COMMONWEALTH of LEARNING

The Impact of Blended Learning at the Fiji National University

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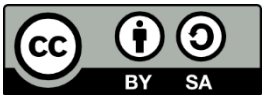

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Abbreviations

ATTL	Attitudes towards thinking and learning
ATTLS	Attitudes Toward Thinking and Learning Survey
BLCES	Blended learning course experience survey
CAFF	College of Agriculture, Fisheries and Forestry
CBHTS	College of Business, Hospitality and Tourism Studies
CEST	College of Engineering, Science and Technology
CFA	Confirmatory factor analysis
CHE	College of Humanities and Education
CIS	Course interest survey
CMNHS	College of Medicine, Nursing and Health Sciences
COL	Commonwealth of Learning
DLAT	Digital literacy and access to technology
EFA	Exploratory factor analysis
FNU	Fiji National University
ICT	Information and communication technology
LMS	Learning management system
NTPC	National Training and Productivity Centre
TEL	Technology-enabled learning

Executive Summary

Blended learning has been an ongoing mode of teaching and learning along with fully face-to-face and online modes at the Fiji National University (FNU) since the university adopted Moodle and other technological tools. However, online and blended learning became more significant in April to November 2021, when the university closed as part of the national disease control measures in the face of the COVID-19 pandemic. During the closure, the university conducted a survey called The Impact of Blended Learning at the Fiji National University to assess the university's use of blended learning and its impact on student learning experiences and academic achievement. Students' attitudes towards blended learning and the relationship between blended learning and students' grades were examined.

Participation in the study was open to the 817 students who were enrolled in 22 blended courses offered by FNU. Out of the 817 students, 10.04% (n = 82) participated in the survey. For quantitative data analysis, an independent sample t-test, a Pearson correlation coefficient, a likelihood-ratio test and stepwise regression analyses were used. Data were collected through a student post-course survey, students' performance rates from end-of-semester grades and learning management system (LMS) (Moodle) data. The grades of students enrolled in blended courses in Semester 2, 2021, were compared with the grades of students in Semester 2, 2019 and 2020, to analyse differences in academic achievement. The results of the survey indicated that the majority (84%–93%) of the students perceived blended learning positively, with most (89%–92%) reporting that their teachers played a positive role in their learning and took an interest in their learning. Students also indicated a positive view of the blended learning course design. A comparison of the students' grades between blended and non-blended learning courses showed mixed results: a difference in the grades was noted in six courses (40%) but in nine other courses (60%), there was no significant difference. Overall, students had a positive opinion of the blended learning environment as it provided them with opportunities to learn when, where and at a pace that suited them.

1.0 Introduction

Evolving educational technologies over the last three decades — from simple learning management systems (LMS) to the use of personal computers, tablets and smartphones for Web-based learning — have given rise to new delivery methods in teaching (Cleveland-Innes & Wilton, 2018).

The increasingly rapid pace of developments in technology and the massive shift to online learning due to the COVID-19 pandemic have caused unprecedented disruption in education. The pandemic forced many nations into lockdown. In Fiji, for example, schools were closed in April 2021 and did not reopen until November 2021. The closure would have resulted in over 200,000 students losing more than 1,050 hours of teaching and learning time (Veitch & Jacobs, 2021). However, in response to this crisis, there was an abrupt transition to online learning, with the integration of various educational technologies into traditional face-to-face learning, a change that continued even post-lockdown. This integration of face-to-face and online learning is termed blended learning.

The shift from face-to-face learning to online and blended learning increased teachers' and students' confidence in the capacity of online teaching to deliver quality education and exposed teachers and students to the new possibilities and challenges that blended teaching and learning offers.

Numerous studies on the benefits and challenges of blended learning suggest that students find it beneficial as it combines the best features of both face-to-face and online learning. Because online learning allows students to learn from anywhere at any time, it offers autonomy in learning. Most importantly in the context of the COVID-19 pandemic, it reduces face-to-face contact and allows students to pursue their education in the safety of their homes. Blended learning also makes learning more accessible and personalised, allowing students to work both independently and collaboratively, which has been shown to have positive impacts on students' confidence and their leadership, time-management, reflective thinking and decision-making skills. It increases learning opportunities by offering students choices about how, when and where they can access their learning. However, while blended learning is praised for its flexibility in terms of being able to accommodate students' circumstances, it also brings a variety of challenges, including isolation, technological problems, limited real-time guidance from teachers, insufficient infrastructure, limited information about the implementation of blended learning, students' unwillingness/inability to access online content, poor or unstable Internet connections, instructors' performance, and the negative attitude of some students towards blended learning (Dahmash, 2020; Namyssova et al., 2019).

This report presents the findings of a survey on the impact of blended learning conducted at the Fiji National University (FNU) in 2021. The survey was done when the campus was closed because of COVID-19 and all the students were learning from home. This survey provides insights into students' perceptions of, attitudes towards and readiness for blended learning.

1.1 The Study Environment

The Fiji National University was established in 2010 and consists of five major colleges: College of Agriculture, Fisheries and Forestry (CAFF), College of Business, Hospitality and Tourism Studies (CBHTS), College of Engineering, Science and Technology (CEST), College of Humanities and Education (CHE) and College of Medicine, Nursing and Health Sciences (CMNHS). It also has a National Training and Productivity Centre (NTPC) which provides training and qualifications in technical and trade skills. The university has campuses and centres at 40 locations throughout the country, with a total of approximately 300 different courses and programmes, 2,000 staff and a student enrolment of around 26,000 (Fiji National University, 2021). The Commonwealth of Learning (COL) has been supporting FNU in implementing technology-enabled learning (TEL) since February 2019. That assistance has been provided via the development of blended courses, and FNU signed an agreement to develop a community of practice for TEL, with the aim of providing a space where all institutions throughout the Commonwealth can collaborate with, learn from and interact with each other. In collaboration with FNU, COL launched the TEL Community of Practice online platform to

develop a network of teachers across the Commonwealth who are adopting technology-enabled and blended learning practices in their teaching (Commonwealth of Learning, 2020). As part of a systematic approach to TEL implementation, COL supported the following capacity-building activities at FNU:

- Workshop on Designing, Implementing and Facilitating Problem-Based Learning, June 2019.
- Workshop on eModeration, October 2019.
- Workshop on Policy Development for Open Educational Resources, 12 May 2022.
- Workshop on Policy Development for Open Educational Resources, Review, 10 June 2022.

2.0 Research Questions

The primary objective of this survey was to examine the impact of blended learning on student learning experiences and achievement. Broadly, the research was based on the following research questions (RQ):

RQ1: How do learners at FNU describe the effectiveness of the blended learning environment in their course of study?
RQ2: How do students at FNU perceive their teachers' practices and behaviours in a blended learning environment?
RQ3: How do teachers' practices at FNU affect students' perceptions of blended learning courses?
RQ4: How is the learning achievement in blended learning courses different from that of other courses at FNU?
RQ5: How do students' perceptions of and satisfaction with blended learning courses relate to achievement?
RQ6: How does student engagement in blended learning courses relate to achievement?
RQ7: How do perceptions of learning in blended courses relate to achievement?

3.0 Literature Review

Over the years, blended learning has been defined in numerous ways. According to Cleveland-Innes & Wilton (2018), "blended learning is a term applied to the practice of providing instruction and learning experiences through some combination of both face-to-face and technology-mediated learning" (p. 2). Bates (2016) described blended learning as online learning being "gradually blended with face-to-face teaching, but without changing the basic classroom teaching model" where "online learning is being used as a supplement to traditional teaching" (p. 33). Graham (2006) defined blended learning as a combination of face-to-face and computer-mediated instructions, and Garrison and Kanuka (2004) suggested that blended learning is a fusion of face-to-face and online learning experiences. Hrastinski (2019), however, gave a more comprehensive definition, stating that blended learning is the umbrella term for all teaching and learning set-ups with any degree of face-to-face and online combination, in any form, be it instructions, pedagogy or technology. This definition is in line with the more detailed description of blended learning provided by Bates (2016), who stated that "technology-enhanced learning, or technology used as classroom aids; the use of a learning management system; the use of lecture capture for flipped classrooms; one semester on a residential-type campus and two semesters online; a shortened time on campus spent on campus hands-on experience or training preceded or followed by a concentrated time spent studying online; and a hybrid or flexible learning requiring the redesign of teaching so that students can do the majority of their learning online" (310-11) are all examples of blended learning. In fact, blended, hybrid or multi-modal learning can fall anywhere in the continuum between face-to-face and online learning. Blended learning facilitates improved and increased accessibility, collaborative learning opportunities, enhanced communication, enhanced assessment processes — including self-assessments — and feedback that can improve engagement and learning. Several studies have recorded the positive impacts of blended learning on learner experience and achievement. For example, a study exploring students' perceptions of an experimental cross-cultural entrepreneurial blended learning course in the United States and Croatia recorded student satisfaction and engagement throughout the course

(Štefanić et. al., 2019). Another survey conducted on the effectiveness of blended learning among nursing students recorded positive outcomes relating to the use of various LMS (Sáiz-Manzanares et al., 2020). The results of a similar study conducted at an Australian university campus located in Vietnam recorded little positive feedback from students on blended learning in terms of their learning experience, engagement with teachers and peers and the learning environment (Bouilheres et al., 2020). Likewise, a survey at Rajiv Gandhi University in India revealed that students perceived the effectiveness of blended learning, their teachers' interest in their learning, course design and overall satisfaction positively (Koneru, 2019). Bhagat (2020) also recorded positive responses from students in a similar survey conducted at the Uganda Management Institute and noted that blended learning was especially effective in providing access and flexibility.

Similar results have been observed through studies conducted in the Pacific region. A survey done at the University of Papua New Guinea, a multi-campus university, revealed that students and teachers preferred blended learning over other delivery modes, and perceived it to be cost-effective for facilitating courses across campuses. The course design and delivery were successful, which led to student satisfaction. The study indicated that blended learning improved students' time-management skills and academic performance and had a positive impact on digital literacy (Sharma, 2021). Another significant study was conducted at the National University of Samoa to evaluate the effectiveness of COL-supported blended learning courses. That study showed that it was crucial to undertake training and planning when implementing blended learning (Mow, 2019). Digital literacy is an important prerequisite for teachers and students to benefit fully from blended learning, but the blended learning must be shaped by effective pedagogy.

> "Although distance education educators like to assert that the pedagogy alone defines their distance learning designs, it is only in a complex dance between technologies and pedagogies that quality distance education emerges. The technology sets the beat and the timing. The pedagogy defines the moves" (Anderson, 2009, p. 2). Panda (2020, p. 268) describes the role of pedagogy as an important factor in "self-direction, collaboration, resilience, and learning with confidence" for the shift to online learning. Along with the availability of tools, the pedagogical design of the course is equally important, where the role of the teacher is critical. (Hunt et al., 2012)

4.0 Methodology

4.1 Research Design and Sample

A convenience sampling method was employed to collect the survey data. A total of 817 students enrolled in the 22 blended courses offered during Semester 2 (July – November), 2021. Some students enrolled in multiple blended courses. A questionnaire, developed previously by COL (Bhagat, 2019), was distributed at the end of the courses. The questionnaire contained 75 closed questions and one open-ended question, and participation was voluntary. Eighty-two students — 27 male and 55 female — from across the ten campuses participated. The students' final grades in the blended courses were collected from the university's academic records.

4.2 Instruments

This study was conducted using the following tools:

- Post-course survey: a specially designed student experience survey.
- Data on student performance in the current year and two previous years in the selected courses.

A four-part questionnaire was used to collect data on (i) digital literacy and access to technology (DLAT), (ii) blended learning course experience survey (BLCES), (iii) course interest survey (CIS) and (iv) attitudes towards thinking and learning (ATTL).

Except for demographic information, all the survey items were measured on a five-point Likert scale, with 1 signifying "strongly agree" and 5 signifying "strongly disagree."

The DLAT, as discussed and reviewed by Covello et al. (2010), included three items, and the overall Cronbach's α for DLAT was 0.79.

The BLCES was based on the instrument used by Koneru (2019) to measure students' blended learning experience in a similar higher education institution. A group of five experts validated the items in the BLCES. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed to examine its factor structure construct validity. The resulting scale consisted of three subscales and 18 items: a nine-item course design subscale, a six-item learning experience subscale and a three-item personal factor subscale. The three BLCES factors had adequate reliability (Cronbach's α = 0.96, 0.92 and 0.74 for course design, learning experience and personal factors, respectively). The overall Cronbach's α for the BLCES was 0.9.

The CIS was designed by Keller (2010) and included four subscales and 34 items: an eight-item attention subscale, a nine-item relevance subscale, a nine-item satisfaction subscale and an eight-item confidence subscale. The four factors in the questionnaire had adequate reliability (Cronbach's α = 0.83, 0.77, 0.85 and 0.71 for attention, relevance, satisfaction and confidence respectively). The overall Cronbach's α for CIS was 0.93.

The ATTL scale was developed by Galotti et al. (2009) and consisted of 20 items. The overall Cronbach's α was 0.95.

4.3 Data Analysis

For quantitative data analysis, an independent sample *t*-test, a Pearson correlation coefficient, a likelihood-ratio test and stepwise regression analyses were used. All the quantitative analyses were conducted using Microsoft Excel (Office 365). The statistical significance level was set at $p < 0.05$.

5.0 Student Data Analysis and Findings

5.1 Demographic Profile

Of the 817 students enrolled in courses offered in blended mode, 10.04% ($n = 82$) participated in the post-course survey. The data were cleaned and records with missing field values were filtered out for the data to be considered valid for analysis. The demographic profile of the survey respondents, as illustrated in Table 1, was as follows: Of the 82 respondents, 43.9% ($n = 36$) were below the age of 20; 17.1% ($n = 14$) were between 21 and 25; 12.2% ($n = 10$) were between 26 and 30; 9.8% ($n = 8$) were between 31 and 35; 14.6% ($n = 12$) were between 36 and 40; and 2.4% ($n = 2$) were above the age of 40. Furthermore, 67.1% ($n = 55$) of the respondents were female and 32.9% ($n = 27$) were male. Students from ten blended courses (out of the 22) participated in the survey.

5.2 Student Responses

The survey questionnaire was divided into four sections to record students' responses to (i) Digital Literacy and Access to Technology (DLAT), (ii) blended learning course experience survey (BLCES), (iii) course interest survey (CIS) and (iv) attitudes towards thinking and learning (ATTL).

A five-point Likert scale (i.e., strongly agree, agree, neither agree nor disagree, disagree, strongly disagree) was used in the actual questionnaire but for the purpose of this report we have collapsed the scale into three categories: agree (i.e., strongly agree and agree), neutral (i.e., neither agree nor disagree) and disagree (i.e., disagree and strongly disagree). This scale was used to determine the significant difference between the proportions of agreeing, being neutral and disagreeing through a likelihood-ratio test. The analyses of the responses to each of the four sections are shown in Table 2.

The DLAT scale recorded students' responses to statements about their digital literacy skills, their access to and use of digital tools and their ability to access and use FNU's Moodle system. A statistically significant 87.8% of respondents agreed with the statements. Only 1.2% disagreed and 11% were neutral.

Table 1. Demographic statistics for student participants

Measure	Category	Frequency & percentage in the study	
		Number	%
Age	Below 20	36	43.9%
	21–25	14	17.1%
	26–30	10	12.2%
	31–35	8	9.8%
	36–40	12	14.6%
	41 and above	2	2.4%
Gender	Female	55	67.1%
	Male	27	32.9%
Courses	EDU505 - Science Education 1	22	26.8%
	EDU549 - Social Education 1	19	23.2%
	EDU561 - Enterprise, Innovation and Enrichment in Education	1	1.2%
	EPI832 - Introduction to Health Information Systems	2	2.4%
	EPI833 - Outbreak Investigation in Field Epidemiology	1	1.2%
	ETH401 - Introduction to Ethics and Governance	2	2.4%
	FTV434 - FTV Secondary of Direction and Production	1	1.2%
	MGT501 - Introduction to Business Management	11	13.4%
	MKT501 - Introduction to Marketing	21	25.6%
	PHE601 - Measurement and Evaluation in Exercise and Sports	2	2.4%
Grades	I	5	6.1%
	C-	3	3.7%
	C	3	3.7%
	C+	5	6.1%
	B-	9	11.0%
	B	13	15.9%
	B+	12	14.6%
	A-	14	17.1%
	A	10	12.2%
	A+	4	4.9%
	NA	4	4.9%
Total number of students		82	

The BLCES scale, which recorded students' perceptions of course design, how their learning experience was enhanced and personal factors impacting their experience, shows the majority of the respondents (90.2%) agreed the course design was excellent in terms of the description of course objectives, learning activities and assignments, expression of expectations, organisation, continuity between face-to-face and online learning, pace, lecturer's interest, feedback and orientation. A significantly lower proportion disagreed (1.2%) or were neutral (8.6%). A significantly high proportion (87.8%) of respondents agreed that their learning experience had improved through the use of multimedia resources on FNU's Moodle system, online communication with other students and teachers, improved time-management skills via online learning, improved digital literacy, improved performance in mid-semester and end-of-semester exams, and flexibility. A small proportion (1.2%)

disagreed and 11% were neutral. The third part of the scale recorded students' perceptions of the personal factors affecting their course experience. Almost half (42.7%) of the respondents agreed that they felt anxious during the course and had trouble using technologies, and that the course required more time and effort than other courses; 26.8% disagreed and 30.5% were neutral. Overall, a significantly higher percentage of respondents agreed with the statements on course design and learning experience in comparison to those who disagreed or were neutral. The exception to this pattern was the respondents' views on statements about personal factors. In that instance a slightly higher percentage of respondents agreed with the statements compared to those who were neutral, which was still a higher proportion than those who disagreed.

The CIS scale was used to record students' perceptions of how well the course held their attention, satisfaction and confidence about the course, including their perception of its relevance. A significantly higher proportion (52.4%) of respondents agreed that the course was well designed and held their attention than those who disagreed (31.7%). The balance of respondents were neutral. Furthermore, more students agreed (65.9%) than disagreed (22%) that the course was relevant. Similar results emerged for students' perceptions of their satisfaction about the course: 65.9% agreed the course was satisfactory, 26.9% disagreed and 7.2% were neutral. Furthermore, 56.1% of the respondents agreed that the course maintained their confidence level while 31.7% disagreed and 12.2% were neutral.

The ATTL scale recorded students' responses to statements about positive attitudes to thinking and learning. An analysis of the results showed a significantly higher proportion of students (64.6%) agreed with the statements compared to those who disagreed (31.7%) or were neutral (3.7%).

Table 2. Student responses to categorised questionnaire items (*n* = 82)

Questionnaire item	Agree	Neutral	Disagree	$\chi 2$
Digital literacy and access to technology				
My digital literacy (use of MS Office, browse the Web and navigate through FNU's Moodle System) skills are excellent.	75	7	0	110.66*
My access to and use of digital tools (laptop, smartphone) are excellent.	68	11	3	
My ability to access and use the FNU's Moodle system was excellent.	73	9	0	
Combined score for items	72	9	1	
Blended learning course experience survey: Course design				
Description of course objectives, learning activities and assignments in the online course was excellent.	75	6	1	120.17*
Expression of expectations for performance (e.g., online forums and assignments) in the course was excellent.	75	7	0	
The lecturer's overall organisation of the course was great.	75	7	0	
Continuity between face-to-face class and online learning was good, if applicable.	67	12	3	
The pace of the course was user-friendly.	73	9	0	
The lecturer's interest in your learning was good.	75	7	0	
The lecturer's feedback on your performance in assignments and participation in the forums was very helpful.	73	8	1	
The orientation provided by the lecturer on the use of the online resources, activities and FNU's Moodle system was very helpful.	75	6	1	
Overall, the course experience was excellent.	74	8	0	
Combined score for items	74	7	1	

Blended learning course experience survey: Learning experience				
Multimedia resources on FNU's Moodle system enriched my learning experience.	76	6	0	
Communicating online with students and the lecturer improved my learning.	72	10	0	
Online learning improved my time-management skills.	70	11	1	
Online learning improved my digital literacy.	75	7	0	114.50*
Online learning improved my performance in mid-semester tests and end-of-semester exams.	69	11	2	
Online learning enabled me to learn at any time, any pace, from anywhere, using any device.	72	10	0	
Combined score for items	72	9	1	
Blended learning course experience survey: Personal factors				
I feel more anxious in this course.	38	23	21	
I have trouble using the technologies in this course.	23	21	38	3.39
This course required more time and effort.	43	22	17	
Combined score for items	35	22	25	
Course interest survey: Attention				
The lecturer knows how to make us feel enthusiastic about the subject matter of this course.	65	17	0	
This course has very little in it that captures my attention.	24	24	34	
The lecturer creates suspense when building up to a point.	42	27	13	
The students in this course seem curious about the subject matter.	46	29	7	
The lecturer does unusual or surprising things that are interesting.	39	35	8	23.80*
The lecturer uses an interesting variety of teaching techniques.	62	18	2	
I often daydream (e.g., have distracting thoughts) while in this course.	20	29	33	
My curiosity is often stimulated by the questions asked or the problems given on the subject matter in this course.	45	32	5	
Combined score for items	46	26	10	
Course interest survey: Relevance				
The things I am learning in this course will be useful to me.	68	14	0	
The lecturer makes the subject matter of this module seem important.	68	14	0	
I do not see how the content of this course relates to anything I already know.	18	26	37	
In this course, I try to set and achieve high standards of excellence.	67	15	0	
The content of this course relates to my expectations and goals.	64	18	0	40.20*
My fellow students actively participate in this course.	53	25	4	
To accomplish my goals, it is important that I do well in this course.	68	14	0	
I do not think I will benefit much from this course.	12	20	46	
The personal benefits of this course are clear to me.	67	15	0	
Combined score for items	54	18	10	
Course interest survey: Satisfaction				
I have to work very hard to succeed in this course.	63	17	2	43.71*

I feel that this course gives me a lot of satisfaction.	64	18	0	
I feel that the grades or other recognition I receive are fair compared to other students.	54	26	2	
I enjoy working on the course activities.	60	22	0	
I am pleased with the lecturer's evaluations of my work compared to how well I think I have done.	59	21	2	
I feel satisfied with what I am getting from this course.	63	18	1	
I feel rather disappointed with this course.	12	30	40	
I feel that I get enough recognition of my work in this course by means of grades, comments or other feedback.	56	24	2	
The amount of work I have to do is appropriate for this type of course.	57	23	2	
Combined score for items	54	22	6	
Course interest survey: Confidence				
I feel confident that I will do well in this course.	61	20	1	
You have to be lucky to get good grades in this course.	38	23	21	
Whether or not I succeed in this course is up to me.	49	25	8	
The subject matter of this course is just too difficult for me.	9	35	38	
It is difficult to predict what grade the professor will give my assignments.	35	35	12	23.80*
As I am taking this course, I believe that I can succeed if I try hard enough.	64	18	0	
I find the challenge level in this module to be about right: neither too easy not too hard.	58	24	0	
I get enough feedback to know how well I am doing.	54	26	2	
Combined score for items	46	26	10	
Attitudes towards thinking and learning				
I like to understand where other people are "coming from," what experiences have led them to feel the way they do.	64	18	0	
The most important part of my education has been learning to understand people who are very different to me.	60	21	1	
I feel that the best way for me to achieve my own identity is to interact with a variety of other people.	61	19	2	
I enjoy hearing the opinions of people who come from backgrounds different to mine — it helps me to understand how the same things can be seen in such different ways.	64	17	1	
I am always interested in knowing why people say and believe the things they do.	62	18	2	45.83*
I try to think with people instead of against them.	58	22	2	
I'm more likely to try to understand someone else's opinion than to try to evaluate it.	58	22	2	
I tend to put myself in other people's shoes when discussing controversial issues, to see why they think the way they do.	60	22	0	
Through empathy, I can obtain insight into opinions that differ from mine.	53	27	2	
When I encounter people whose opinions seem alien to me, I make a deliberate effort to "extend" myself into that person, to try to see how they could have those opinions.	54	25	3	

In evaluating what someone says, I focus on the quality of their argument, not on the person who's presenting it.	56	24	2	
I like playing devil's advocate — arguing the opposite of what someone is saying.	24	38	20	
I find that I can strengthen my own position through arguing with someone who disagrees with me.	37	34	11	
I often find myself arguing, in my head, with the authors of books that I read, trying to logically figure out why they're wrong.	41	32	9	
It's important for me to remain as objective as possible when I analyse something.	55	27	0	
I have certain criteria I use in evaluating arguments.	48	31	3	
I try to point out weaknesses in other people's thinking to help them clarify their arguments.	42	32	8	
One could call my way of analysing things "putting them on trial" because I am careful to consider all the evidence.	51	28	3	
I value the use of logic and reason over the incorporation of my own concerns when solving problems.	55	27	0	
I spend time figuring out what's "wrong" with things. For example, I'll look for something in a literary interpretation that isn't argued well enough.	52	28	2	
Combined score for items	53	26	3	

5.3 Digital Literacy and Access to Technology

Digital literacy and access to technology are key factors for students who want to participate in blended learning. Digital literacy, considered the most important factor of the two, is the umbrella term for information literacy (the ability to use technology to find, locate, analyse and synthesise resources), computer literacy (an understanding of how to use computers and digital technologies and their various applications), media literacy (the ability to use digital technologies to access, analyse, evaluate and communicate information on digital platforms), communication literacy (the ability to use digital technologies to communicate and collaborate), visual literacy (the ability to use digital technology to "read," interpret and understand information presented in pictorial or graphic images, to communicate this information and to convert information into visual representations), and technological literacy (the ability to use digital technology for, among other things, learning and improving performance) (Covello et al., 2010). Access to technology is the second most important aspect for consideration as inaccessibility can be a serious barrier to participation in blended learning courses.

We assumed that all students had a certain level of digital literacy and self-efficacy in using MS Office, browsing the Web, navigating through FNU's Moodle system, and accessing and using digital tools. We asked students to provide their responses to three statements relating to digital literacy and access to technology, using a five-point Likert scale reduced to agree, neutral and disagree, as described above. As summarised in Table 3, most respondents (91.5%) agreed that they had excellent digital literacy skills. A high proportion (82.9%) agreed that their ability to access and use digital tools using a laptop and smartphone was excellent, and 89.0% agreed that they were able to access and use FNU's Moodle system.

The overall weighted average (mean = 4.24) and the highest weighted average (mean = 4.33) for their "ability to access and use FNU's Moodle system" indicate that students had the skills and ability required to access and participate successfully in Moodle-enabled blended learning.

Table 3. Digital literacy and access to technology

Statements	Agree	Neutral	Disagree	Mean	SD
My digital literacy (use of MS Office, browse the Web and navigate through FNU's Moodle system) skills are excellent.	91.5%	8.5%	0%	4.32	3.84
My access to and use of digital tools (laptop, smartphone) are excellent.	82.9%	13.4%	3.7%	4.08	3.64
My ability to access and use the FNU's Moodle system was excellent.	89.0%	11.0%	0%	4.33	3.85

Some studies have suggested that female students have less computer knowledge and computing experience than their male counterparts, as well as lower visual literacy, computer literacy and self-efficacy than male students (see, for example, Beyer, 2008; Çam & Kiyici, 2017; He & Freeman, 2010). We therefore analysed the data from our study to compare digital literacy across gender (male/female) and age groups to see if we could identify any differences between male and female students and among the different age groups.

Table 4 shows the results of the two-tailed *t*-test to examine differences between the male and female students' digital literacy. No significant difference in each gender's ability to use digital tools and access and use FNU's LMS, Moodle, emerged.

Table 4. Independent sample *t*-test for digital literacy between the groups based on gender

Statements	Female mean	Male mean	*t*	*df*	*p*
My digital literacy (use of MS Office, browse the Web and navigate through FNU's Moodle System) skills are excellent.	1.60	1.85	-1.86	62	0.06
My access to and use of digital tools (laptop, smartphone) are excellent.	1.96	1.81	0.88	70	0.38
My ability to access and use the FNU's Moodle system was excellent.	1.62	1.78	-0.10	49	0.32

Table 5 illustrates the results of the chi-square test, which indicate that differences in digital literacy levels among age groups are statistically insignificant.

Table 5. Relationship between digital literacy and age group

Statements	Chi-square test	*p*
My digital literacy (use of MS Office, browse the Web and navigate through FNU's Moodle system) skills are excellent.	10.28	0.96
My access to and use of digital tools (laptop, smartphone) are excellent.	19.48	0.49
My ability to access and use the FNU's Moodle system was excellent.	21.21	0.38

In sum, our study established that digital literacy and access to technology are prerequisites for FNU students to use various digital tools for lifelong learning and for accessing and using the university's learning management system, Moodle.

5.4 Effectiveness of the Blended Learning Environment

5.4.1 Research Question 1: How do learners at FNU describe the effectiveness of the blended learning environment in their course of study?

The students were asked to rate the quality of the blended course teaching in terms of the effectiveness of the blended learning environment. The six questionnaire items related to the

effectiveness of the blended learning environment (learning experience subscale) are shown in Table 6. The students were asked to indicate their perspective on the effectiveness of the blended learning environment in terms of improved digital literacy, flexibility, time management, learning and performance on a five-point Likert scale categorised as agree, neutral and disagree. Table 6 summarises the students' responses to their perception of the overall effectiveness of blended learning. A notable majority of students (84%–93%) agreed with all the statements: 92.7% felt that multimedia resources on FNU's learning management system, Moodle, enriched their learning experience; 87.8% agreed that communicating online with students and the lecturer improved their learning; 85.4% agreed that online learning improved their time-management skills; 91.2% agreed that online learning improved their digital literacy; 84.1% agreed that online learning improved their performance in mid-semester tests and end-of-semester examinations; and 87.8% agreed that online learning enabled them to learn at any time and any pace, from anywhere and using any device. Means above 4 for all the statements indicate that students perceived FNU's online environment to be effective.

Table 6. Students' perception of blended learning effectiveness (based on learning experience subscale)

Statements	Agree	Neutral	Disagree	Mean	SD
Multimedia resources on FNU's Moodle system enriched my learning experience.	92.7%	7.3%	0%	4.34	3.86
Communicating online with students and the lecturer improved my learning.	87.8%	12.2%	0%	4.24	3.77
Online learning improved my time-management skills.	85.4%	13.4%	1.2%	4.34	3.88
Online learning improved my digital literacy.	91.5%	8.5%	0%	4.41	3.94
Online learning improved my performance in mid-semester tests and end-of-semester exams.	84.2%	13.4%	2.4%	4.24	3.80
Online learning enabled me to learn at any time, any pace, from anywhere, using any device.	87.8%	12.2%	0%	4.35	3.88

A further analysis was made to determine whether perceptions of the effectiveness of the blended learning environment differed across genders. The results of the gender comparison analysis, as reflected in Table 7, show statistically insignificant ($p > 0.05$) differences in the responses from male and female students, indicating that students' gender did not impact their perception of the effectiveness of blended learning. However, students' perceptions differed for one statement: "Online learning improved my digital literacy" ($t = -2.22$, $df = 47$, $p < 0.05$).

Table 7. Relationship between gender and students' perceptions of blended learning effectiveness (based on learning experience subscale)

Statements	Female mean	Male mean	*t*	*df*	*p*
Multimedia resources on FNU's Moodle system enriched my learning experience.	1.60	1.78	-1.15	43	0.26
Communicating online with students and the lecturer improved my learning.	1.76	1.74	0.14	52	0.88
Online learning improved my time-management skills.	1.56	1.85	-1.56	46	0.12
Online learning improved my digital literacy.	1.47	1.81	-2.22*	47	0.03
Online learning improved my performance in mid-semester tests and end-of-semester exams.	1.67	1.93	-1.18	40	0.25
Online learning enabled me to learn at any time, any pace, from anywhere, using any device.	1.60	1.74	-0.85	50	0.40

*p = < 0.05

The age comparison results, shown in Table 8, indicate that differences between the age groups were statistically insignificant ($p > 0.05$), meaning there was no difference in perceptions of the effectiveness of blended learning across age groups.

Table 8. Relationship between age and students' perceptions of blended learning effectiveness (based on learning experience subscale)

Statements	Chi-square	*p*
Multimedia resources on FNU's Moodle system enriched my learning experience.	16.79	0.67
Communicating online with students and the lecturer improved my learning.	7.72	0.99
Online learning improved my time-management skills.	21.75	0.34
Online learning improved my digital literacy.	17.02	0.65
Online learning improved my performance in mid-semester tests and end-of-semester exams.	20.62	0.42
Online learning enabled me to learn at any time, any pace, from anywhere, using any device.	4.74	0.99

The overall implication of the data presented in Tables 7 and 8 is that students' perceptions of blended learning have no relationship with their age and gender ($p > 0.05$).

5.5 Student Perceptions of Teacher Practices and Behaviour

5.5.1 Research Question 2: How do students at FNU perceive their teachers' practices and behaviours in a blended learning environment?

The data in Table 9 illustrate the students' perceptions of their teachers' blended teaching practices and behaviours on a five-point scale. The students were asked to respond to statements about their teachers' interest in students' learning, the effectiveness of teachers' feedback and orientation on online resources and the overall course experience. The majority (89%–92%) of the students perceived that their teacher showed interest in their learning (mean = 4.49) and provided helpful feedback on their performance (mean = 4.45) and meaningful orientation to online resources (mean = 4.45). Students' positive responses to how they perceived the "overall experience of the course" (mean = 4.45) indicate that students found their teachers' blended teaching practices and behaviours beneficial.

Table 9. Students' perceptions of teachers' practices and behaviours

Statements	Agree	Neutral	Disagree	Mean	SD
The lecturer's interest in your learning was good.	91.5%	8.5%	0%	4.49	4.01
The lecturer's feedback on your performance in assignments and participation in the forums was very helpful.	89.0%	9.8%	1.2%	4.45	3.98
The lecturer-provided orientation on use of the online resources, activities and FNU's Moodle system was very helpful.	91.5%	7.3%	1.2%	4.45	3.98
Overall the course experience was excellent.	90.2%	9.8%	0%	4.45	3.98

To determine the relationship between students' perceptions of their teachers' practices and behaviours and students' gender, a gender-wise comparative analysis was done. The data in Table 10 show that differences in perception by gender are statistically insignificant ($p > 0.05$), suggesting that the students' gender had no effect on their perceptions of their teachers' practices and behaviours.

Table 10. Relationship between gender and students' perceptions of teachers' practices and behaviours

Statements	Female mean	Male mean	*t*	*df*	*p*
The lecturer's interest in your learning was good.	1.49	1.56	-0.41	48	0.69
The lecturer's feedback on your performance in assignments and participation in the forums was very helpful.	1.51	1.63	-0.68	46	0.50
The lecturer-provided orientation on use of the online resources, activities and FNU's Moodle system was very helpful.	1.51	1.63	-0.72	47	0.48
Overall the course experience was excellent.	1.49	1.67	-1.06	46	0.29

To determine the relationship between students' perceptions of their teachers' practices and behaviours and students' age group, we conducted a chi-square test. The data in Table 11 show that differences in perception by age are statistically insignificant ($p > 0.05$), suggesting that the students' age had no effect on their perceptions of their teachers' practices and behaviours.

Table 11. Relationship between age and students' perceptions of teachers' practices and behaviours

Statements	Chi-square	*p*
The lecturer's interest in your learning was good.	10.74	0.95
The lecturer's feedback on your performance in assignments and participation in the forums was very helpful.	22.48	0.31
The lecturer-provided orientation on use of the online resources, activities and FNU's Moodle system was very helpful.	22.89	0.29
Overall the course experience was excellent.	17.25	0.64

5.5.2 Research Question 3: How do teachers' practices at FNU affect students' perceptions of blended learning courses?

The data in Table 12 show the analysis of students' responses to the statements about teachers' blended teaching practices. The means range between 4.23 and 4.55, indicating that students generally had a positive view of their teachers' blended teaching practice. A notable majority (81%–92%) of the students perceived their teachers as effective at describing the course learning objectives, activities and assignments (mean = 4.44), expressing expected performance in activities (mean = 4.39), organising the course overall (mean = 4.55), blending face-to-face with online learning (mean = 4.23) and maintaining the pace of the course (mean = 4.32).

Table 12. Students' perceptions of teachers' blended teaching practices

Statements	Agree	Neutral	Disagree	Mean	SD
Description of course objectives, learning activities and assignments in the online course was excellent.	91.5%	7.3%	1.2%	4.44	3.97
Expression of expectations for performance (e.g., online forums and assignments) in the course was excellent.	91.5%	8.5%	0%	4.39	3.91
The lecturer's overall organisation of the course was great.	91.5%	8.5%	0%	4.55	4.07
Continuity between face-to-face class and online learning was good, if applicable.	81.7%	14.6%	3.7%	4.23	3.79
The pace of the course was user-friendly.	89.0%	11.0%	0%	4.32	3.84

Further analysis was conducted to determine differences in perceptions across gender and age. Table 13 presents the results of a *t*-test administered with a significance level of 0.05 to find out whether perceptions of blended course design differed between male and female students. Table 14 presents the results of a chi-square test to find out whether the students' perceptions of blended course design

differed between age groups. *P* values more than the significance level (0.05) in both tables indicate that there was no difference between male and female students' perceptions (Table 13) and no significant difference in their perceptions based on their age groups (Table 14).

Table 13. Relationship between gender and students' perceptions of blended course design

Statements	Female mean	Male mean	*t*	*df*	*p*
Description of course objectives, learning activities and assignments in the online course was excellent.	1.49	1.70	-1.29	48	0.20
Expression of expectations for performance (e.g., online forums and assignments) in the course was excellent.	1.56	1.70	-0.91	49	0.37
The lecturer's overall organisation of the course was great.	1.38	1.59	-1.34	47	0.19
Continuity between face-to-face and online learning was good, if applicable.	1.73	1.85	-0.61	47	0.55
The pace of the course was user-friendly.	1.60	1.85	-1.56	46	0.13

Table 14. Relationship between age and students' perceptions of blended course design

Statements	Chi-square	*p*
Description of course objectives, learning activities and assignments in the online course was excellent.	26.02	0.17
Expression of expectations for performance (e.g., online forums and assignments) in the course was excellent.	13.06	0.87
The lecturer's overall organisation of the course was great.	13.48	0.86
Continuity between face-to-face and online learning was good, if applicable.	9.17	0.98
The pace of the course was user-friendly.	7.41	0.99

5.6 Achievement in Blended Courses

5.6.1 Research Question 4: How is the learning achievement in blended learning courses different from that of other courses at FNU?

To investigate differences in learning achievement between blended learning courses and other courses at FNU, the grades of Semester 2 (July – November), 2021, blended learning students were compared with those of non-blended learning students taught by the same faculty. Out of 22 courses, 15 were analysed. Of the other seven courses, five (EPI832, EPI833, EPI834, HSM814 and PBH805) were offered in online mode, one (APS607) was offered in Semester 2, 2021, for the first time, and 2019 results for one (EDU721) could not be obtained. The end-of-semester grades for the 15 blended courses for Semester 2, 2021, were collected from the university's academic records. These grades were compared with the previous batch of non-blended student grades (i.e., Semester 2, 2019 and 2020 respectively). A two-sample *t*-test assuming unequal variances was used for this comparison. The comparison of the mean achievement scores of blended and non-blended students shows a positive mean gain and a negative mean difference, as shown in Table 15, where the results are statistically significant for 40% ($n = 6$) of the courses: Purchasing Food Commodities (CKY306) ($t = 2.51$, $df = 75$, $p < 0.05$), Science Education I (EDU505) ($t = 3.74$, $df = 300$, $p < 0.05$), Social Education I (EDU549) ($t = 2.03$, $df = 257$, $p < 0.05$), Enterprise, Innovation and Enrichment in Education (EDU561) ($t = -4.59$, $df = 1147$, $p < 0.05$), Introduction to Business Management (MGT501) ($t = 5.83$, $df = 217$, $p < 0.05$) and Introduction to Marketing (MKT501) ($t = 9.58$, $df = 531$, $p < 0.05$). The course grades are not significantly different in 60% ($n = 9$) of the courses ($p > 0.05$).

Table 15. Comparison of blended and non-blended students' grades

Courses	Non-blended		Blended		*t*	*df*	*p*
	Mean	SD	Mean	SD			
APS503 – Social Research Methods I	8.00	4.93	9.45	3.72	-0.70	13	0.50
ART601 – Painting	5.25	4.83	9.00	4.78	-1.64	15	0.12
ART606 – Studio Craft	5.13	1.36	8.22	4.89	-1.82	9	0.10
CKY306 – Purchasing Food Commodities	8.59	4.22	6.83	2.15	2.51*	75	0.01
EDU505 – Science Education 1	10.31	3.79	8.57	4.67	3.74*	300	0.00
EDU549 – Social Education 1	8.94	3.47	8.00	4.49	2.03*	257	0.04
EDU561 – Enterprise, Innovation and Enrichment in Education	7.58	4.02	8.79	4.92	-4.59*	1147	0.00
ETH401 – Introduction to Ethics and Governance	9.07	4.06	8.51	5.31	0.77	138	0.44
FTV434 – FTV Secondary of Direction & Production	6.14	4.96	4.83	2.14	0.83	18	0.42
FTV435 – FTV Secondary of Editing & Sound Design	5.93	4.76	3.67	1.75	1.55	18	0.14
FTV436 – FTV Secondary of Cinematography	5.93	4.71	3.67	2.07	1.49	18	0.15
FTV437 – FTV Secondary of Script Writing	6.21	4.84	4.33	2.8	1.09	16	0.29
MGT501 – Introduction to Business Management	10.48	3.86	7.59	4.98	5.83*	217	0.00
MKT501 – Introduction to Marketing	9.61	3.88	6.34	4.78	9.58*	531	0.00
PHE601 – Measurement and Evaluation in Exercise and Sports	9.23	4.74	9.62	5.04	-0.22	24	0.83

*$p < 0.05$

Some possible factors that could be behind the differences in students' grades include differences in the number of students completing the course as a result of COVID-19; students' ability to access the course and their level of information and communication technology (ICT) skills; and teachers' engagement and interaction with students during the course.

5.7 Satisfaction and Achievement

5.7.1 Research Question 5: How do students' perceptions of and satisfaction with blended learning courses relate to achievement?

The data in Table 16 present a correlation between students' satisfaction with blended courses and their achievement levels. The results have an *r* value of -0.199, indicating a lower-level relationship between student achievement and satisfaction. However, the correlation coefficient was found to be insignificant among the various satisfaction variables.

The data were further analysed using the regression function with grades as the dependent variable and mean of the satisfaction variables as the independent variable. The results in Table 17 indicate that the relationship between student satisfaction variables and grades was not statistically significant, as the *p* value for the satisfaction mean was 0.07.

Table 16. Correlation between student achievement and satisfaction

	Grade	Satisfaction mean		
Grade	1			
Satisfaction mean	-0.199049262	1		
Source	***df***	**Computed *r***	**Critical *r* value**	**Interpretation**
Grades				
Satisfaction mean	80	-0.20	0.22	Insignificant

Table 17. Regression analysis of student grades and satisfaction

Regression statistics					
Multiple *r*	0.199049262				
***r*-square**	0.039620609				
Adjusted *r*-square	0.027615867				
Standard error	19.95291912				
Observations	82				
ANOVA					
	df	**SS**	**MS**	**F**	**Significance F**
Regression	1	1313.957097	1313.957097	3.300413088	0.073007753
Residual	80	31849.51851	398.1189814		
Total	81	33163.47561			
	Standard error	***t* stat**	***p* value**		
Intercept	8.327711527	3.047954516	0.003121941		
Satisfaction mean	3.821288634	-1.816703908	0.073007753		

5.8 Engagement and Achievement

5.8.1 Research Question 6: How does student engagement in blended learning courses relate to achievement?

For this question, data from Moodle were retrieved and analysed. The total number of student views per course was calculated, and a correlation analysis was made to determine the students' course resources and activity viewing and their end-of-semester results. The total views data were correlated with students' end-of-semester grades. The correlation coefficient of 0.09 indicates a positive relationship between the average views and the grades.

Table 18. Correlation between course content views and grades

	Average views	Average grades
Average views	1	
Average grades	0.09	1

Correlations were also made to ascertain the relationship between the number of assignments, quizzes and exams that faculty created in the blended learning courses and students' grades. The relationship between the number of online assignments, exams and students' grades was not significant, with $r = -0.54$ and $r = 0.22$ respectively (see Table 19). However, there was a significant relationship between the number of quizzes and the average grades, with $r = 0.08$.

Table 19. Correlation between online assignments and quizzes and grades

	No. of assignments	No. of quizzes	No. of exams	Average grades
No. of assignments	1			
No. of quizzes	-0.30	1		
No. of exams	-0.41	-0.12	1	
Average grades	-0.54	0.08	0.22	1

5.9 Perceptions of Learning and Achievement

5.9.1 Research Question 7: How do perceptions of learning in blended courses relate to achievement?

Students' perceptions of their blended learning experience with the BLCES factors were compared with their grades. The results, shown in Table 20, indicate that there was no significant relationship between students' grades and their perceptions of their blended learning experience.

Table 20. Correlation between student perceptions of blended learning and achievement

	Grade	Course design	Learning experience	Personal factors
Grade	1			
Course design	-0.121828959	1		
Learning experience	-0.124357025	0.776559544	1	
Personal factors	-0.188913976	-0.151394376	-0.049224357	1

The students' perceptions underwent regression analysis to ascertain the effect of BLCES factors on their achievement, with grades as the dependent variables and BLCES factors as the independent variables. The results, shown in Table 21, indicate that the relationship between students' perceptions of blended learning and grades was not statistically significant, as the *p* values are greater than the alpha value (0.05).

Table 21. Regression analysis of student perceptions of blended learning and achievement

Regression statistics					
Multiple *r*	0.243805305				
***r*-square**	0.059441027				
Adjusted *r*-square	0.023265681				
Standard error	19.99750131				
Observations	82				
ANOVA					
	df	**SS**	**MS**	**F**	**Significance F**
Regression	3	1971.271034	657.0903445	1.643136404	0.186232
Residual	78	31192.20458	399.9000587		
Total	81	33163.47561			
	Coefficients	**Standard error**	***t* stat**	***p* value**	
Intercept	32.81218112	10.26751789	3.195726705	0.002014182	
Course design	-4.18798975	6.015238236	-0.696230072	0.488354275	
Learning experience	-1.336107621	6.026663336	-0.221699396	0.825127305	
Personal factors	-4.558484718	2.431875068	-1.874473232	0.064609122	

6.0 Discussion and Conclusions

The findings from this survey provide important insights into the impact of blended learning on students' learning experience and achievement at the Fiji National University (FNU). They contribute to an understanding of students' perceptions of blended learning and its effectiveness at enhancing their learning performance.

The first research question aimed to gauge the effectiveness of the blended learning environment. The results indicated that students viewed the blended learning environment positively. Students recognised that the use of multimedia resources and the provision of a collaborative space helped maintain their interest and attention in a course, was relevant, boosted their confidence and maximised their learning. The blended learning environment was reported to have improved students' time-management skills and digital literacy along with having a positive impact on assessment results. The majority of the students (87.8%) agreed they possessed good digital literacy skills and had access to the digital tools required and the ability to access and navigate FNU's Moodle system. This shows that the courses were accessible. A vast majority of the students (90.2%) had a positive opinion of the overall course experience and most had positive perceptions of the course design, which enriched their learning experience.

Working from the understanding that teachers play a crucial role in students' learning experience, the intent of the second research question was to analyse students' perceptions of their teachers' practices and behaviours in a blended learning environment. Irrespective of their age and gender, the students had a highly positive perception of their teachers' interest in student learning; feedback on students' performance and participation; timely orientation and feedback; and stimulation of students' interest. We concluded that teachers' presence, active engagement in the course, timely feedback, continuous interaction with students, positive feedback and encouragement are crucial in helping students adapt to blended learning.

Research question three measured students' perceptions of how teachers' practices at FNU affected students' perceptions of blended learning courses. Students had a highly positive opinion of their teachers' use of blended learning where teachers were able to clearly communicate their expectations, the course objectives, activities and assignments. Teachers' organisation of the course and user-friendly pace was also perceived well by the students.

For the fourth research question, learning achievement in blended learning courses was compared with the learning achievement in other courses at FNU. For the purpose of this research question, the grades of the Semester 2, 2021, blended learning students were compared with those of Semester 2, 2019 and 2020, non-blended students in the same courses. The comparison showed mixed results, with improvement in ten courses and no improvement in five courses. Multiple factors — ranging from the teacher to the students' completion and submission of assignments and activities, to interaction and engagement in forums to other external factors — could account for the differences in the results. One major event that could have contributed to the differences in results is the COVID-19 pandemic, which introduced accessibility issues.

The intent of the fifth research question was to measure the relationship between student satisfaction with blended learning courses and academic achievement. As per the correlation analysis, the relationship between student satisfaction and grades was not significant. The regression analysis results established that the relationship between student satisfaction and achievement was not statistically significant. This suggests that having a positive perception of the blended mode of learning does not necessarily result in higher grades.

The sixth research question examined whether there was a relationship between students' online course dedication time and online course content views and their achievement. No significant relationship was noted, indicating that time spent online may not be an accurate indication of quality learning taking place.

Research question seven asked how students' perceptions of blended learning related to their achievement. The study found that there was no significant relationship between students' grades and the BLCES factors.

The results of this study lead us to conclude that the blended learning approach at FNU was effective to some extent in enhancing students' learning experience and achievement and positively influenced students' time management, digital literacy, learning experiences, and thinking and learning.

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