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Factors Affecting Students' Readiness for Flipped Learning: An Innovative Approach

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ABSTRACT

This research aims to investigate factors that affect students' readiness for a flipped learning approach in blended courses. For this purpose, the research has proposed an extensive model to examine the critical factors that could influence students' readiness for flipped learning, namely technology self-efficacy, course design, learning flexibility, learning management, online interaction and online environment. Moreover, the moderating role of motivation in affecting the relationship between flipped learning readiness and both learning flexibility and learning management has been examined. A quantitative method was adopted, and 240 valid respondents were obtained and utilised for the data analysis. Both structural and measurement models were assessed using the Partial Least Square-Structural Equations Model (PLS-SEM). The results confirmed that all examined factors significantly affected students' readiness for flipped learning. The interaction–moderation analysis revealed that motivation significantly affected the relationship between the students' readiness for flipped learning and factors related to learning, namely learning flexibility and learning management. The contribution of this research is considerable in terms of its theoretical and practical implications. Following the addressed limitations, several recommendations and suggestions are made for the future direction of research.

KEYWORDS

Technology self-efficacy, course design, learning flexibility, learning management, online interaction, online environment

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1. Introduction

The substantial attention given to blended courses has given witness to a tremendous change in terms of pedagogical models. The flipped learning approach is among these models and has been considered one of the most successful approaches in satisfying both learners and instructors (Avdic and Akerblom, 2015; Schultz *et al.*, 2014; Tomas *et al.*, 2019). Recently, most research has focused on integrating the flipped learning approach with blended learning, that is, integrating online learning with traditional learning (Al Mamun *et al.*, 2021). However, students' readiness for the content delivery approach of flipped courses is an essential part of the quality of blended education (Bishnoi, 2020; Tomas *et al.*, 2019). In reference to the annual report, the university vice rectorate for educational affairs indicated that Jouf University has produced over 200 sections in blended courses in order to improve students' learning experience in terms of accessibility, flexibility, and motivation. A large body of research has addressed several related adoption issues, such as readiness, perceptions and attitudes towards flipped learning courses (Jong *et al.*, 2019; Yildiz, 2018). However, few studies have addressed and investigated students' readiness for using the flipped learning approach in blended courses as compared with other learning methods (Burke and Fedorek, 2017; Jiang *et al.*, 2021). Therefore, this research will try to fill the gap in this body of literature by examining the factors affecting students' readiness for the flipped learning approach in blended learning courses at Jouf University.

1.1. Research Problem and Significant Factors:

The COVID-19 pandemic has forced educational institutions to adopt new pedagogical approaches in order to effectively deliver courses for students (Dhawan, 2020). Therefore, the landscape of education has been transformed as a result of adopting new learner-centred approaches to teaching, such as blended learning and flipped classrooms, even after the pandemic (Low *et al.*, 2021; Singh *et al.*, 2021). However, the implementation of such approaches remains a challenging process (Bruggeman *et al.*, 2021). Hence, this transformation needs to be studied from different perspectives (Castro, 2019; Nurhas *et al.*, 2021). In the Saudi context, several studies have investigated blended learning and its related strategies from perceptual, acceptance and effectiveness perspectives (Alowedi, 2020; Anas, 2020; Bamoallem and Altarteer, 2021; Dahmash, 2020). However, students' readiness is similarly significant in terms of their attitudes and perceptions towards and motivations for implementing such an approach. Thus, a deep understanding of the factors affecting flipped-learning adoption is necessary in order to successfully adopt and implement flipped learning (Hasani *et al.*, 2020; Kim *et al.*, 2021). Furthermore, motivation has proven to be a significant factor that could affect students' readiness for a flipped learning setting in addition to its correlation with factors related to external learning, such as flexibility and management (Fisher *et al.*, 2020; Yildiz, 2018). Hence, the proposed research model examines the moderating effect of motivation on the relationships between factors related to the proposed learning model and students' readiness for flipped learning. Furthermore, this research also investigates the direct effect of the proposed factors on students' readiness for the flipped learning approach in blended learning courses. Therefore, both significant theoretical and practical contributions are expected to expand our insight into one of the most important issues concerning the transformation of education in line with such pedagogical approaches. The findings will contribute significantly to the development of the implementation of flipped learning by determining the significant factors that could affect students' readiness for the flipped learning approach. This determination, in turn, will benefit designers of flipped learning courses by endorsing the factors that promote students' readiness to use flipped classrooms effectively. Moreover, the proposed research model could theoretically provide more richness to the body of literature and ultimately help future researchers extensively investigate this issue from different perspectives.

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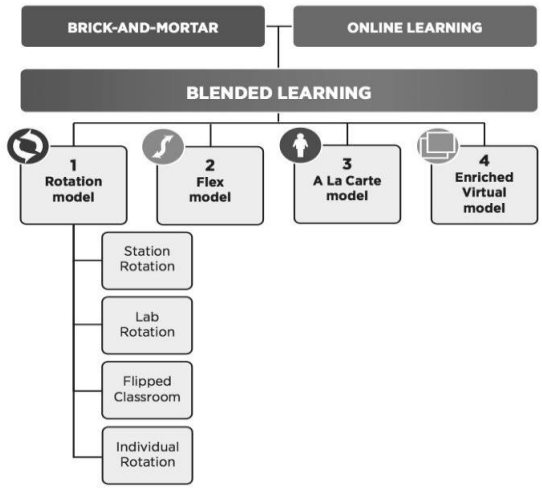
2. Literature Review

2.1. Blended Learning:

Blended learning (BL) combines online and face-to-face instruction and is regarded as an experiential learning approach (Graham *et al.*, 2013). According to Cronje (2020), this approach requires that both the students and the instructor be together in the classroom or the e-learning environment. Namyssova *et al.* (2019) claim that, since it combines the best features of these two different learning methods, BL is an effective method of teaching in higher education. This explains why scholars, including Fisher *et al.* (2018) and Jnr *et al.* (2020), have written about the growing popularity of BL in higher education institutions together with similar approaches, such as flipped learning. These new teaching methodologies are considered beneficial to the learning environment, with Dhawan (2020) noting that the ability to learn in diverse locations at a time that suits students can increase their learning potential. Meanwhile, Chiu (2021) highlights that BL promotes student engagement, Rahman *et al.* (2020) suggest that offline activities promote collaborative learning among students and Tang *et al.* (2020) indicate that BL has been proven to enhance student outcomes. There are four principal models of BL in current use: the Rotation, Flex, A La Carte and Enriched Virtual models (Staker and Horn, 2012). Dewi *et al.* (2018) suggest that the effectiveness of the Rotation model and its ability to implement diverse learning modes explains its wide usage, with Graham *et al.* (2019) and Krasnova and Shurygin (2020) asserting that it is the most popular of the four models. Graham *et al.* (2019) suggest that the further subdivisions within the Rotation model may account for its popularity relative to the other models, identifying Lab Rotation, Station Rotation, Individual Rotation and Flipped Classroom as the four principal models. Figure 1 shows that flipped learning is one of the approaches used in the Rotation model of BL. The present study will use the term 'flipped classroom' to represent the technique or strategy, while the term used to describe the learning approach will be 'flipped learning'; the latter enables the researcher to explore alternative models and to identify the factors that affect flipped learning within blended courses.

Figure 1: BL Models

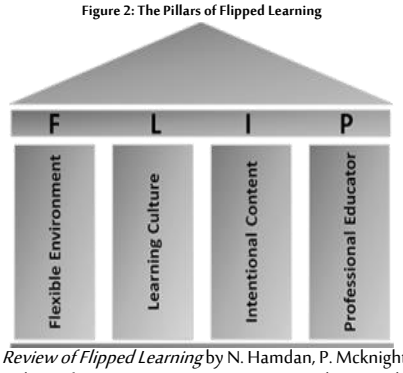


Note. From *Classifying K-12 BL* by H. Staker and M.B. Horn, 2012, p. 2, Innosight Inc.

2.2. Flipped Learning Approach:

Kibar *et al.* (2020) propose that traditional conceptions about in-class and pre-class activities are reversed in the flipped-learning model of BL. Tang *et al.* (2020) refer to flipped learning as the 'offspring' of BL since it combines the best aspects of in-class teaching and online techniques. Meanwhile, Lopes and Soares (2018) indicate that the flipped classroom model is a pedagogical strategy that supports BL. Although numerous scholars, including Hamdan *et al.* (2013), Deng (2018), Bokosmaty *et al.* (2019), Andujar *et al.* (2020), Choi and Choi (2021), Strongoli (2021) and Lin *et al.* (2022), have proposed flipped learning frameworks for various disciplines, Hamdan *et al.*'s (2013) F-L-I-P model is considered one of the best, since it identifies the pillars of a flipped classroom (see Figure 2).

Figure 2: The Pillars of Flipped Learning



Note. From *A Review of Flipped Learning* by N. Hamdan, P. Mcknight, K. Mcknight and D. Arfstrom, 2013, p. 5, Pearson Research Network

Taking these pillars individually, the Flexible Environment (F) pillar suggests that flexibility is required across two dimensions: (1) the approach, meaning that learning takes place and is assessed in a flexible manner, and (2) the space, which itself must also be flexible, with instructors frequently supporting independent study or group work by physically rearranging the learning space. As the second pillar, the student-centred, rich learning approach is represented by Learning Culture (L) which, in flipped learning, means that class time facilitates a deeper investigation of particular topics. Unlike traditional teaching models, where the information flows from the teacher as the primary source, a flexible learning culture allows students to engage in meaningful learning by actively constructing knowledge. The third pillar, Intentional Content (I), refers to a teacher's intentions to enable students to develop procedural fluency and a deeper understanding of concepts, which underlies their adoption of the flipped learning approach (FLA). In adopting this approach, teachers and instructors consider the materials and methods they can use to enable students to learn through exploration; this student-centred approach to active learning can be adapted to suit particular grades and subjects. Professional Educator (P) is the final pillar and refers to an educator's approach to teaching and the professionalism that governs their reflective practice when teaching and observing students, assessing students' work, and providing feedback.

2.3. Flipped Learning Readiness and Related Studies:

Jiang *et al.*'s (2021) Chinese-based study considered university students' readiness for learning and how this was affected by three factors: support, attitude and motivation. This study explored the relationships between student readiness and motivation for and engagement with online flipped learning, as well as investigated the moderating roles played by environmental support and learner attitudes. Jiang *et al.*'s (2021) large-scale study surveyed more than 6,300 English learners from 11 Chinese universities. Although demographic differences were significant, the results revealed that these students had a high level of readiness for online flipped learning and that motivation for and engagement with online flipped learning were moderated by environmental support and learner attitudes. Jiang *et al.* (2021) also identified and considered the implications of the potentially polarising effect of online flipped learning. Another study from Cho and Kim (2021) focused on the factors that influenced readiness for self-directed learning (SDL) and self-esteem in a clinical

adult-nursing practicum that used an FLA. The authors evaluated two learning models used for Korean nursing students: a flipped-learning contact model and a flipped-learning 'untact' model. They investigated how SDL readiness and self-esteem affected these learning models. Three factors influenced SDL readiness: learner motivation, ward friendliness and the flipped-mastery contact model (FMCM) model.

Another study considered information and technology classrooms where programming was taught with the flipped classroom (FC) model. Yildiz (2018) investigated how students' flipped learning readiness (FLR) affected interaction intensity, engagement, attitude towards programming and programming self-efficacy. Yildiz's (2018) study used the relational screening method to identify 371 middle school students for this research, using a structural-equation model for data analysis. The study's results found that FLR and its teaching indicators in the FC model successfully predicted attitudes towards programming, interaction intensity and programming self-efficacy.

2.4. Factors Affecting Student Readiness for Flipped Learning:

2.4.1. Technology Self-Efficacy

According to Bandura (1986), self-efficacy is a subset of social cognitive theory and can be defined as how people judge their capability of organising and executing particular courses of action that they need to take in order to perform certain tasks. McDonald and Siegall (1992) highlight the difference between self-efficacy as a general personality term and technology self-efficacy (TSE), which indicates people's belief in their ability to perform a new technologically sophisticated task. Research from scholars, including Bervell and Umar (2018), Long *et al.* (2019), Sahni (2019), and Zhao *et al.* (2021), has identified that TSE significantly influences students' decisions to integrate technologies into classrooms that use flipped learning, BL and online learning approaches. Bervell and Umar's (2018) study investigated how personality influences behavioural intentions to accept and use emerging technologies. The study revealed that 'technology experience' and 'technology attitude' were major predictors of usage intentions. Factors that influence the decision to adopt an FC instructional model were investigated by Long *et al.* (2019), who used exploratory factor analysis and multiple regressions to investigate the critical factors that predict the decision of higher education instructors to adopt such models. Set in a US university, this study's results found that TSE and performance expectancy were significant predictors of such decisions. Instructors' adoption decisions correlated significantly with facilitation conditions, although this was not a significant predictor. In order to improve the adoption of active learning instructional models, such as the FC in higher education settings, Long *et al.* (2019) proposed that improving performance expectancy and TSE will help break down internal barriers and should, thus, be regarded as a priority for higher education institutions.

2.4.2. Course Design

Jovanovic *et al.* (2019) claimed that course design (CD) has yet to be verified empirically in FC settings, even though it is regarded as a significant predictor in the success of flipped learning environments. Considering the factors that predicted learning effectiveness online during the COVID-19 pandemic, Tsang *et al.* (2021) assessed factors including CD, university support, instructor–student dialogue and student–student dialogue, measuring these through student initiative, perceived learning outcomes and satisfaction levels. Tsang *et al.*'s (2021) survey of 409 university students revealed that the key predictive factors of online learning effectiveness were CD, instructor–student dialogue and student–student dialogue, which contributed to the successful implementation of BL or online approaches. Kim *et al.*'s (2021) Korean-based study focused on 134 university students whose course was being taught using a flipped learning model. The study revealed that, while the level of flipped learning design fidelity did not affect continuance intention, it did have a significant effect on satisfaction, while the level of self-regulated learning had a significant effect on both continuance intention and student satisfaction.

2.4.3. Learning Flexibility

Kafyulilo (2015) defined learning flexibility (LF) as learning opportunities that are facilitated by technology, which allows learners to learn from any place at any time. In order to investigate students' attitudes towards various dimensions of BL and to determine their readiness for this approach to learning, Birbal *et al.*'s (2018) study examined instructors' attitudes towards BL and explored whether these were related to factors including age, gender, place of residence, student specialisation and year group, as well as full-time or part-time status. The study found that flexibility and technology were the most valued and important aspects of BL. Meanwhile, Nerantzi's (2020) study argued that the pivotal factor in maximising student engagement and outcomes in flipped learning was LF. This is echoed in Glazunova *et al.*'s (2020) research, which found that flexible learning settings are necessary in FLAs. Another study, by Challob (2021), found that LF and other factors in the interactive learning environment positively impacted students' motivation, autonomy and English writing performance.

2.4.4. Learning Management

El Miedany (2019) proposed that, since online learning is a vital part of flipped learning, it is important to investigate learning management (LM) in the flipped learning setting. El Miedany (2019) noted that controlling the flexibility of the time, pace and place of learning is particularly relevant to student-centred learning approaches. According to Lee *et al.* (2019), behavioural engagement is fundamental to LM and the way that learners manage their own learning when participating in active learning. Lee *et al.* (2019) suggested that LM must be considered when planning and managing learning and seeking to create an effective learning atmosphere. Pozo Sánchez *et al.*'s (2020) study used a quasi-experimental design combined with a descriptive and correlational quantitative methodology to analyse the effectiveness of innovative mixed practices, including flipped learning and gamification tools. The research found that flipped learning allowed students to autonomously organise their learning (Pozo Sánchez *et al.*, 2020).

2.4.5. Online Interaction

Birbal *et al.* (2018) defined online interaction (OI) as the use of web-based technologies that allow students to interact with lecturers and collaborate with other students for assignments. When used in the FLA, OI can reinforce students' learning, while interaction with classmates can allow them to gain more skills and knowledge (Lin *et al.*, 2021). Latorre *et al.* (2021) claimed that flipped learning has been used extensively during the COVID-19 pandemic due to social distancing requirements and, since it can increase online learning interactions, this approach enhances students' learning performance and education more broadly (Wang and Zhu, 2019). The influence of OI on student readiness for flipped learning will, therefore, be explored by the proposed research model.

2.4.6. Online Environment

According to Hodge-Zickerman *et al.* (2021), the online environment (OE) refers to a computer-based internet-learning environment in which a class is attended by a teacher and their students. Lindeiner-Stráský *et al.* (2020) stated that an online learning environment is an essential element of flipped learning. Yoon *et al.* (2020) indicated that

students engage in self-controlled learning by using online teaching and learning resources. In their investigation of FLAs, Birbal *et al.* (2018) identified a significant positive correlation between online learning and the OE. The influence of the OE on student readiness for flipped learning will, therefore, be investigated in the proposed research model.

2.4.7. Motivation

Several scholars, including Fisher *et al.* (2020) and Yildiz (2018), have identified that motivation (M) is a significant factor that not only affects FLR but also has a significant association with external factors related to BL. Ekici's (2021) systematic literature review on the use of gamification in flipped learning found that the use of game elements in an FC engendered higher M, greater participation and better learning performance. In another study that investigated how the FC model affected student M, Abdullah *et al.* (2019) found that the FC approach had a significant impact on increasing students' M, as well as creating an engaging, creative and motivating atmosphere in English as a Foreign Language (EFL) courses. Turan and Göktaş (2018) also advised that M is strongly associated with factors related to the FLA.

3. Research Methodology

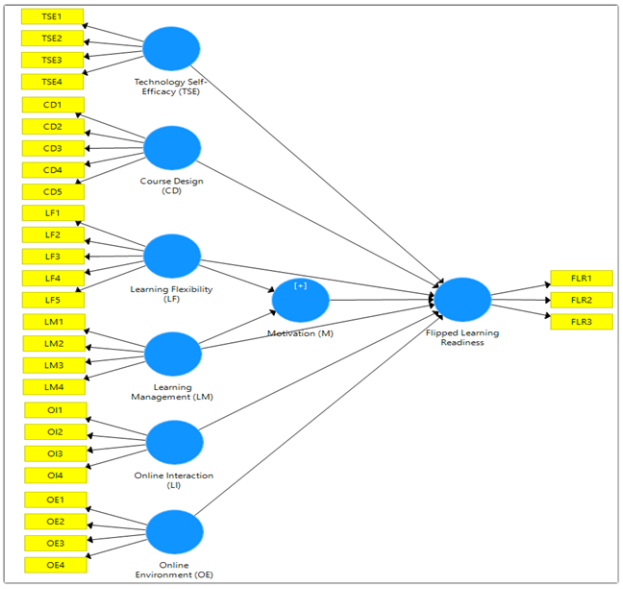
In this research, the aim was to investigate the factors affecting students' readiness for flipped learning in BL courses. Thus, the proposed research questions were:

- Do the proposed factors (TSE, CD, LF, LM, OI and OE) affect students' readiness for flipped learning in BL courses?
- Does M moderate the relationship between students' FLR and both LF and LM?

3.1. Research Model and Hypotheses:

In order to achieve the research objectives and answer the research questions, a proposed model was developed based on an extensive review of the literature related to the FLA. The proposed research model investigated the direct effect of several factors, namely TSE, CD, LF, LM, OI and OE on students' readiness for flipped learning. Moreover, the model investigated the moderating role of M in affecting the relationship between learning-related factors, namely LF and LM, with students' readiness for flipped learning. Figure 3 shows the proposed research model.

Figure 3: Proposed Research Model



Based on the research questions and proposed research model, several hypotheses were formulated:

H1: TSE has a positive effect on students' readiness for flipped learning.

H2: CD has a positive effect on students' readiness for flipped learning.

H3: LF has a positive effect on students' readiness for flipped learning.

H4: LM has a positive effect on students' readiness for flipped learning.

H5: OI has a positive effect on students' readiness for flipped learning.

H6: OE has a positive effect on students' readiness for flipped learning.

H7: M positively moderates the relationship between LF and students' readiness for flipped learning.

H8: M positively moderates the relationship between LM and students' readiness for flipped learning.

3.2. Research Design and Sampling:

A quantitative approach was adopted due to the nature of this research. The research data was collected using a questionnaire that was distributed electronically to students who completed BL courses during the 2021–2022 academic year at Jouf University. The chain-referral sampling technique was applied to obtain the required sample size.

3.3. Development of Questionnaire Instruments:

The questionnaire items were developed in order to answer the research questions and achieve the research objectives based on the related literature (Afacan, 2018; Birbal *et al.*, 2018; Lee *et al.*, 2019; Sahni, 2019; Tang and Chaw, 2013; Tsang *et al.*, 2021). The questionnaire was divided into two sections: questions concerning demographics and a total of 35 items measuring the investigated factors, namely TSE, CD, LF, LM, OI, OE, M and FLR. The questionnaire was sent to three bilingual experts in the field of instructional technology for face and content validity. Table 1 presents the proposed factors, related items and adapted references.

Table 1: Factors, Number of Items, and References

Factor	# of items	References
TSE	4	Sahni (2019)
CD	5	Tsang *et al.* (2021)
LF	5	Birbal *et al.* (2018)
LM	4	Lee *et al.* (2019)
OI	6	Birbal *et al.* (2018)
OE	4	Birbal *et al.* (2018)
M	4	Afacan (2018)
FLR	3	Tang and Chaw (2013)
Total	35	

4. Data Analysis

The data from the present research was analysed using Partial Least Squares-Structural Equation Modelling (PLS-SEM) with SmartPLS 3 software. A PLS-SEM approach was conducted due to the nature of the proposed model and its ability to measure the complex path model and moderating effect of intervening factors (Hair *et al.*, 2019).

4.1. Descriptive Analysis of the Respondents' Profiles:

The main purpose of analysing the respondents' profiles was to ensure that the research population was well-represented in the obtained sample. Variation in the respondents' characteristics was ensured in order to reduce any possible bias among the respondents. The total responses collected from Jouf University students were 252; nevertheless, only 240 valid questionnaires were included in the analysis. As shown in Table 2, the majority of respondents were female students, with 72.1% compared with 29.9% of male students. Moreover, most students were between 18 and 24 years old, which represented about 77.5% of the total respondents. In terms of students who used online learning, the majority of students (145) used online learning daily, which represented 60.4% of the total respondents. Most students took 1 to 3 blended courses during their studies, which represented 57.1% of the total sample.

Table 2: Analysis of the Respondents' Profiles

Items		Frequency	Percentage
Gender	M	67	27.9%
	F	173	72.1%
Age	18–24	186	77.5%
	25–30	33	13.8%
	31–35	14	5.8%
	>35	7	2.9%
Online learning usage	Once a month	2	0.8%
	A few times a month	21	8.8%
	A few times a week	72	30.0%
	Once a day	145	60.4%
BL courses taken	1–3	137	57.1%
	4–7	70	29.2%
	7–10	27	11.3%
	>10	6	2.5%
Total		240	100%

4.2. The Assessment of Measurement Model:

The purpose of measurement model assessment is to investigate the convergent and discriminant validities of the examined and proposed model factors. The convergent validity was tested using the obtained results of factor loading, Cronbach's Alpha (α), rho_A, Composite Reliability (CR) and Average Variance Extracted (AVE). A threshold value recommended by Hair *et al.* (2021) advised that factor-loading scores above 0.70 are considered satisfactory. Cronbach's Alpha (α), rho_A and CR must exceed the minimum threshold of 0.7 (Hair *et al.*, 2021), while the AVE value should be more than 0.5.

Table 3: Results of Convergent Validity Analysis

Factor	Items	Factor loading	Cronbach's Alpha (α)	rho_A	CR	AVE
TSE	TSE1	0.839	0.879	0.880	0.917	0.734
	TSE2	0.899				
	TSE3	0.888				
	TSE4	0.796				
CD	CD1	0.927	0.947	0.950	0.960	0.828
	CD2	0.951				
	CD3	0.916				
	CD4	0.929				
	CD5	0.822				
LF	LF1	0.844	0.915	0.916	0.937	0.747
	LF2	0.884				
	LF3	0.908				
	LF4	0.871				
	LF5	0.717				
LM	LM1	0.865	0.865	0.874	0.908	0.713
	LM2	0.818				
	LM3	0.893				
	LM4	0.798				
OI	OI1	0.869	0.908	0.922	0.935	0.784
	OI2	0.914				
	OI3	0.929				
	OI4	0.827				
OE	OE1	0.902	0.914	0.949	0.939	0.794
	OE2	0.938				
	OE3	0.939				
	OE4	0.775				
M	M1	0.864	0.868	0.874	0.910	0.718
	M2	0.827				
	M3	0.893				
	M4	0.803				
FLR	FLR1	0.949	0.893	0.898	0.934	0.825
	FLR2	0.925				
	FLR3	0.849				

As revealed in Table 3, the factor loading of all items exceeded the minimum level of 0.7. Cronbach's Alpha (α), rho_A and CR also exceeded the minimum threshold of 0.7. Furthermore, the AVE values of all items were above the acceptable cutoff value of 0.5. The variance inflation factor (VIF) was assessed to investigate any possible multicollinearity, and the result yielded that the values of the items' VIF were below the threshold value of 5.0 (Hair *et al.*, 2022). This confirmed the convergent validity.

The discriminant validity was examined using the Fornell-Larcker Criterion and the Heterotrait-Monotrait ratio. According to the Fornell-Larcker Criterion, the diagonal value of the square root of AVE of each factor should be greater than the correlation values of other factors.

Table 4: Discriminant Validity Analysis (Fornell-Larcker Criterion – Heterotrait-Monotrait Ratio)

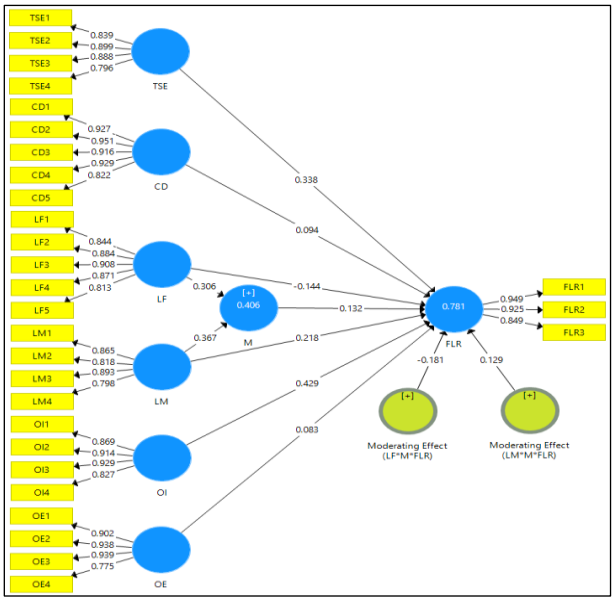
		Heterotrait-Monotrait Ratio							
	Factor	1	2	3	4	5	6	7	8
1	CD								
2	FLR	0.468							
3	LF	0.571	0.564						
4	LM	0.576	0.732	0.685					
5	M	0.383	0.538	0.665	0.699				
6	OE	0.310	0.566	0.434	0.519	0.386			
7	OI	0.358	0.832	0.487	0.531	0.363	0.384		
8	TSE	0.387	0.758	0.618	0.710	0.514	0.606	0.693	
		Fornell-Larcker Criterion							
	Factor	1	2	3	4	5	6	7	8
1	CD	**0.910**							
2	FLR	0.431	**0.909**						
3	LF	0.531	0.514	**0.865**					
4	LM	0.522	0.645	0.792	**0.845**				
5	M	0.347	0.476	0.597	0.609	**0.847**			
6	OE	0.300	0.524	0.413	0.479	0.357	**0.891**		
7	OI	0.333	0.757	0.446	0.473	0.325	0.361	**0.885**	
8	TSE	0.358	0.765	0.556	0.624	0.453	0.559	0.621	**0.857**

As illustrated in Table 4, the diagonals of the square roots of the proposed factors were greater than the correlation coefficients of latent factors. Thus, the Fornell-Larcker Criterion was met. Furthermore, Table 4 shows that the Heterotrait-Monotrait ratio values were less than the acceptable cutoff values of 0.85 (Franke and Sarstedt, 2019). Accordingly, the Heterotrait-Monotrait ratio was satisfied. Therefore, the convergent and discriminant validities of the measurement model were considered satisfactory, and the structural model could be assessed.

4.3. The Assessment of the Structural Model:

The structural model was evaluated by utilising the bootstrapping technique in order to assess the coefficient of determination (R2), path coefficients (β) and t-values. Figure 4 indicates the results of the structural-model assessment. The model fit was analysed using the standardised root mean square residual, which was 0.065 < 0.08, and the Normed Fit Index, which was 0.928 > 0.90, both of which were found to be satisfactory (Hair *et al.*, 2021). Figure 4 revealed that the R2 of the proposed model accounted for about 78.1% of the total variation and the determination of FLR above a threshold value of 0.2, which is considered satisfactory (Hair *et al.*, 2022). Therefore, the applicability of the proposed model is confirmed. Table 6 shows the results of path analysis and hypotheses testing.

Figure 4: Structural Model



The results of Table 5 confirm that all hypotheses were significantly associated with students' FLR. The results revealed that the most influential factor of FLR was OI with (β = .429, t = 5.488, at the significance level of p < .01). TSE was the second-greatest contributor towards students' FLR with (β = .388, t = 4.348, p < .001). Furthermore, the third-most affecting factor associated with FLR was LM with (β = .218, t = 2.978, p < .001). CD positively affected students' readiness for flipped learning (β = .218, t = 2.978, p < .001). Moreover, LF had a direct negative effect on students' readiness for flipped learning (β = -.144, t = 2.204, p < .05). Finally, OE positively affected students' readiness for flipped learning (β = .083, t = 2.157, p < .05).

Table 5: Results of Structural-Model Assessment (Path Analysis Results)

H	Path of hypotheses	β	*T*-value	*P*-value	Hypotheses' results
H1	FLR <--- TSE	0.338	4.348	0.000***	H1: Supported
H2	FLR <--- CD	0.094	2.738	0.006***	H2: Supported
H3	FLR <--- LF	-0.144	2.204	0.028**	H3: Supported
H4	FLR <--- LM	0.218	2.978	0.003***	H4: Supported
H5	FLR <--- OI	0.429	5.488	0.000***	H5: Supported
H6	FLR <--- OE	0.083	2.157	0.031**	H6: Supported

*** $p < 0.001$, ** $p < 0.05$

4.4. Assessment of Moderating Effect:

The last two hypotheses were formulated in order to investigate the moderation effect of M on the relationship between FLR and both LF and LM. Therefore, the interaction–moderation method was employed.

Table 6: Moderating Effect Assessment

H	Path of hypotheses	β	T-value	P-value	Hypotheses' results
-	M <--- LF	0.306	3.342	0.001***	-
-	M <--- LM	0.367	3.582	0.000***	-
-	FLR <--- M	0.132	2.507	0.013***	-
H7	Moderating Effect (LF*M*FLR)	-0.181	3.176	0.002***	H7: Supported
H8	Moderating Effect (LM*M*FLR)	0.129	2.301	0.022**	H8: Supported

As presented in Table 6 and Figure 4, the interaction–moderation outcomes indicated that there was a significant relationship between LF and M ($\beta = .306$, $t = 3.342$, $p < .001$) and between M and FLR ($\beta = .132$, $t = 2.507$, $p < .05$). The interaction effect between LF and FLR had a negative effect and a significant relationship with M ($\beta = -.181$, $t = 3.176$, $p < .001$). Thus, H7 was supported. Furthermore, in terms of the moderation effect of M on the relationship between LM and FLR, the results revealed a negative effect and a significant relationship between LM and M ($\beta = .367$, $t = 3.582$, $p < .001$) and between M and FLR ($\beta = .132$, $t = 2.507$, $p < .05$). The interaction between LM and FLR had a positive and significant relationship with M ($\beta = .129$, $t = 2.301$, $p < .05$). Thus, H8 was supported, and M played a moderating role in the relationship between FLR and both LF and LM.

5. Discussion and Implications

This research aimed to investigate the factors affecting students' readiness for flipped learning. The results of the research revealed that all the examined and proposed factors significantly contributed to students' readiness for flipped learning. The results showed that OI was the most effective factor for FLR in line with other related studies (Birbal *et al.*, 2018; Latorre *et al.*, 2021; Lin *et al.*, 2021; Wang and Zhu, 2019). Even though the previously cited works regarding OI were emphasised, students' perceptions towards OI increased during the pandemic due to social distancing, which ultimately influenced their physical interactions with their teachers and other students. Furthermore, the second-most important factor that contributed to students' FLR was, in line with other studies, TSE, which indicates the key role that self-efficacy plays in blended courses and particularly in the FLA (Long *et al.*, 2019; Sahni, 2019; Zhao *et al.*, 2021). Moreover, in line with the findings of El Miedany (2019), Lee *et al.* (2019) and Pozo Sánchez *et al.* (2020), LM was the third factor associated with FLR. Unsurprisingly, LM is an essential part of any student-centred approach, such as flipped learning, because students need to organise and control time and pace flexibly. This study's findings also indicated that CD positively impacts students' readiness for flipped learning, which contributes to other research recommendations, such as those of Jovanovic *et al.* (2019), who advised that CD needs to be empirically investigated in a flipped learning context. Moreover, the findings regarding CD were consistent with other research, including that of Kim *et al.* (2021) and Tsang *et al.* (2021). Lastly, in line with other research findings (Birbal *et al.*, 2018; Glazunova *et al.*, 2020; Lindeiner-Stráský *et al.*, 2020; Nerantzi, 2021; Yoon *et al.*, 2020), LF and OE were found to significantly affect FLR.

In terms of interaction–moderation analysis, the results revealed that M plays a moderating role in the relationship between FLR and both LF and LM. Much research has identified M as a significant factor that affects not only FLR but other external factors that could affect FLR readiness (Fisher *et al.*, 2020; Yildiz, 2018). Therefore, the current research has investigated the moderation effect of M on the relationship between FLR and both LF and LM. As mentioned earlier, both factors were found to have direct significant effects on students' readiness for the FLA. The findings of the moderating analysis supported the suggestion of Turan and Göktaş (2018) that M is strongly associated with factors related to flipped learning.

The findings of this research have considerable implications from a theoretical perspective. The proposed research model and its related factors have been examined in terms of validity and their applicability in measuring the factors affecting students' readiness for the FLA. Therefore, other research could benefit from using the proposed model in measuring other factors that could influence the perception, usage of and readiness for flipped learning. Some contributions to the literature recommended the empirical examination of some of the proposed factors in a flipped learning setting (Lin *et al.*, 2021; Jovanovic *et al.*, 2019; Wang and Zhu, 2019). Thus, the findings of this research will add the significant influence of the proposed and examined factors to the body of literature, which will help other researchers build a foundation on a solid validated basis. The R2 of the proposed model accounted for a high percentage of total variation in FLR, which indicates the significant influence and determination of the proposed factors. The research confirmed the moderating effect of M. Thus, M has proven to be a direct significant moderating and influential factor in the FLA, which would turn the attention of other researchers towards M when building their flipped learning models and frameworks.

In terms of practical implications, a substantial insinuation can be obtained from the research findings. The stakeholders, academics, and flipped learning course designers should take into account the importance of the proposed factors in order to successfully implement the FLA and other related student-centred approaches. Factors related to online learning, such as OI and OE have proven to play a significant role in the FLA, along with TSE and CD. Therefore, academics and course designers should produce online learning elements in a way that enhances interactivity, engagement and the educational atmosphere. The use of the online learning system is an essential part of the FLA; therefore, students' TSE should be observed and developed through specific training courses prior to the implementation of flipped learning. Furthermore, the factors related to learning, namely LF and LM were found to meaningfully contribute towards students' readiness for flipped learning. The flexibility of online and offline learning in flipped learning courses should be achieved. Academics should teach or train students to control and manage their learning activities in the context of the FLA in order to prevent any time consumption. Finally, M was found to be a significant predictor of students' FLR. It was also found to be associated with other factors that could help their engagement, attitude and perception. Thus, motivating the students prior to and after the flipped learning process is fundamental for a better and more effective learning experience.

6. Conclusion, Limitations and Recommendations

The aim of this research was to investigate the factors affecting students' readiness for flipped learning. The proposed research model explored the direct influence of several factors, namely TSE, CD, LF, LM, OI and OE on students' readiness for flipped learning. Furthermore, the model examined the moderating effect of M on the relationship between learning-related factors, namely LF and LM and

students' readiness for flipped learning. The results confirmed that all hypotheses indicated significant associations with students' FLR. Furthermore, the interaction–moderation analysis indicated that there was a significant moderating influence from M on the relationship between FLR and both LF and LM.

In order to provide clear directions for future research, some limitations in the research need to be addressed. The research findings indicated that R2 approximately explained about 78.1% of the total variance of FLR. Therefore, future research could investigate additional factors related to psychological, technological and institutional constructs. The research is limited by a small sample size, a public university setting and a quantitative approach. For future research, it will be useful to increase the sample size, apply the research model to different public and private universities and use qualitative methods in order to comprehend the reasons behind the influences of the examined factors and to generalise the findings. To conclude, the M effect has been investigated in relation to limited factors, and future research could, thus, investigate the influence of M on other proposed factors and examine its mediating effect.

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