other factors not included in the model, such as student motivation, learning style, or technological infrastructure, may be more influential in determining satisfaction in a blended learning environment.

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Engagement Model

The engagement model also showed a lack of statistical significance, $F(3, N) = 0.266$, $p = .727$, with an R^2 of .011, meaning that only 1.1% of the variance in student engagement was explained by teaching competence, adaptive skills, and technical skills. The findings shows that the relationship between teaching competence ($\beta = -1.219$, $t = -0.395$, $p = .693$), Technical skills ($\beta = 0.808$, $t = 0.618$, $p = .537$), and adaptive skills ($\beta = -0.330$, $t = -0.553$, $p = .580$) and student engagement was not significant suggesting that a teacher's ability to demonstrate subject knowledge or instructional ability did not significantly enhance student engagement as well as it implies that teachers' ability to adjust to students' needs was not a key factor in engaging students in the blended learning context. It also suggest that the use of technology in the learning process had no substantial effect on students' engagement levels.

Academic Performance (GPA) Model

The regression model predicting academic performance (GPA) was statistically significant, $F(3, N) = 3.246$, $p = .039$, with an R^2 of .152, meaning that 15.2% of the variance in GPA was explained by teaching competence, adaptive skills, and technical skills.

Specifically, teaching competence did not significantly predict academic performance ($\beta = 1.067$, $t = 0.351$, $p = .726$), indicating that the teacher's ability to deliver content effectively did not have a direct effect on students' GPA. Adaptive skills, however, were a significant negative predictor of GPA ($\beta = -0.247$, $t = -3.061$, $p = .002$). This suggests that teachers' ability to adapt to student needs may be associated with lower academic performance. This negative relationship may reflect a potential mismatch between adaptation strategies and the actual needs of students, or it may indicate that excessive adaptability could detract from academic rigor. In contrast, technical skills were a significant positive predictor of GPA ($\beta = 0.648$, $t = 3.046$, $p = .003$). This finding suggests that teachers' technical proficiency, possibly through the use of digital tools and resources, can have a positive impact on students' academic performance in a blended learning environment.

These results emphasize that technical skills have a notable impact on students' academic outcomes, while adaptive skills may be a double-edged sword and may need further examination to understand why it negatively affects GPA. Teaching competence, however, was not found to have a direct impact on academic performance.

The findings of this study are consistent with the work of Olufemi et al. (2018), who emphasized that, beyond student, parental, and institutional influences, teacher-related factors exert a significant impact on students' academic performance. Similarly, Alos et al. (2015), as cited in Olufemi et al. (2018), highlighted the critical need for qualified teachers in the learning process to ensure positive educational outcomes.

Engin-Demir (2009) and Heinesen (2018) further reinforce this perspective by asserting that teacher quality, competence, and attitude are key contributors to student academic success. Supporting this, Pham (2022) noted that a teacher's capacity to integrate diverse instructional ideas and practices—particularly in the development of online course content—plays a crucial role in promoting effective learning outcomes in higher education.

In alignment with these studies, the results of the present research affirm the significant role that teacher-related factors—especially technical skills and adaptability—play in facilitating students' academic performance in blended learning environments. Teachers continue to be central figures in the educational process, with student outcomes often reflecting the effectiveness of instructional delivery. In this context,

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learning outcomes serve not only as indicators of student achievement but also as tangible measures of teaching quality.

Although blended learning remains a relatively new modality in higher education institutions (HEIs) in Sulu, the findings suggest that teachers have been able to adapt well to the shift. Their willingness to embrace technological integration and instructional flexibility reflects a positive and proactive response to changes in the educational system.

Moving forward, it is imperative for teachers to continue embodying the core attributes associated with effective blended instruction. This includes maintaining a high level of teaching competence, technological proficiency, and adaptability—factors which collectively contribute to improved academic outcomes and a more resilient, student-centered learning environment.

In conclusion, the results suggest that while teaching competence and adaptive skills did not significantly predict student satisfaction or engagement, technical skills showed a positive effect on academic performance. The negative relationship between adaptive skills and GPA warrants further investigation to better understand the potential complexities of teaching adaptability in blended learning environments. Overall, these findings indicate that while teacher-related factors are important, other elements—such as student engagement strategies, curriculum design, and institutional support—may be equally crucial for promoting effective learning outcomes in blended environments.

Table 5. Summary of Regression Analysis for Teacher Related Factors Predicting Learning Outcomes

Outcome Model	Predictor	B	SE	*T*	*P*
Satisfaction	Teaching Competence	1.004	142.03	0.327	.744
	Adaptive Skills	-1.337	28.453	-0.557	.578
	Technical Skills	2.685	49.702	0.713	.476
	Model Summary				
	R = .103, R^2 = .011, Adj. R^2 = .008, F(3, N) = 0.587, p = .740				
Engagement	Teaching Competence	-1.219	54.066	-0.395	.693
	Adaptive Skills	-0.330	26.049	-0.553	.580
	Technical Skills	0.808	62.774	0.618	.537
	Model Summary				
	R = .105, R^2 = .011, Adj. R^2 = .007, F(3, N) = 0.266, p = .727				
Academic Performance	Teaching Competence	1.067	3.250	0.351	.726
(GPA)	Adaptive Skills	-0.247	0.656	-3.061	.002**
	Technical Skills	0.648	0.826	3.046	.003**
	Model Summary				
	R = .390, R^2 = .152, Adj. R^2 = .102, F(3, N) = 3.246, p = .039				

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Regression Analysis on Student Factors Influencing Learning Outcomes in Blended Learning

To examine the influence of student motivation and learning style on learning outcomes—specifically, student satisfaction, engagement, and academic performance—three multiple linear regression models were analyzed. The results are summarized in Table 6 and discussed below.

Satisfaction Model

The regression model predicting student satisfaction was statistically significant, $F(2, N) = 6.76$, $p < .001$, with an $R^2 = .111$, indicating that 11.1% of the variance in satisfaction was explained by student motivation and learning style.

Student motivation was found to be a significant positive predictor of satisfaction ($\beta = 0.064$, $t = 5.25$, $p < .001$). This suggests that more motivated students tend to report higher satisfaction in the blended learning environment. In contrast, student learning style was not a significant predictor ($\beta = 0.069$, $t = -0.37$, $p = .712$). These results highlight the importance of fostering motivation to enhance students' satisfaction with blended learning.

Engagement Model

The regression model predicting student engagement was not statistically significant, $F(2, N) = 2.05$, $p = .059$, with an $R^2 = .036$, indicating that only 3.6% of the variance in engagement was explained by the model.

Neither student motivation ($\beta = 0.068$, $t = 1.20$, $p = .232$) nor student learning style ($\beta = 0.118$, $t = 2.08$, $p = .068$) significantly predicted engagement. Although the learning style variable approached significance, the overall weak model fit suggests that additional variables—such as instructional strategies, social interaction, or digital access—may better account for student engagement in blended environments.

Academic Performance (GPA) Model

The regression model for academic performance (GPA) was statistically significant, $F(2, N) = 3.77$, $p < .001$, with an $R^2 = .085$, indicating that 8.5% of the variance in GPA was explained by the predictors.

Interestingly, student motivation was a significant negative predictor of academic performance ($\beta = -0.160$, $t = -2.87$, $p = .004$). This finding suggests that increased motivation may not always correlate with better academic outcomes. Possible explanations include overexertion, burnout, or misaligned effort and strategy. Student learning style remained a non-significant predictor ($\beta = 0.026$, $t = 0.47$, $p = .638$).

This study examined the influence of student motivation and learning style on blended learning outcomes—specifically student satisfaction, engagement, and academic performance. The findings highlight nuanced relationships between these student-related factors and learning outcomes, revealing both expected and unexpected results that warrant deeper exploration.

The regression model for student satisfaction was statistically significant, with results indicating that student motivation was a strong positive predictor. This aligns with previous studies (Gao et al., 2020; Chen & Yao, 2017), which emphasize the importance of intrinsic learner characteristics—such as adaptability, perceived usefulness, and learner engagement—in shaping satisfaction with blended learning. These findings suggest that fostering student motivation, through goal-setting, personalized learning paths, and timely feedback, may enhance satisfaction. However, student learning style did not significantly predict satisfaction, suggesting that while learning style may be a useful instructional consideration, it is not sufficient alone to drive satisfaction in a blended context.

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Contrary to expectations, the engagement model was not statistically significant, indicating that student motivation and learning style explained only a small portion of the variance in engagement. This implies that other variables—such as course design, instructional strategies, digital access, and teacher presence—may play a more substantial role in student engagement. This is consistent with findings from Heilporn, Lakhal, and Belisle (2021), who noted that course structure, instructional activities, and teacher-student relationships are critical for fostering engagement. The marginal significance of learning style suggests a potential area for future investigation, particularly in combination with instructional alignment strategies.

The results of the academic performance model were particularly noteworthy. While the model was statistically significant, student motivation emerged as a negative predictor of GPA, an unexpected finding that diverges from much of the literature. One possible interpretation is that highly motivated students may engage in learning behaviors that do not directly translate into academic success—such as multitasking, overcommitting to extracurricular learning, or inefficient study strategies. Alternatively, this finding could reflect a misalignment between student effort and assessment formats. These possibilities align with concerns raised in prior research (Hinampas et al., 2018) that academic outcomes are influenced by multiple intersecting variables, including assessment design and instructional support. Meanwhile, student learning style again proved to be a non-significant predictor of GPA, suggesting that individual learning preferences may not translate into measurable academic performance in a blended setting.

The present findings are consistent with studies by Kintu, Zhu, and Kagambe (2017), which emphasize that blended learning outcomes are influenced more by design features—such as technology quality, feedback mechanisms, and instructor presence—than by student characteristics alone. Moreover, the findings affirm that blended learning can yield positive academic results, as noted in studies conducted in Philippine higher education institutions (Austria et al., 2020; Hinampas, 2018), though such improvements may depend heavily on instructional context and course implementation.

The limited predictive power of motivation and learning style on engagement and GPA reinforces the need for multifactorial models that incorporate variables such as digital infrastructure, pedagogical strategies, and institutional support. As noted by Utami (2017), Vo and Diep (2017), and Maccoun (2016), blended learning is effective primarily when supported by robust teaching methodologies, flexible pacing, and student-centered course design.

In summary, student motivation significantly influenced satisfaction positively and GPA negatively, while learning style did not show a statistically significant effect on any of the learning outcomes measured. Among the three models, the strongest predictive relationship was found for student satisfaction. These findings indicate the complexity of motivational dynamics in blended learning and suggest that while motivation enhances satisfaction, it does not necessarily translate to better academic performance.

Table 6. Summary of Regression Analysis for Student Related Factors Predicting Learning Outcomes

Dependent Variable	Predictor	β	SE	T	p	R	R^2	Adj. R^2	F	p (Model)
Satisfaction	Student Motivation	0.064	0.064	5.250	.000**	.333	.111	.094	6.758	.000
	Student Learning Style	0.069	0.069	-0.369	.712					

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Dependent Variable	Predictor	β	SE	T	p	R	R^2	Adj. R^2	F	p (Model)
Engagement	Student Motivation	0.068	0.061	1.197	.232	.191	.036	.019	2.046	.059
	Student Learning Style	0.118	0.066	2.084	.068					
Academic Performance	Student Motivation	-0.160	0.060	-2.870	.004**	.292	.085	.063	3.772	.000
(GPA)	Student Learning Style	0.026	0.065	0.471	.638					

Note: $p < .05$*, **p** < .01**

Conclusion

This study investigated the influence of teacher and student factors on blended learning outcomes in higher education institutions (HEIs) in Sulu, with a specific focus on student satisfaction, engagement, and academic performance (GPA). The findings offer several important insights into the effectiveness and challenges of blended learning in the local context.

Results showed that student-related factors played a more consistent and meaningful role in shaping learning outcomes. Student motivation was found to significantly predict satisfaction, while learning style had a marginal influence on engagement. Furthermore, motivation showed a significant negative relationship with academic performance, a counterintuitive result that warrants further exploration. These results affirm that student engagement and internal drive are essential contributors to the effectiveness of blended learning environments.

Conversely, the analysis of teacher-related factors revealed mixed results. Teaching competence and adaptive skills did not significantly predict student satisfaction or engagement. However, technical skills of teachers emerged as a significant positive predictor of students' academic performance. Interestingly, adaptive skills showed a negative relationship with GPA, suggesting that excessive adaptability may compromise instructional consistency or academic rigor. This finding highlights the need for a balanced approach to instructional flexibility in blended settings.

The descriptive analysis also revealed that students were generally highly satisfied and highly engaged in blended learning. Despite this, their academic performance remained within the average range (GPA of 80–85), indicating that affective outcomes may not automatically translate into higher academic achievement. This underscores the importance of strengthening the link between instructional strategies and measurable academic results.

In alignment with existing literature (e.g., Kintu & Zhou, 2018; Pham, 2022), the findings support the idea that blended learning, when properly designed and supported, can positively influence students' learning experiences. However, achieving optimal outcomes requires attention to both teacher readiness—particularly in terms of digital competence—and student-centered approaches that foster motivation and sustained engagement.

Overall, the study concludes that blended learning implementation in Sulu HEIs is effective in fostering student satisfaction and engagement, but more deliberate efforts are needed to translate these gains

into improved academic performance. Institutions are encouraged to provide continuous faculty development in digital instruction, invest in technology infrastructure, and implement learning analytics to monitor and support students' academic progress. Future research should explore other mediating variables—such as instructional design quality, institutional support, and peer interaction—to better understand the dynamics influencing blended learning success.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are proposed to enhance the effectiveness of blended learning implementation in higher education institutions (HEIs), particularly within the context of Sulu:

The Commission on Higher Education (CHED), as the governing body for tertiary education in the Philippines, is encouraged to conduct periodic evaluations of the effectiveness of blended learning implementation across HEIs to ensure alignment with institutional goals and student needs and to establish clear goals and priorities that align blended learning programs with available resources, including human capital, technological infrastructure, and physical facilities.

At the institutional level, school administrators, may implement regular performance evaluations of faculty members engaged in blended learning, focusing on instructional effectiveness, student engagement, and use of technology; periodically review the availability and adequacy of resources, such as learning platforms, devices, and instructional materials; and schedule regular orientation programs for both faculty and students to ensure familiarization with blended learning systems, tools, and content delivery formats.

Instructors may enhance their digital literacy and instructional skills through continuous professional development focused on online and hybrid teaching modalities; identify and mitigate access-related barriers, such as limited device availability, internet issues, or lack of digital proficiency among students; and provide targeted support for students who may struggle with technology use or who demonstrate low performance in blended settings.

As this study was limited to the context of Sulu HEIs, further exploration is encouraged to deepen understanding of blended learning's broader impact. A research study on The Impact of learning assessments and evaluation tools on academic outcomes in blended learning settings and the extent of institutional and administrative support for blended learning and its correlation with student and teacher performance are highly recommended.

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