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Critical factors influencing online learning effectiveness: Insights from a local university

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Abstract

This research evaluates student attitudes and perceptions towards online learning at a local institution in Fiji using critical success factors (CSFs), (1) *student characteristics*, (2) *teacher characteristics*, (3) l*earning environment and instructional design*, and (4) *support*. Data was collected using quantitative research methodology. A validated online questionnaire was disseminated to the students and 436 students participated voluntarily. Once the data was collected, appropriate analysis was performed to evaluate the findings. The results indicated that the students perceived the four CSFs as influencing the success of online learning. Student characteristics, such as digital literacy, teacher characteristics, instant feedback, the quality and design of the learning environment, and institutional support were important for effective online learning. Additionally, the correlation analysis showed a significant relationship between the four CSFs. Evaluating critical success factors from the student perspective is essential for educational providers to gauge the effectiveness of the teaching and learning processes and improve them in the future. Educational institutions can leverage the CSFs identified in this study to assess the effectiveness of their online delivery and develop strategies to enhance the quality of online learning and teaching.

Keywords: COVID-19, Critical success factors, Online learning, Student perception, Student attitude, e-learning Fiji, Sustainable education.

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Contribution of this paper to the literature
This article provides localized insights, empirical evidence, practical recommendations and best practices for an effective online teaching and learning environment. The research methodology can be utilized by educational stakeholders, researchers, and policymakers in Fiji to improve educational outcomes and prepare students for a technology-driven educational environment.

1. Introduction

The technology-supported learning environment has paved the way to deliver enhanced learning outcomes through cognitively powerful pedagogical strategies such as collaborative, case-based and authentic problem-based learning (Bennett & Lockyer, 2004). Technology in education has evolved from being a simple medium of knowledge transfer to becoming the heart of the education system as realized during the COVID-19 pandemic (Elhaty, Elhadary, Elgamil, & Kilic, 2020; Mulla, Osland-Paton, Rodriguez, Vazquez, & Kupesic Plavsic, 2020).

The mandated lockdowns and social distancing (Alhumaid, Ali, Waheed, Zahid, & Habes, 2020; Murphy, 2020; Roman & Plopeanu, 2021) saw a rapid and massive transition to online education as institutions grappled with emergency e-learning protocols to continue to serve their more than 1.4 billion learners (UNESCO, 2020). Although online learning platforms allow for rich and sophisticated interaction between facilitators and learners, their success at the university and in the South Pacific region has not been studied in great depth.

Critical success factors (CSF) are key factors of an organisation that must be critically taken care of to achieve success (Arshavskiy, 2017; Farid, Qadir, Ahmed, & Khattak, 2018; Lu & Dzikria, 2019). In the case of online learning, researchers have identified a plethora of CSFs to measure its success. Technology, the teacher and students experience (Alhabeeb & Rowley, 2017; Alqahtani & Rajkhan, 2020) institutional management, learning environment, instructional design, service support and course evaluation (Bao, 2020) e-learning readiness and online presence (Alqahtani & Rajkhan, 2020; Basak, Wotto, & Bélanger, 2016) were some factors highlighted in the literature.

The problems, gaps, and challenges mentioned above have motivated the current research. Hence, the research examined the crucial factors of online learning at a national university in Fiji. The name of the university will not be revealed due to ethical considerations. An online survey which consisted of curated critical success factors (CSFs) was used to evaluate the student perspectives on the contribution of the chosen CSFs. The results from this study will pave the way for university teachers to determine whether their online facilitation strategies were effective. Moreover, the suggestions and perceptions of students can be used to improve online facilitation to sustain OL in emergencies and crises.

The CSFs for the study were as follows: (1) student characteristics, (2) teacher characteristics, (3) learning environment and instructional design and (4) support. As the study is novel to the research area, the authors chose CSFs relevant to the study's nature and setting. However, the study's implications are not limited to Fiji only. This research contributes a new set of relevant CSFs for online learning, especially for online learning environments. The questionnaire is also validated using data analytics. Thus, it is valid and reliable to be used by anyone in Fiji. The article is structured as follows: the review of literature that introduces the ideologies around online learning and its critical success factors followed by the methodology used to conduct the study. Furthermore, the results obtained from the study are presented. The article concludes with recommendations for the HEIs in Fiji and beyond.

2. Literature Review

2.1. Online Learning

The developments in technology have rolled out critical improvements to practice various aspects of our lives, going from a worldwide economy to individuals and expert organisations to the origins of data, news, and learning. According to Yadegaridehkordi, Shuib, Nilashi, and Asadi (2019) and Lee (2018) the Internet has made online learning conceivable, and several analysts and teachers are keen on exploring how to upgrade and improve online pedagogies and the teaching and learning processes. Literature shows that with the rise of online learning, web-based learning tools are increasingly allowing the learners to study at their own pace, furnishing them with legitimate clarification and criticism when they commit errors (Castro, 2019; Toquero, 2020). As such, online learning has shifted from teacher-focused facilitation to student-focused facilitation. To go against online learning in the 21st century, particularly in COVID-19 era is to go against progress and advancement and to welcome an absence of readiness for an innovation-rich future.

However, the advantages of online learning are sometimes subsided by the issues and challenges of online facilitation. The researchers of this study have identified four critical success factors from the literature and designed a self-reporting questionnaire piloted for university students in the Fiji Islands to address this issue.

2.2. Critical Success Factors

Online learning and teaching in the South Pacific Islands indicate that new-age education mechanisms are rapidly being adopted in primary, secondary, and tertiary education (Raturi, 2018; Reddy, Chaudhary, Sharma, & Chand, 2021b). Tertiary students have become regular users of technological handheld devices for online learning and have an overall positive attitude towards their studies with the help of such gadgets (Nand & Sharma, 2019; Reddy, Chaudhary, Sharma, & Chand, 2021a). However, there is little evidence of the relationship between the tools used, the success factors primarily established, and their contribution to the success of students who study online.

Studies indicate that online learner engagement is a critical factor in the success of the majority of students (Antony, McDermott, Sony, Fernandes, & Ribeiro, 2021). However, a significant relationship between the constant online engagement of a student on online learning or student management tools such as Moodle and the students' ultimate success may be further investigated mainly in the COVID-19era. Table 1 comprises some studies over the past two decades that have established critical success factors of online learning.

Table 1. CSFs studied over the years.

Years	Publication	Critical success factors
2000	Critical success factors in online education (Volery & Lord, 2000)	1. Technology 2. Teacher 3. Previous use of the technology
2001	Online education: An exploratory study into success factors (Volery, 2001)	1. Technology 2. Lecturer 3. The students' previous use of the technology
2013	Critical success factors for online distance learning in higher education: A review of the literature (Cheawjindakarn, Suwannatthachote, & Theeraroungchaisri, 2013)	1. Institutional management 2. Learning environment 3. Instructional design 4. Services support 5. Course evaluation
2016	A framework on the critical success factors of e-learning implementation in higher education: A review of the literature (Basak et al., 2016)	1. Technological factors 2. Institutional factors 3. Pedagogical factors 4. Management factors 5. Ethical factors 6. Evaluation factors 7. Resource factors 8. Social interaction factors
2017	Critical success factors for e-learning in Saudi Arabian universities (Alhabeeb & Rowley, 2017)	1. Student characteristics 2. Teacher characteristics 3. Learning environment 4. Instructional design 5. Support
2018	E-learning critical success factors: Comparing perspectives from academic staff and students (Alhabeeb & Rowley, 2018)	1. Supportive cultural practices 2. Access to computers, system or online environment availability 3. Computer and online learning self-efficacy 4. User perception of usefulness and ease of use.
2018	Critical success factors of e-learning systems: A quality perspective (Farid et al., 2018)	1. Quality from different dimensions
2019	Critical success factors (CSFs) of distance learning systems: A literature assessment (Lu & Dzikria, 2019)	1. Student attribute 2. Teacher attribute 3. Online learning content 4. Technology infrastructure 5. System support 6.Institutional management support
2020	E-learning critical success factors during the COVID-19 pandemic: A comprehensive analysis of e-learning managerial perspectives (Alqahtani & Rajkhan, 2020)	1. Student characteristics 2. Teacher characteristics 3. Learning environment 4. Instructional design 5. Support 6. Information technology

According to the studies in Table 1, this study intends to evaluate the students' perception of the CSFs chosen at a university in Fiji. The following CSFs *(1) student characteristics, (2) teacher characteristics, (3) learning environment and instructional design, and (4) support* were applied and evaluated in an educational setting in Fiji. Researchers narrate each CSF as follows:

2.2.1. CSF 1 Student Characteristics

Critical success factor 1 includes four student attributes: digital competency, computer self-efficacy and attitude and perception. Digital competency has been mentioned in recent studies proving that it is essential in successfully transferring knowledge. A study conducted in the Health Sciences department at the University of Oklahoma has devised a new model consisting of four next steps which could help streamline better education deployment during the pandemic (Hassell & Afzal, 2021). The New Zealand Medical Student Journal reported a study that found that undergraduate medical students from low and middle-income countries appreciate and accept blended- mode studies where a collaboration of digital online tools is seen as a catalyst (Sasidharan & Dhillon, 2021). Recent studies on digital competency in the South Pacific by Reddy et al. (2021b) and Reddy et al. (2021a) also show that students in the South Pacific need digital competency to be successful in their learning at higher education institutes.

Computer self-efficacy is correlated with online learning. It is a judgment of one's capability to use a computer (Reddy et al., 2021b). It positively relates to learning engagement, resulting in positive learning performance (Dow, 2021; Li et al., 2021). In the Pacific, computer self-efficacy has also been identified as one of the significant factors for technology acceptance globally and in the South Pacific (Dow, 2021; Reddy et al., 2021b).

Attitude and perception are other contributors to the success of online teaching and learning methods. A longitudinal study conducted in Saudi Arabia showed that online learning has been embraced by university students and they realised the importance of technology (Linjawi & Alfadda, 2018). Johnson, Reddy, Chand, and Naiker (2021) showed that students of a regional university in the South Pacific Islands have a positive attitude and perception towards online learning. Studies have also shown that a positive attitude and perception towards

learning with technology or online learning or e-learning relates to success in higher education (Bao, 2020; Maon, Hassan, Yunus, Jailani, & Azizam, 2021).

2.2.2. CSF 2: Teacher Characteristics

Researchers have stated that teachers should have the capability and be responsible for providing their students with a comfortable learning environment (Alhabeeb & Rowley, 2017; Alqahtani & Rajkhan, 2020). Furthermore, Bao (2020); Crawford et al. (2020) and Castro (2019) added that teachers are responsible for effective course design, student engagement in course content, initiating collaboration among students, and providing supplementary course materials and timely feedback to the students. A study that examined whether the presence of teachers facilitates students' social and cognitive presence in online courses found that the frequency of teacher interaction in discussion does not affect students' performance (Castro, 2019). In the South Pacific region, studies conducted by Reddy et al. (2021b) and Raturi (2018) have mentioned that teacher characteristics play a vital role in the success of online learning. A study conducted by Wendt and Courduff (2018) state that teacher immediacy is also important when it comes to students engaging and participating in online learning environments. The study showed that non-verbal immediacy, such as smiling, engaging in eye contact, maintaining a relaxed body position, and gesturing and verbal immediacy, such as incorporating humor, engaging in informal dialogue with students, and asking questions that solicit student opinion, contribute to effective learning and better student outcomes.

2.2.3. CSF 3: Learning Environment and Instructional Design

The learning environment and instructional design have a direct impact on the success of online learning (Kintu, Zhu, & Kagambe, 2017; Naveed et al., 2020). A well-designed course, learning content, and teaching presence provide positive learning experiences. A study conducted by Kintu et al. (2017) showed that learner connectedness is important in online learning. Therefore, the use of a learning management system and the facilitation of courses are essential. Moreover, a learning environment influences students' learning behaviour, satisfaction with courses, and, most importantly, pass rates. Therefore, much emphasis must be given to how teachers design their courses (Rienties, Lewis, McFarlane, Nguyen, & Toetenel, 2018). Students' perceptions of the learning environment and design is positive if they can easily navigate the course, have access to the appropriate course content, receive timely feedback and interact with their peers and facilitators (Dhika, Destiawati, Surajiyo, & Jaya, 2021; Holiver, Kurbatova, & Bondar, 2020). Several research studies show that Moodle is one of the most common and effective learning management systems (Chow, Patu, Soon, Lipine, & Mose, 2019; Dhika et al., 2021; Holiver et al., 2020) that has been used to design and deliver online courses (Suartama, Setyosari, & Ulfa, 2019).

2.2.4. CSF 4: Support

Most efforts will be futile as the infrastructure lays the hardware and communication technologies for enabling the virtual online environment while online education has ensured continuity of education and work in various fields without support in establishing a robust Information Communication Technology(ICT) infrastructure (Singh & Nair, 2021). Academics in an African university have found factors such as lack of access to connectivity and devices, technological competency, and emotional and social factors as challenges that significantly impede students' ability to engage in online education methods in their university (Singh & Nair, 2021). Technical skills, cost, and availability of the Internet are also sub-factors of the IT infrastructure that can obstruct online education (Adarkwah, 2021; Baticulon et al., 2021; Reddy et al., 2021a). For the South Pacific region, IT infrastructure was an underlying issue. However, the IT infrastructure has been improved to provide adequate access to the Internet to facilitate teaching and learning practices with support and assistance from the government and relevant stakeholders (Reddy et al., 2021a). A study conducted by Guo, Saab, Wu, and Admiraal (2021) showed that student's social and cognitive presence from the community of inquiry framework also affects their academic performance in online learning environments.

Recent studies related to the success factors in literature have shown similar patterns compared to those from the South Pacific region. The study is novel to the research in Fiji and the South Pacific and is important because the university chosen for this study implemented the paradigm of full online teaching and learning during the COVID-19 era. Therefore, the study will present results that relevant stakeholders can use at the university to improve the online teaching and learning platform. It can also be used by other regional universities to benchmark their best practices for online learning and teaching.

2.3. Background of the Study

The study is based on the students of a national university in the Fiji Islands. The Fiji Islands economy is based primarily on tourism and agriculture. Most schools are controlled by local committees or religious communities while the government provides some primary and secondary education (Reddy et al., 2021a). The country has three major higher education institutes. The campuses or centres of the institutes are located within the country and in other parts of the region.

Although the national university was formally established in 2010, it has a long history of providing higher education to students in Fiji. In 2021, the university has campuses and centres at 40 locations throughout the country, running a total of approximately 300 different courses and programmes with a staff complement of 2000 and a student enrolment of around 26,000 and is one of the few dual-sector universities in the world (Tagicakiverata, 2014; University, 2020). The university is committed to achieving the United Nations' Sustainable Development Goals (UNDSDGs) through its learning, teaching, and research with SDG Goal 4, which highlights the need for quality education which is the university's premier aim. A Centre for Flexible & E-Learning (CFEL) has been established to incorporate the latest technologies in learning and teaching.

The centre collaborates with academic and support units and students to design, deliver and enhance pedagogically sound flexible learning experiences at the national university in Fiji. The university also provides flexible learning to its students through three modes of delivery: face-to-face, blended, and online. Currently, more courses and programmes are being developed to be flexible due to the increased demands from the students.

Moodle, Turnitin, Mahara, Zoom, Camtasia, iSpring, GSuite and Office 365 are used for learning and teaching. Additionally, the university provides OER repositories to its teaching staff and students.

Since the university was already practicing the culture of flexible learning, the transition from traditional face-to-face to fully online teaching and learning due to the unprecedented event of COVID-19 was not difficult. The university went ahead and fully facilitated its courses online although there were challenges such as connectivity issues, lack of digital competency and device accessibility. The online courses provided a significant opportunity for the university to effectively offer post-secondary education in a way that minimizes the impact on the success of the learners during and post endemics and pandemics. The fashion of learning through a fully online mode was new to most students at the university. Therefore, the current study intends to evaluate the student perspective of their learning experiences through online learning at the national university in Fiji.

3. Research Objectives

The current research works on the following objectives:

i. To evaluate student perspectives on four critical success factors i.e., *student characteristics, teacher characteristics, learning environment and instructional design, and support.*
ii. To determine the correlation among the four critical success factors.
iii. To provide statistical validation for each of the 54 survey items and each critical success factor.

4. Methodology

The study used a quantitative research methodology to accomplish the formulated objectives. An online survey was conducted using the Moodle platform to gauge the students' perception of the chosen CSFs. 436 students from the national university in Fiji participated in the survey. This research was undertaken just after the COVID-19 shutdown when students were slowly returning to face-to-face learning. The courses were still offered online with few face-to-face interactions. Approval of this research was obtained from the university research committee.

The status of the participants is shown in Table 2. The Statistical Package for the Social Sciences (SPSS) software analysed the data. The process used to conduct this study is shown in Figure 1.

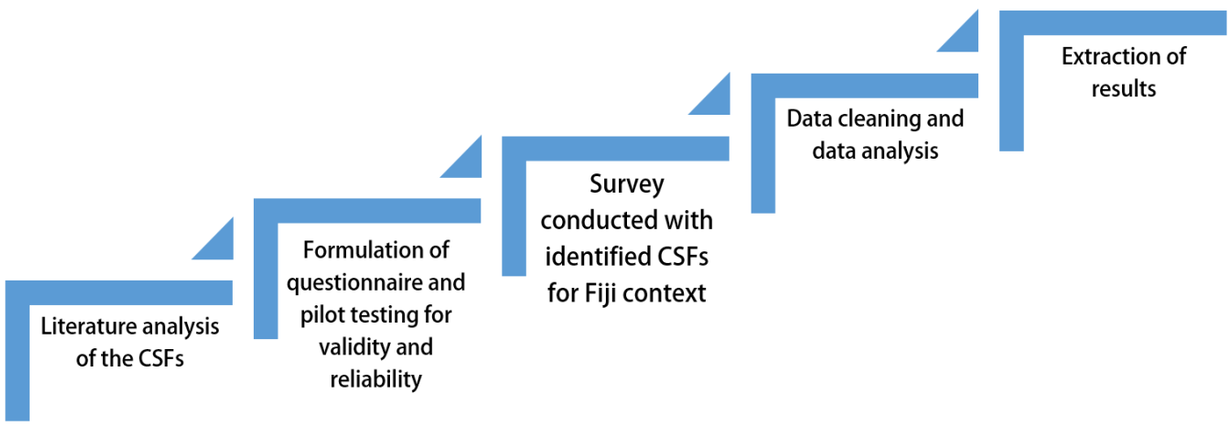

Figure 1. Process adopted to conduct the study.

4.1. Survey Instrument

A five-point Likert scale questionnaire consisted of four major categories and 54 survey items. The distribution is as follows:

i. Student characteristics consisted of digital competence (9 variables), computer self-efficacy (9 variables) and attitude and perception (12 variables).
ii. Teacher characteristics (7 variables).
iii. The learning environment and instructional design (8 variables).
iv. Support (13 variables).

For each CSF, the response in the questionnaire ranged from either "strongly disagree (1) to strongly agree (5). A pilot testing for the questionnaire was done with a sample of 50 students. The Cronbach's alpha value was calculated using the SPSS software for the reliability test. The Cronbach's alpha value for the test was 0.92. Therefore, the questionnaire was reliable to be used for the study. Research approval was taken from the research committee of the national university.

4.2. Sample

The survey participation was voluntary. Hence, 436 students participated. Figure 2 shows that 53.7% were males and 46.3% were females. A total of 393 out of 436 participants were between the ages of 18-32, while 43 participants can be categorized as adult learners.

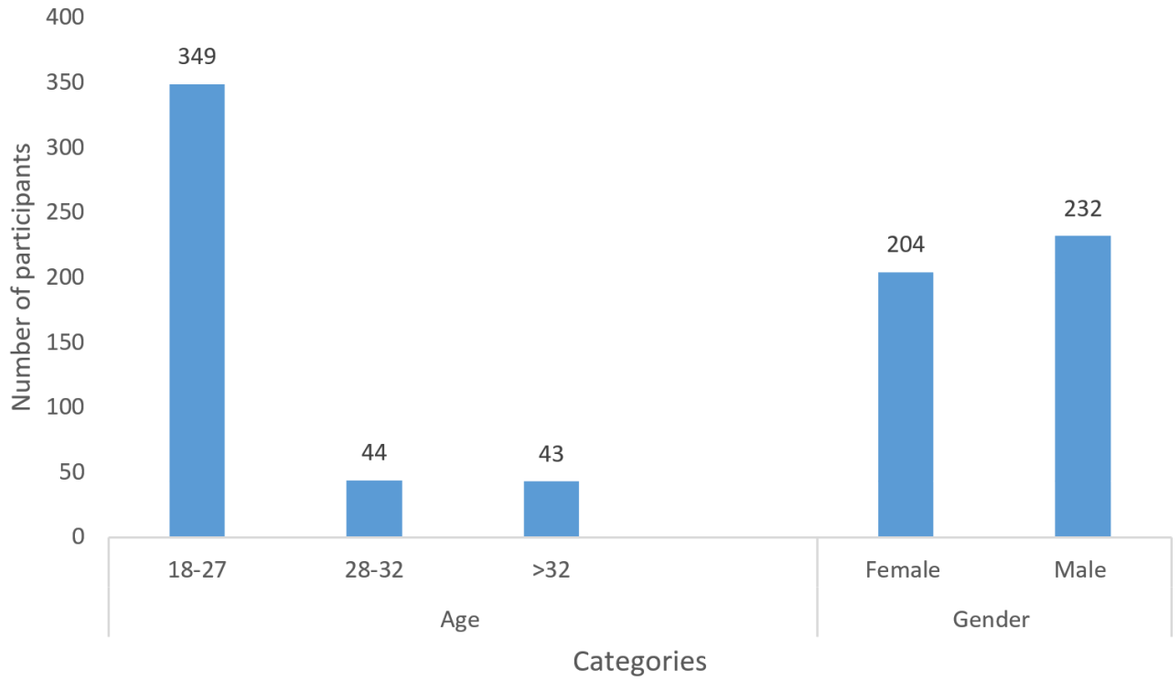

Figure 2. Participant demographics: age and gender.

The education level or the status of the students at the university is reflected in Table 2.

Table 2. Participant status at the university.

Student status	Number of participants
Certificate students	79
Diploma students	69
1st undergraduate year students	66
2nd year undergraduate students	56
3rd year undergraduate students	93
Post- graduate students	11
Students at the college of medicine, nursing and health sciences	8
Student at national training productivity center	54

4.3. Device Ownership and Internet Accessibility

Figure 3 shows that 396 out of 436 participants (90.1%) owned an ICT device ranging from desktops to laptops to tablets and IPads to smartphones. Most participants access the Internet using mobile data – 296 out of 436, representing 67.8% of the sample. Others had accessibility through home is 7.8%, university lab is 6.2% and Wi-Fi access at the university is 18.2%.

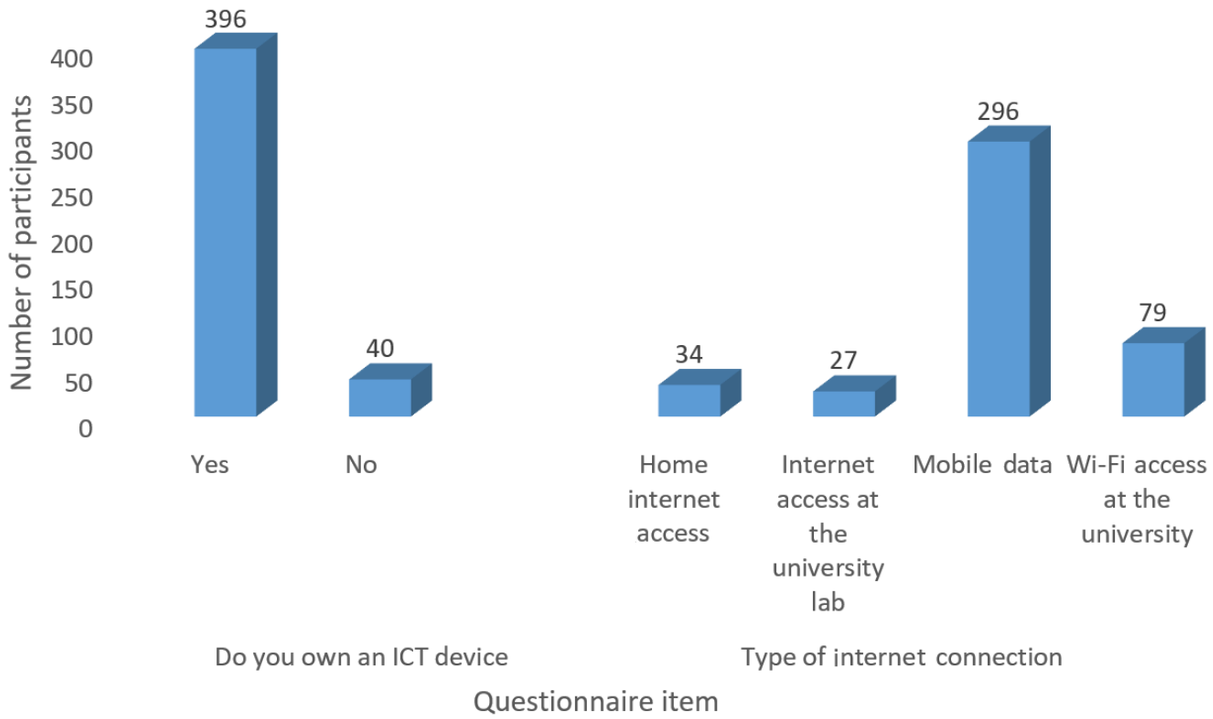

Figure 3. Participant information on device ownership and internet access.

4.4. Data Analysis

The SPSS software was used to analyse the data gathered to attain the study's objectives. Descriptive statistics like the mean and standard deviations were calculated. Inferential statistical analysis like the Cronbach's alpha for reliability and internal consistency analysis, factor loading for validating each variable and each CSF chosen for the study was also performed.

5. Results

5.1. Part A: Mean and Standard Deviation

The mean ($\bar{x}$) was calculated to evaluate the student perception of each statement for each factor. The mean values indicated the overall strength in the students' perception, i.e., the importance of each factor towards online learning from the students' perspective. The standard deviation (SD) indicated the spread of the responses for each variable. The responses are measured as follows: "5- strongly agree, 4-agree, 3- neutral, 2- disagree, and 1- strongly disagree". For this study, the overall mean values will be interpreted as follows: "1 and 2- not important , 3- neutral, and 4 and 5- important".

Table 3. Calculated mean and standard deviation for success factor 1.

Variables	($\bar{x}$)	*SD*	*Variables*	($\bar{x}$)	*SD*
D1	4.61	0.61	AP1	4.36	0.73
D2	4.50	0.72	AP2	4.40	0.76
D3	4.51	0.74	AP3	4.24	0.87
D4	4.57	0.62	AP4	4.22	0.88
D5	4.37	0.84	AP5	4.28	0.83
D6	4.41	0.75	AP6	4.26	0.84
D7	4.44	0.75	AP7	4.17	0.93
D8	4.24	0.89	AP8	4.17	0.93
D9	4.35	0.88	AP9	4.27	0.86
CSE1	4.30	0.79	AP10	4.27	0.81
CSE2	4.15	0.88	AP11	4.25	0.84
CSE3	4.22	0.87	AP12	4.36	0.76
CSE4	4.29	0.77			
CSE5	4.26	0.82			
CSE6	4.27	0.78			
CSE7	4.36	0.74			
CSE8	4.36	0.76			
Overall mean = 4.32					

5.1.1. Success Factor 1: Student Characteristics

Success factor 1 was student characteristics which evaluated the digital competency, computer self-efficacy and attitude and perception of the students. According to Table 3, for each variable, the mean ($\bar{x}$) responses from *D1-D9* indicate the digital competency of the students. Since these mean ($\bar{x}$) responses are close to 4, it can be stated that the students perceive that they had relevant digital skills for online learning. The variables *CSE1- CSE8* reflect students' computer self-efficacy. The mean ($\bar{x}$) value for each variable *(CSE1- CSE8)* also rounds up to 4. Therefore, it can be stated that the students were ready for online learning and intended to complete the given tasks in the online learning environment independently or with help. Finally, the variables *AP1-AP12* indicate student attitude and perception towards online learning. The mean ($\bar{x}$) values for variables; *AP1-AP12* are also close to 4 which indicates that the students had a positive attitude and perception of online learning. The overall mean ($\bar{x}$) for success factor 1 indicates that the students perceive that all the variables under success factor 1 are important for online learning. The SD values are greater than 0.6 and closer to 1 indicating that the responses are distributed across the range.

Table 4. Calculated mean and standard deviation for success factor 2.

Variables	($\bar{x}$)	*SD*	*Variables*	($\bar{x}$)	*SD*
IC1	4.56	0.62	IC5	4.58	0.64
IC2	4.59	0.60	IC6	4.61	0.61
IC3	4.53	0.64	IC7	4.59	0.62
IC4	4.40	0.74			
Overall mean = 4.55					

5.1.2. Success Factor 2: Teacher Characteristics

Table 4 presents the mean ($\bar{x}$) and SD for teacher characteristics. The mean ($\bar{x}$) for variables *IC1-IC7* round off to 4.5 ~ 4. Therefore, the students agreed that teachers played an important role in online teaching and were responsible for designing the course in an organised manner, updating the course regularly, being flexible and available, motivating students and initiating discussions. Since the SD values are about 0.6, the students' responses are close to the mean and not distributed across a wide range. The overall mean response is close to 4.5; it can be stated that the students perceive success factor 2 as a contributor to the success of online learning.

Table 5. Calculated mean and standard deviation for success factor 3.

Variables	($\bar{x}$)	*SD*	*Variables*	($\bar{x}$)	*SD*
LE1	4.63	0.58	LE5	4.69	0.58
LE2	4.63	0.58	LE6	4.60	0.58
LE3	4.64	0.56	LE7	4.66	0.55
LE4	4.61	0.60	LE8	4.50	0.68
Overall mean = 4.62					

5.1.3. Success Factor 3: Learning Environment and Instructional Design

Table 5 shows the mean ($\bar{x}$) and SD for the learning environment and instructional design. The mean ($\bar{x}$) values for *LE1-ME8* are greater than 4.5, which indicates that the students agreed to all the variables under success factor 3. The SD values are close to 0.5 meaning student responses are close to the mean. The overall mean-4.6 for success factor 3 indicates that the learning environment and instructional design is important contributors to online learning success from the student perspective.

Table 6. Calculated mean and standard deviation for success factor 4.

Variables	($\bar{x}$)	*SD*	*Variables*	($\bar{x}$)	*SD*
S1	4.65	0.57	S8	4.67	0.55
S2	4.69	0.55	S9	4.64	0.59
S3	4.61	0.65	S10	4.68	0.52
S4	4.57	0.63	S11	4.65	0.53
S5	4.52	0.67	S12	4.64	0.56
S6	4.64	0.54	S13	4.57	0.65
S7	4.67	0.58			
Overall mean = 4.63					

5.1.4. Success Factor 4: Support

Table 6 presents the mean ($\bar{x}$) and SD for success factor 4 (support). The means ($\bar{x}$) for variables *S1-S13* are close to 4.6. Therefore, it can be stated that the students' agreed to each variable under success factor 4. The students felt that the university should provide support during the online offerings regarding hardware and software, the Internet, learning tools and proper access to the universities websites. The SD for the success factor is 0.5; thus, the student's responses are closer to the mean and not widely distributed. The overall mean for success factor 4 is 4.6, which indicates that the students perceive that success factor 4-support is an important contributor to the success of online courses.

5.2. Part B: Correlation Test and Factor Loadings

A Kolmogorov-Smirnov normality test was carried out to perform the correlation analysis. The normality results indicated that the data were not normally distributed ($p<0.05$); therefore, a Spearman's rho for correlation test was performed. The results of the correlation analysis are shown in Table 7.

Table 7. Correlation between the success factors.

Correlations for N=436				
	Student characteristics	**Teacher characteristics**	**LEID**	**Support**
Student characteristics	1.000			
Teacher characteristics	0.827	1.000		
LEID	0.827	1.000	1.000	
Support	0.808	0.940	0.940	1.000

The correlation coefficients range from 0.808 to 1.00 indicating a very strong correlation (StatisticsHowTo, 2019) between the four CSFS. It can be concluded that all the CSFs for this study are important and related to each other. The surprising result from Table 7 is that the students perceived a significant relationship between instructors and the learning environment and design (see correlation of 1).

Table 8. Factor loadings for each variable.

Success factor	**Factor loading**	**Cronbach's alpha**	**Success factor**	**Factor loading**	**Cronbach's alpha**
Success factor 1		0.935	Success factor 2		0.931
D1	0.856		IC1	0.819	
D2	0.826		IC2	0.881	
D3	0.831		IC3	0.873	
D4	0.857		IC4	0.784	
D5	0.765		IC5	0.849	
D6	0.790		IC6	0.864	
D7	0.837		IC7	0.845	
D8	0.815		Success factor 3		
D9	0.771		LE1	0.832	0.945
CSE1	0.823		LE2	0.889	
CSE2	0.849		LE3	0.852	
CSE3	0.85		LE4	0.889	
CSE4	0.83		LE5	0.810	
CSE5	0.873		LE6	0.872	
CSE6	0.872		LE7	0.864	
CSE7	0.844		LE8	0.806	
CSE8	0.727		Success factor 4		
AP1	0.768		S1	0.781	0.952
AP2	0.799		S2	0.838	
AP3	0.832		S3	0.766	
AP4	0.845		S4	0.809	
AP5	0.888		S5	0.776	
AP6	0.867		S6	0.807	
AP7	0.816		S7	0.758	

Success factor	Factor loading	Cronbach's alpha	Success factor	Factor loading	Cronbach's alpha
AP8	0.870		S8	0.782	
AP9	0.895		S9	0.793	
AP10	0.883		S10	0.869	
AP11	0.885		S11	0.861	
AP12	0.807		S12	0.811	
			S13	0.776	

Table 8 presents the factor loadings for each variable from the factor analysis. The principal component analysis was performed using the eigenvalues greater than 1. Furthermore, the data was rotated using the direct oblimin method. The authors decided to present the results of the first component as shown in Table 8. According to Watkins (2018) factor loading values greater than 0.7 indicate that the variable strongly relates to the factor. Table 8 shows that all the values are greater than 0.7. Therefore, it can be stated that the variable chosen has a strong relationship with the factors indicated. The Cronbach's alpha values are greater than 0.9. Thus, it can be stated that the results obtained for factor loadings are reliable and valid. Overall, it can be stated that statistically, there is a strong and significant relationship between each variable and each factor.

6. Discussion

The current study aimed to evaluate the students' perception of the four CSF for the success of online learning. The results present the following perceptions of students.

6.1. A Student Perspective on Success Factor 1: Student Characteristics

According to the work of Reddy et al. (2021b); Lu and Dzikria (2019) and Zainab, Awais Bhatti, and Alshagawi (2017), students' perceptions of digital literacy skills are always positive. The results from this study support the above claim. The calculated mean (approximately 4 out of 5) for the digital competency category indicates that the students' perceived that they had relevant digital skills for online learning.

Furthermore, computer self-efficacy significantly contributes to student participation, achievement and success in online learning (Alhabeeb & Rowley, 2017; Bao, 2020; Basak et al., 2016; Farid et al., 2018). Students with higher computer self-efficacies are likely to have higher levels of self-awareness and, consequently, increased ability and willingness to learn using computers (Castro, 2019). The results of the study showed that students perceived to have a higher computer self-efficacy which indicates that students are ready to independently or with assistance adapt to online learning. The current study results show that the students have a positive attitude and perception of online learning, as the calculated mean was approximately 4 out of 5. Overall, the students perceive that success factor 1 is an important contributor to the success of online learning.

6.2. To Evaluate Student Perspective on Success Factor 2: Teacher Characteristics

Literature states that teachers' role needs to be enhanced for online facilitation as they are totally in control of the delivery of the courses using the learning management system and the various online learning tools (Castro, 2019; Farid et al., 2018; Pinto, Caballero, Sales, & Fernández-Pascual, 2020). Teachers are responsible for the quality of the content, motivating students learning and performance and providing timely and fair responses to students (Bao, 2020; Tsai, Liang, & Hsu, 2021). The results indicate that students perceived that the chosen teacher characteristics for the study were significant contributors to the success of online learning. The overall results indicate that success factor 2 from student perception is an important contributor to the success of online learning.

6.3. To Evaluate Student Perspective on Success Factor 3: Learning Environment and Instructional Design

According to Farid et al. (2018); Lee (2018) and Zainab et al. (2017) many online courses are not successful due to their poor instructional design. Factors such as the structured interface design of the course, easy navigation, and friendly user interface contribute to the quality of the course and student attitude (Farid et al., 2018). The results show that the students perceived that the learning environment and instructional design are important contributors to the success of online courses. The students' response was approximately 4, which indicated that all the variables in success factor 4 were important for online learning. Overall, success factor 3 is an important contributor to the success of online learning from the students' perspective.

6.4. To Evaluate Student Perspective on Success Factor 4: Support

For this study, the student perception of support was evaluated regarding appropriate hardware and software, university support and instructor support. The literature states that for any academic institute, the success of content delivery depends on the support from relevant stakeholders, including facilitators and university administrators (Alhabeeb & Rowley, 2017; Arshavskiy, 2017; Basak et al., 2016). The results of the present study reveal that support from the facilitators and the university is important for online learning. The response for 13 variables for the success factor indicates that all variables are important contributors to success factor 4.

6.5. To Evaluate the Correlation among the Four Critical Success Factors

The literature also shows that online learning teachers are responsible for the students' learning, which they facilitate using a learning management system such as Moodle (Suartama et al., 2019). It is noted that the learning environment and design are usually associated with the characteristics of the teacher, which indicates that teachers and the learning environment have a significant relationship (Chow et al., 2019; Dhika et al., 2021). The results of this study indicate a similar result. Other factors, such as student characteristics and support are closely linked to the success of online courses as indicated by studies conducted earlier (Alhabeeb & Rowley, 2017; Bao, 2020; Farid et al., 2018).

6.6. To Evaluate the Statistical Validation for Each Variable and Each CSF

The factor loadings were calculated to provide the statistical validation of all 54 survey items and four factors for the study. The factor loadings for all the variables are greater than 0.7 and closer to 1 therefore, all the variables chosen for the study are statistically significant contributors to the success of online learning. Since all the variables are significant, the four CSF for the study become statistically significant contributors to the success of online learning from the student perspective.

7. Conclusion

Online learning has become the mainstream in the South Pacific region since the COVID-19 era. The study was conducted at a national university in Fiji, one of the country's higher education providers using the critical success factors: (1) *student characteristics*, (2) *teacher characteristics*, (3) l*earning environment and instructional design* and (4) *support* to evaluate student perception of online learning. This research study is the first one that has identified the critical success factors necessary for online learning in a developing country like Fiji. Moreover, the CSF can be used as a tool to combat the growing attrition rates at universities in Fiji. The results showed that all the CSFs were significantly important for the success of online teaching and learning with a mean value of 4. Furthermore, all the 54 CSFs had a strong relationship with each other and were important contributors to evaluating student perception of online learning. Since the measuring instrument used for the study was significantly valid and reliable, it can be used further to evaluate student perception with a greater audience.

Evaluating critical success factors from the student perspective is necessary for any institution facilitating online studies. Since the students are the consumers of online teaching and learning, their perceptions can be used to enhance the teaching and learning processes. The feedback from students will enable education institutes to prepare the delivery of the courses better, be it for online facilitation in the pandemic era or post-pandemic era. This research study also highlighted the importance of students' computer competency and digital literacy for online learning. Educational institutions need to develop short courses or programs to improve students and even facilitate digital literacy so that online learning is successful and attrition rates at universities are reduced. Furthermore, course design and the learning environment should also be a priority so that students learn with interest. Having well-designed or learner-centred courses will enable effective teaching and learning and improve student outcomes. This also prepares both facilitators and students for future endemic and pandemics. The CSFs and the methodology presented in this research study can be used as a guideline for academics in Fiji to explore the effectiveness of their courses and further improve the delivery of their courses. Secondary schools can use the methodology of this research to transform their courses into online courses in preparation for future crises. One of the limitations of this research study was the number of participants. If similar studies are conducted in the future, then student numbers need to be given consideration and strategies implemented for survey dissemination need to be improved.

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