A study of factors influencing first-year students' adaptation to blended learning

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Abstract. Blended learning has become an indispensable learning way in universities, and study adaptation is a key indicator for determining learning quality. This paper compiles scales of blended learning adaptation and influencing factors for first-year students on the basis of survey research to explore the influencing mechanism of blended learning adaptability. The results show that the blended learning adaptability is at a moderately high level, but there are significant differences in terms of sex and course frequency. Female students are significantly higher than male students, and students who participate in learning 8-12 times and more 12 times per month are significantly higher than those with low frequency of learning courses in terms of online learning, learning environment, and overall study adaptation. In terms of influencing factors, motivation, academic self-efficacy and learning platform have a direct positive and significant effect on blended learning adaptation, while instructor teaching and online course content don't have a direct positive and significant influence.

Keywords: Blended learning, study adaptation, motivation, academic self-efficacy.

1. Introduction

The blended teaching model combining online learning and classroom teaching has been gradually promoted in Chinese universities since 2015, which organically combines face-to-face learning and online learning, and has the advantages of both reflecting the leading role of the teacher and guaranteeing the students' main identity. However, students have a certain degree of maladaptation problem to blended learning, especially for freshmen students, which directly affects their learning quality and has become a key issue that needs to be solved at present [1].

Regarding learning adaptability, American scholars Baker and Siryk believed that it was to the effectiveness of a positive attitude toward learning goals and learning environment [2]. In China, Zhou et al. first proposed learning adaptability in 1991 [3]. Feng defined learning adaptability as the psychological and behavioral adjusting process to the needs of learning and the learning environment [4], and this definition is also recognized by many scholars.

By sorting and ranking the high-frequency keywords, He et al. found that high-frequency keywords such as blended teaching mode, catechism, flipped classroom, teaching mode, SPOC, and so on, have become the hot topics of blended learning research nowadays [5]. However, there are relatively few studies on blended learning adaptability, and the first foreign study on learning adaptability in a blended learning environment was in 2004 when Ausbum analyzed the impact of course content design on adult learners' learning adaptability in a blended learning environment [6]. The first domestic study on the

adaptation of blended learning is Shao Xiuying who investigated college students' adaptability in 2015 [7]. Abbas concluded through a questionnaire survey that still 30% of the students thought blended learning not as effective as traditional teaching methods [8]. Yang et al. found that only 30.4% of domestic college students were able to fully adapt to this teaching method by using questionnaire and interview method, 46.4% of college students thought that there was some discomfort, 14.3% of college students had a greater degree of discomfort, and 10.0% of college students thought that they were not adapted at all [9]. Liu found that freshmen showed five major adaptation problems such as lack of persistence in learning motivation, lack of metacognitive strategies, unsuccessful role transition, low self-efficacy, and poor adaptability to the learning environment [10].

From the point of view of existing research, scholars at home and abroad focus more on the application of blended study in practice to explore the problem, the research on blended learning adaptation is relatively small, the lack of universally recognized blended learning adaptability scale, the researches on its influencing factors are also different and mainly use qualitative analysis. This paper compiles a blended learning adaptability scale for first-year students, collect data through questionnaires and explores the mechanism of its influence quantitatively.

2. Methods

2.1. Indicator selection and description
Combining existing studies, this paper measures blended learning adaptability in three dimensions: online learning, offline classroom and adaptability to the learning environment, as shown in Scale 1, table 1. The research on the influencing factors is divided into five dimensions: learning motivation, learning self-efficacy, instructor teaching, learning platform and online course content, see Scale 2, table 1.

2.2. Data sources and description
In this paper, questionnaires are distributed to first-year students who are doing blended learning in University Q of Province S. A total of 178 questionnaires were recovered, and by deleting the missing ones, 153 valid questionnaires were finally obtained, with a validity rate of 85.96%. The questionnaire has three parts: the basic information of the respondents, the blended learning adaptation scale and the influencing factors of blended learning adaptation scale. The two scales are in the form of a five-point Likert scale, ranging from very compliant, largely compliant, uncertain, not quite compliant, and very non-compliant in order of 5, 4, 3, 2, and 1 points.

Table 1. Scale of blended learning accommodation and influencing factors.

Scale 1		Scale 2	
learning	accommodation topics	Influencin	g factor topics
online learning (B1)	high standards for academic performance (B11)	learning motivation (A1)	satisfying interest in learning(A1)
	complete online tasks (B12)		completing studies (A12)
			grow knowledge (A13)
	solve problems other than assigned (B13)		show abilities in front of people (A14)
			getting a good grade (A15)
	solve problems through discussions (B14)	academic self-efficacy (A2)	keep up what I have learnt(A21)
			get good grades(A22)
			concentrate studies without distractions(A23)
	learn without the constraints of time and space (B15)		combine work and leisure wisely(A24)

Table 1. (continued).

offline classroom learning (B2)	adapt to offline classroom (B21)	instructor teaching (A3)	study hard(A25)
	follow requirements and carry out learning activities (B22)		think positively(A26)
			well organise online and offline (A31)
	initiative to ask for help (B23)		teach methods appropriately (A32)
	actively participate in class discussions (B24)		rich knowledge base and strong content presentation skills (A33)
			offline teaching highlights (A34)
	communicate without barriers (B25)		urge to complete my learning tasks(A35)
			teach ways to learn efficiently(A36)
	efficient offline learning (B26)		responds to question promptly(A37)
	use course materials effectively (B31)	course platform (A4)	easy to operate (A41)
	use video resources effectively (B32)		functionality meets learning (A42)
			support communication (A43)
	use other resources effectively (B3)		Support participation tests (A44)
learning environment (B3)	use discussion forums effectively (B34)	online course content (A5)	Videos clear and high quality (A51)
			right length of videos for understanding (A52)
			video content can be repeated (A53)
	use extended resources (B35)		curriculum is resourceful (A54)

2.3. Research hypotheses

On the basis of existing research, this paper puts forward the following hypotheses about the relationship between the five dimensions of influencing factors and blended study adaptation.

2.3.1. Learning motivation. Learning motivation is the conditional basis of learning engagement, learning motivation can promote students' learning participation and increase the level of learning engagement, thus enabling them to achieve higher goals. Therefore, in the process of learning sustained and strong learning motivation can bring out positive learning behaviours, based on which hypothesis 1 is proposed.

   H1: Learning motivation has a positive effect on blended study adaptation.

2.3.2. Academic self-efficacy. Academic self-efficacy is a subjective judgement of learners' ability to complete learning tasks, and Burgoo et al. showed that college students' self-efficacy has a significant influence on study [11], so hypothesis 2 is proposed.

   H2: Academic self-efficacy has a positive effect.

2.3.3. Instructor teaching. Although students' independent learning ability is more emphasised in blended learning, effective learning cannot be separated from teachers' guidance and supervision. Therefore, hypothesis 3 is proposed.

   H3: Instructor teaching has a positive effect.

2.3.4. Learning platform. Gyamfi et al. found that the functional characteristics of course platforms can influence the learning outcomes of first year students through a survey of first year students [12]. Therefore, hypothesis 4 is proposed.

H4: Learning platform has a positive effect.

2.3.5. Online course content. Rich course resources can help students learn independently, and the length of video resources, the style of teachers' explanations, and the richness of resources in online course resources can significantly affect students' evaluation of learning platforms. Therefore, hypothesis 5 is proposed

H5: online course content has a positive effect.

2.4. Research methods

This paper uses SPSS 23 software to analyse the reliability of the research data of the two scales, and AMOS 26 software to conduct validation factor analysis of the two scales, mainly to verify the structural validity and convergent validity. Besides, this paper uses independent samples t-test and one-way ANOVA to analyse the level of college students' adaptability to blended learning and the differences of the dimensions Finally, the structural equation model is drawn using AMOS software to test the proposed hypotheses.

3. Results and discussion

3.1. Reliability and validity test

The reliability analysis on the research data shows that the cronbach reliability coefficients of Scale 1 and Scale 2 are 0.934 and 0.978 respectively, all greater than 0.8, which indicates that the scales have a good degree of reliability (Table 2).

Table 2. Reliability testing

	Scale 1		Scale 2
variable	cronbach reliability coefficient	variable	cronbach reliability coefficient
B1	0.859	A1	0.819
B2	0.891	A2	0.887
B3	0.918	A3	0.940
-	-	A4	0.916
-	-	A5	0.936
total	0.934	total	0.978

Validated factor analyses are conducted on the two scales using AMOS 26 software, mainly to verify their structural and convergent validity. Measures of structural validity for Scale 1 and Scale 2 show a good fit, greater than 0.9, and the established validated factor analysis models are valid and matched well with the recovered data (Table 3).

Table 3. Structural validity.

	X^2/df	RMSEA	GFI	CFI	IFI	TLI	RMR
Scale 1	1.844	0.067	0.873	0.951	0.951	0.941	0.043
Scale 2	1.913	0.072	0.822	0.939	0.940	0.930	0.032

The results of convergent validity measurement of Scale 1 show that each measurement item can explain its dimension well, and all measurement items in each variable explain it consistently, with good convergent validity (Table 4).

Table 4. Convergent validity of Scale 1.

variables	topics	estimate	CR	AVE
B1	B11	0.873	0.845	0.527
	B12	0.711		
	B13	0.807		
	B14	0.618		
	B15	0.577		
B2	B21	0.807	0.867	0.527
	B22	0.668		
	B23	0.695		
	B24	0.857		
	B25	0.750		
	B26	0.534		
B3	B31	0.787	0.910	0.671
	B32	0.911		
	B33	0.885		
	B34	0.830		
	B35	0.658		

In the convergent validity analysis of Scale 2, it is found that the standardised factor loading of learning motivation A14 is 0.38, and that of teacher teaching A37 is 0.44, which are lower than 0.5, so the items are deleted. After the deletion the standardised factor loading of each item is higher than 0.5 with better combined reliability CR (Table 5) , and the mean variance extracted AVE is higher than 0.5. So the convergent validity is better.

Table 5. Convergent validity of Scale 2.

variables	topics	estimate	CR	AVE
A1	A11	0.545	0.820	0.540
	A12	0.680		
	A13	0.860		
	A15	0.812		
A2	A21	0.737	0.864	0.518
	A22	0.606		
	A23	0.753		
	A24	0.772		
	A25	0.833		
	A26	0.581		
A3	A31	0.924	0.932	0.702
	A32	0.944		
	A33	0.905		
	A34	0.928		
	A35	0.627		
	A36	0.628		

Table 5. (continued).

	A41	0.865		
	A42	0.913		
A4	A43	0.849	0.901	0.696
	A44	0.693		
	A51	0.888		
	A52	0.923		
A5	A53	0.822	0.924	0.753
	A54	0.835		

3.2. Descriptive analysis

3.2.1. The overall level of blended learning adaptability. The overall level of college students' adaptability to blended learning is moderate (Table 7), but the three dimensions are different. Ihat is in descending order: offline classroom learning (B2), online learning (B1), and study environment (B3).

Table 6. Descriptive statistics.

variables	Mean(M)	Standard deviation(SD)
B1	3.6994	0.76358
B2	4.1441	0.60811
B3	3.2914	0.62030
total	3.7116	0.55462

3.2.2. Differential characteristics of blended learning adaptability. We use independent samples t-test and one-way ANOVA to analyse the level of college students' learning adaptability and the variability of each dimension in terms of sex, course frequency, net age and time of exposure to catechism.

In terms of sex and study course frequency, except for offline classroom learning (B2), the significance p-values of online learning (B1) and learning environment (B3) dimensions are all less than 0.05, indicating that the two items have important difference. Specifically in terms of online learning, learning environment and overall learning adaptability, female students are significantly higher than male students; college students who participated in the study less than 4 times per month and 4-8 times per month are significantly less likely than those who participated in the study 8-12 times per month and more than 12 times per month.

In contrast, the significance p-values of blended learning adaptation, the dimensions of net age and time of exposure to catechism are highter than 0.05, indicating that there is no significant difference in these two aspects (Table 7).

Table 7. Variability of different dimension

different dimension		B1		B2		B3		total	
		M	P	M	P	M	P	M	P
sex	male	3.4174	0.003	4.1812	0.624	3.0725	0.004	3.5570	0.024
	female	3.8183		4.1284		3.3838		3.7769	
study course frequency per month	<4 times	3.3674		4.0635		3.7429		3.7133	
	4-8 times	3.5893		4.1316		3.8842		3.8605	
	8-12 times	4.0889	0.000	4.3194	0.270	4.1833	0.026	4.1972	0.001
	>12 times	4.0737		4.0965		4.1895		4.1199	

Table 7. (continued).

net age	<1year	3.6000		4.4792		3.2292		3.7694		
	1-2 year	3.7412	0.912	3.9216	0.093	3.2745	0,949	3.6458	0.846	
	2-5 year	3.7000		4.1526		3.2974		3.7167		
exposure times to catechism	< 6 months	3.5070		4.2063		3.8419		3.8513		
	6-12 months	3.8094		4.1513		4.0523		3.9984		
	1-2 year	3.8842	0.167	4.0000	0.678	3.8842	0.509	3.9228	0.678	
	>2 year	3.7250		4.1389		4.0087		3.9478		

3.3. Hypothesis testing

Using AMOS software to draw the structural equation model to test the proposed hypothesised paths on the basis of model fit assessment and correction, the results are that standardised path coefficients of learning motivation, learning self-efficacy and learning platforms are 0.418, 0.501, and 0.195 respectively, and the p-values of significance are lower than 0.05. So hypotheses H1, H2, and H4 are valid (Table 8).

The p-values of significance for instructor teaching, and online course content are greater than 0.05, so there is no direct significant effect of both on blended learning adaptation, and hypotheses H3 and H5 are not valid.

Table 8. Test results

path			standardised path coefficient	P	result
learning motivation(A1)	⟶	Blended learning adaptation	0.418	***	H1 valid.
academic self-efficacy(A2)	⟶	Blended learning adaptation	0.501	***	H2 valid
instructor teaching(A3)	⟶	Blended learning adaptation	-0.099	0.111	H3 not valid
learning platforms(A4)	⟶	Blended learning adaptation	0.195	*	H4 valid
online course content(A5)	⟶	Blended learning adaptation	0.104	0.262	H5 not valid

Note: *** is $p<0.001$, ** $p<0.01$, * $p<0.05$

4. Conclusion

This paper shows that blended study adaptation of freshmen is at a moderately high level, but the dimensions are different, with first-year students having a better offline classroom learning status, average online learning, and the lowest adaptability to learning environment. The blended study adaptation of first-year students shows significant differences in terms of sex and different course frequencies, which is reflected in the fact that female students are significantly higher than male students in terms of online learning, learning environment, and overall study adaptation, while students who participate in learning 8-12 times and more than 12 times per month are significantly higher than students with low frequency of learning courses in terms of online learning, learning environment, and overall study adaptation. On their influencing factors, learning motivation, academic self-efficacy, and learning platform have a direct positive and significant influence on blended study adaptation, while instructor teaching and online course content don't have a direct positive and significant influence.

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