Development and Standardisation of Scale for Assessing Readiness towards Blended Learning

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Abstract

Blended learning approach has various advantages as it is an innovative instructional approach which integrates a variety of delivery strategies of online and face-to-face components. It allows the possibility to upgrade students' achievements, and offers the opportunities to increase the flexibility to access learning resources and enhance self-directed learning at any time and pace. After the Covid-19 pandemic, it has become as an essentiality to integrate the online component with face-to-face learning. The present research was planned before the pandemic and authors decided to know the reaction of various stakeholders towards using blended learning approach for internship of teachers training programme. For this purpose, investigators developed a readiness scale with 35 items distributed under eight different dimensions. The scale is reviewed by various subject experts. The reviewed and corrected scale was administered on 383 subjects for try out and calculating various statistical values. Item analysis was performed and feedback obtained from item analysis led to the item deletion, modification and item replacement. Cronbach's alpha is also computed to know the reliability of the scale. The development and standardisation procedure of readiness scale is described in the present paper in detail.

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Introduction

With the advent of rapidly changing internet technology, higher education institutions are currently embracing transformation in student-teacher interaction, planning and designing course content, and assessment for learners' progress (Ying and Yang, 2017). In fact, incorporating technology into education is important to address student diversity in terms of their educational background, abilities, culture and learning priorities. There has been a consistent demand for quality teachers in schools as well as in universities.

Higher education institutions must make every attempt to a teacher-centred approach with a more student-centred approach to facilitate quality learning (Livingstone, et al., 2011; Birbal, et al., 2018).

According to Graham (2006), there is no single definition of 'Blended Learning', as a blended course could fall anywhere in a spectrum of technology enhancement with onsite and online sessions. It depends on one's perspective that an online learning becomes blended as soon as it offers onsite, face-to-face learning. Mostly, online learning becomes blended when online teaching-learning activities are devised to replace face-to-face settings. Some institutions plan a certain portion of traditional onsite learning be replaced with online sessions, though these planned activities are generally arbitrary. Porter, et al. (2014) defined that blended learning is a combination of onsite with online experiences to provide effective, efficient and flexible learning. This pedagogical approach blends online (asynchronous or synchronous) and face-to-face engagement between teachers and students and/or between students (Graham, et al., 2013). It is an approach that effectively combines the right mix of online and onsite environments to strengthen the learning experiences. It facilitates learning to take place independent of time and place, and offers a learning situation that is student-centred, flexible, self-paced, and multidimensional (Garrison and Vaughan, 2013).

Furthermore, it can help students to develop a set of important skills of the 21st century, such as communication, creativity, information literacy, and collaboration. Students can learn to use digital technologies for a range of purposes (Zurita, et al., 2015). Blended learning is an integrated mode of learning where in online learning is integrated with the traditional classroom learning, in which computer based or internet based online learning competencies are employed, and where in students and teachers meet online meet virtually. On the other hand, Aldalalah and Gasaymeh (2014) argued that blended learning is an innovative methodology that is based on the

employment of learning-oriented technology requiring accuracy and mastery, and the selection of most relevant instructional means by which the problems that are related to classroom management are solved. Blended learning is a brilliant solution to cope with the contemporary educational challenges. It is a method of teaching, learning, and training that combines online learning with traditional classroom teaching-learning within a single framework (Aldalalah and Gasaymeh, 2014).

Blended Learning: Need of the Hour

On the basis of the above discussion based on blended learning, it can be reviewed that blended learning is a blend of both traditional learning where the student and teacher interact and communicates in classroom with the main elements of online learning as characterised by the use of advance technology to improve teaching, learning and training. It is important to make sure that students and teachers possess the skills to use online learning technology. In a blended learning pedagogy, the objectives, plans, implementation, and instructional strategies should be clearly defined; and the learning resources should be diversified to meet the educational needs of diverse learners. Teachers should be responsible for their availability at the right time to answer the students' doubts, whether online or face-to-face interaction in the classroom.

The interactive capabilities of information and communication technology (ICTs) help teachers to create an attractive environment for learners, and the student satisfaction also tends to be higher as compared to traditional lecture method (Badawi, 2009). The study showed that blended learning approach is greatly beneficial in terms of flexible time schedule, improving learning outcomes, creating open and flexible environment for development and continuous improvement. It also creates better opportunities for teacher-student interaction, permits learners to use modern technology, and increases students' involvement. It is necessary to develop a significant future perspective on how can we introduce blended learning approach efficiently to make teaching-learning an advanced and creative activity.

Rational of Readiness Scale

The reviews of the related research revealed that several studies were conducted to analyse the attitude and perceptions of teachers and learners towards blended and online learning. It was found that there is a positive attitude and perception towards blended learning (Chew, Jones and Turner, 2008; Gyamfi and Gyaase, 2015; Nordin and Alias, 2013; Qiang, 2016). Some of the studies revealed that learners enjoyed online learning, and additionally, some researchers

found that the learners believed they were more challenged through online learning, though they liked the flexibility provided (Sari, 2019). Some of the researches were conducted on the designs of online learning but no research was found study on blended approach for teacher education and specifically for internship programme (Milheim, 2006). In the present research, the investigators intended to explore the readiness of various stakeholders of teacher education towards using blended learning approach in teacher preparation (pre-internship activities), which is pre-requisite for creating a blended learning environment in internship. Hence, before creating a blended learning environment, it is required to assess the readiness of stakeholders towards implementing blended learning. For assessing readiness, a scale is required to know the actual level of acceptance towards blended learning.

Scope of the Readiness Scale

The present scale is developed to explore the readiness of various stakeholders of teacher education (teacher educators, pupil teachers and research scholars) towards using blended learning approach in teacher preparation (pre-internship activities), since teacher educators and pupil teachers are directly involved in pre-internship activities and research scholars are indirectly associated with the same for earning their credits of teaching associateship.

Preparation of Initial Draft

To assess the readiness of teacher educators, research scholars of education discipline and trainees towards blended learning approach, a readiness scale was developed and standardised. Firstly, the investigators explored the research area and related reviews. It is found that there are eight dimensions of blended learning generally stated in the available literature. The primary draft of readiness scale comprised 45 items developed on Likert's 3-point scale. The initial draft of 'Readiness Scale towards Blended Learning Approach' was developed and applied on 383 respondents (details are given in Table 1) for standardisation, and establishing reliability and validity of the scale. The procedure of establishing reliability and validity has been presented under the following captions.

Table 1
Sample for Tryout

S.No.	Category	Number of Subjects
1.	Teacher Educators	86
2.	Research Scholars	76
3.	Pupil Teachers	221
Total		383

Table 2 presents the dimension-wise distribution of primary draft of readiness scale towards blended

learning approach. The dimensions were selected after rigorous review of literature and available scales. Initially, after observing Scree Plot (Figure 1), a total of 10 dimensions were selected, based on those having eigenvalue more than one but finally two overlapping dimensions were merged together.

Table 2
Initial Draft of Readiness towards Blended Learning Approach

S.No.	Dimension	Position of Items in Scale
1.	Flexibility in Learning	1–5
2.	Online Learning	6–10
3.	Learning Management and Classroom Learning	11–20
4.	Learning Resources	21–25
5.	Online Interaction	26–30
6.	Teaching-learning Environment	31–35
7.	Co-curricular Activities	36–40
8.	Evaluation	41–45

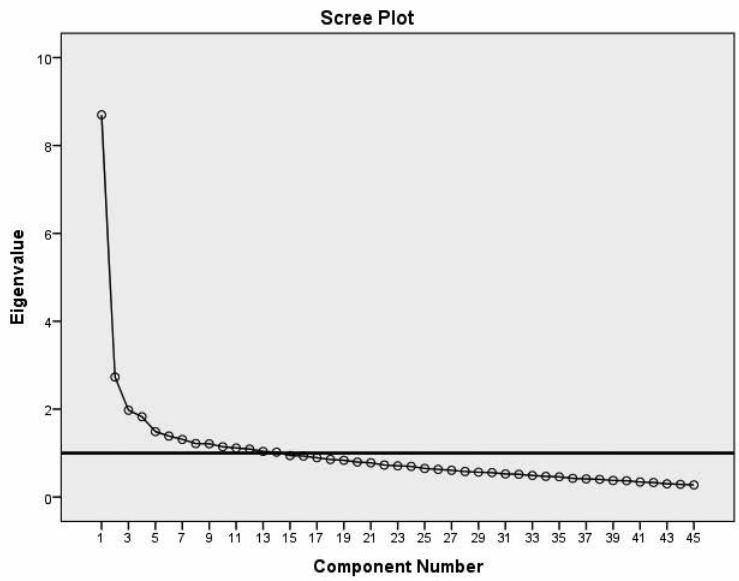

Figure 1: Scree Plot Showing Components of Readiness Scale

Examine the Adequacy of the Sample and the Suitability of Data: Kaiser-Meyer-Olkin (KMO) and Bartlett's Test

Prior to the extraction of the constructs, there are various tests which are required to be conducted to examine the adequacy of the sample size and the suitability of data for Factor Analysis (Burton and Mazerolle, 2011). Sampling adequacy provides the investigator with information regarding the grouping of survey items. Grouping items into a set of interpretable factors can better explain the constructs under investigation. The measures of sampling adequacy evaluate how strongly an item is correlated with other items in the factor analysis correlation matrix (Burton and Mazerolle, 2011). The sampling adequacy can be assessed by examining the Kaiser-Meyer-Olkin (KMO) (Kaiser, 1970). KMO is suggested when the cases to variable ratio are less than 1:5. It ranges from 0 to 1, while according to Anderson, et al. (1995) and Tabachnick and Fidell (2001), 0.50 is considered suitable. On the other hand, Netemeyer, et al. (2003) stated that a KMO correlation above 0.60–0.70 is considered adequate for analysing the factor analysis output. Bartlett's test of sphericity (Bartlett, 1950) explained chi-square output that must be significant. It indicates that the matrix is not an identity matrix and, accordingly, it should be significant ($p<0.05$) for factor analysis to be suitable (Anderson, et al., 1995; Tabachnick and Fidell, 2001). Bartlett's test of sphericity indicates the item correlation matrix is not an identity matrix, then researchers can move forward (Netemeyer, et al., 2003).

Table 3
KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.859
Bartlett's Test of Sphericity	Approx. Chi-Square	4773.902
	Df	990
	Sig.	0.000

From Table 3, it is evident that the statistic value of Kaiser-Meyer-Olkin test is 0.859. This value is greater than 0.60, so the sample is considered adequate for analysing the factor analysis output. The statistic value of Bartlett's Test is 4773.902, its probability of significance with df (990) is 0.000, which is lesser than 0.05, i.e., it is significant at 0.05 level of significance. The statistic value is significant ($p<0.05$), so the sample is considered adequate for analysing the factor analysis output.

Item Analysis

For assessing the item analysis, bi-serial correlation was used to sharpen the scale. The responses were collected and scored. Individual item score was correlated with the total score of the tool. Item analysis was done for the 383 response sheets by using item vs component correlation

method. The sum of the scores on each dimension of the value was calculated. Then 'r' was calculated by correlating the individual item and the corresponding component score. The correlation coefficient at the 5% level of significance is 0.196, when the degree of freedom is 100 (Wani and Masih, 2016). So, the items having 'r' values 0.196 and above were selected. It was found that out of the total 45 items, there are 35 items which have had significant correlations with the total score of the scale, except 10 items which had no significant correlation with the total score of the tool. The correlation table with the decision about item selection is given in Table 4.

Table 4
R-Values of Each Item with the Total Score of the Scale and Decision about Selection of the Item

Item No.	Corrected Item-Total Correlation	Item Decision	Item No.	Corrected Item-Total Correlation	Item Decision
1.	0.308*	Selected	24.	*0.033*	*Deleted*
2.	0.371*	Selected	25.	0.209*	Selected (Improved)
3.	0.323*	Selected	26.	0.389*	Selected
4.	*-0.116*	*Deleted*	27.	0.345*	Selected
5.	0.311*	Selected	28.	*0.096*	*Deleted*
6.	0.392*	Selected	29.	0.469*	Selected
7.	0.256*	Selected (Improved)	30.	0.427*	Selected
8.	0.405*	Selected	31.	0.483*	Selected
9.	0.360*	Selected	32.	0.470*	Selected
10.	0.429*	Selected	33.	0.496*	Selected
11.	*-0.018*	*Deleted*	34.	*-0.006*	*Deleted*
12.	0.475*	Selected	35.	0.461*	Selected
13.	*-0.011*	*Deleted*	36.	0.482*	Selected
14.	*0.029*	*Deleted*	37.	0.426*	Selected
15.	*0.049*	*Deleted*	38.	0.504*	Selected
16.	0.226*	Selected (Improved)	39.	0.579*	Selected
17.	0.238*	Selected (Improved)	40.	0.465*	Selected
18.	0.414*	Selected	41.	0.456*	Selected
19.	0.344*	Selected	42.	0.393*	Selected
20.	*0.080*	*Deleted*	43.	0.517*	Selected
21.	0.329*	Selected	44.	0.410*	Selected
22.	0.282*	Selected (Improved)	45.	0.402*	Selected
23.	*0.071*	*Deleted*			

* Correlation is significant at 0.01

After item analysis, 35 items were remaining. For assessing the correlation of each item with their dimension, bi-serial correlation was used. Individual item score was correlated with the total score of each dimension. A rule-of-thumb is that these values should be at least 0.40 (Gliem and Gliem, 2003). If the correlation between item and the summated score is 0.40 or greater than 0.40, the item was selected for scale and if the correlation between item and the summated score is lesser than 0.40, the item was deleted from the scale. Then 'r' was calculated by correlating the individual item and the corresponding dimension score. It was found that all the 35 items were having significant correlations with the total score of the scale. The correlation table is given below.

Table 5
R-Value of Each Item with their Dimension and Decision about Selection of the Item

Dimension	Item Number	Correlation	Decision
Flexibility in Learning	1	0.532	Selected
	2	0.627	Selected
	3	0.671	Selected
	4	0.639	Selected
Online Learning	5	0.674	Selected
	6	0.480	Selected
	7	0.658	Selected
	8	0.708	Selected
	9	0.636	Selected
Learning Management and Classroom Learning	10	0.643	Selected
	11	0.613	Selected
	12	0.479	Selected
	13	0.608	Selected
	14	0.597	Selected
Learning Resources	15	0.790	Selected
	16	0.665	Selected
	17	0.470	Selected
Online Interaction	18	0.715	Selected
	19	0.519	Selected
	20	0.710	Selected
	21	0.666	Selected

Teaching-learning Environment	22	0.763	Selected
	23	0.763	Selected
	24	0.755	Selected
	25	0.721	Selected
Co-curricular Activities	26	0.726	Selected
	27	0.682	Selected
	28	0.750	Selected
	29	0.739	Selected
	30	0.737	Selected
Evaluation	31	0.742	Selected
	32	0.684	Selected
	33	0.695	Selected
	34	0.667	Selected
	35	0.602	Selected

Final Draft of Readiness Scale

After assessing the items, correction with the scale and dimensions, it is found that all the 35 items are having correlation value similar or greater than 0.40. Table 6 shows dimension-wise distribution of the final draft of readiness scale towards blended learning approach.

Face Validity and Content Validity

The content validity of the readiness scale towards blended learning approach was tested by eight experts of the field. They suggested that items of the test are directly related to the different dimensions of blended learning. They also suggested modification in the language, grammar and spellings.

Table 6
Final Draft of Readiness Scale

S.No.	Dimension	Position of Items on Scale
1.	Flexibility in Learning	1–4
2.	Online Learning	5–9
3.	Learning Management and Classroom Learning	10–14
4.	Learning Resources	15–17
5.	Online Interaction	18–21
6.	Teaching-learning Environment	22–25
7.	Co-curricular Activities	26–30
8.	Evaluation	31–35

Construct Validity

In order to find out the construct validity, the researchers calculated correlation between the score each sub-scale and total score of the scale.

Table 7
Correlation between Each Dimension and Total Score

S. No.	Dimension	Cronbach's Alpha
1.	Flexibility in Learning	0.593*
2.	Online Learning	0.663*
3.	Learning Management and Classroom Learning	0.665*
4.	Learning Resources	0.485*
5.	Online Interaction	0.698*
6.	Teaching-learning Environment	0.700*
7.	Co-curricular Activities	0.740*
8.	Evaluation	0.715*

* Significance at 0.01 level

From the perusal of Table 7 above, it can be concluded that the correlation coefficient of all dimensions (0.593, 0.663, 0.665, 0.485, 0.698, 0.700, 0.740, and 0.715, respectively) are significant at 0.01 level of significance. This indicates that all dimensions of the scale have good construct validity.

Reliability of the Readiness Scale

The degree of consistency among test scores is called reliability. The scores of subjects on test were subjected to internal consistency (Cronbach alpha) reliability analysis. The values of reliability coefficients for each sub-scale and for the whole scale are shown in Table 8.

Table 8
Reliability Coefficient of Readiness Scale

S. No.	Description	Cronbach's Alpha
1.	Flexibility in Learning	0.457
2.	Online Learning	0.624
3.	Learning Management and Classroom Learning	0.516
4.	Learning Resources	0.319
5.	Online Interaction	0.557
6.	Teaching-learning Environment	0.740
7.	Co-curricular Activities	0.770
9.	Evaluation	0.707
	Full Scale	0.888

From the above table, it is evident that all the sub-scales and full scale have a good reliability index. All the sub-scales, except flexibility in learning and learning resources, show reliability coefficient as more than 0.50, which is close to the acceptable value.

Items in the Final Draft

The items in the final draft are presented in Table 9.

Table 9
Items in Scale

S.No.	Proposition
1.	With the help of blended learning approach, the learners can efficiently learn the pedagogical disciplines even from their homes, in addition to the classrooms.
2.	With the help of blended learning approach, the learners will make use of their different senses, which will influence the learning of new concepts.
3.	By means of blended learning approach, the learners will be able to make the choice of subject-matter independently.
4.	Through the blended learning approach, the learners shall have the freedom to learn according to my own pace and ability.
5.	I feel that the different platforms for online learning can make the teaching-learning process more effective.
6.	In online learning, the various study materials can be made available different learners in an easier and faster way.
7.	During online learning, I shall be able to accommodate my time schedules easily which will be helpful in my learning progress.
8.	In this era of technology, I would prefer to conduct my classes online rather than by traditional methods.
9.	Blended learning approach will provide easy access to the students for various activities including data collection.
10.	Learners can be made more aware of their study by means of online learning.
11.	By means of blended learning approach, learners will learn more than the learning done through face-to-face teaching-learning process in the classroom.
12.	With the help of blended learning approach, if the learners are provided an instant feedback in the classroom, there would be a positive growth in their learning.
13.	Implementing the blended learning approach in a traditional classroom would give the learners more opportunities to learn by collaborating with other learners.
14.	Implementing the blended learning approach in regular classes shall enable the learners to meet other learners and teachers directly and indirectly which, in turn, will prove helpful in the social development of learners.
15.	In blended learning approach, learners will get the freedom to choose the learning resources according to their own interests.
16.	In the process of blended learning approach, learners will be given the freedom to procure their learning equipment.
17.	My personal equipment like — mobile phone, computer, laptop, etc. Learners will be helpful for learning in the blended learning approach.
18.	I would prefer an online interaction during the teaching-learning process.

19.	I shall take the help of web-based technology to exchange information and for learning-related interaction by implementing the blended learning approach.
20.	While learning by means of the blended learning approach, it will be possible for the teacher to always remain available for interaction, which will prove helpful in learning.
21.	While learning with the help of blended learning approach, there will be ample opportunities for interaction amongst the learners.
22.	It will be possible to create an effective learning environment through the blended learning approach.
23.	In the environment of blended teaching-learning, it will be possible for learners to get ample opportunities to ask questions, to reason, to make their point, to resolve doubts.
24.	In the environment of blended learning, the learners will get ample opportunities to learn by making maximum use of their senses.
25.	In the environment of blended learning, the learners will get the freedom to take initiatives.
26.	By means of blended learning approach, it is possible to enable growth in the creativity of learners by increasing their divergent thinking by making them perform text-congruent activities.
27.	The blended learning approach will prove to be helpful in the progress of EPC (Enhancing Professional Capacities) in the learners.
28.	The text-congruent activities planned with the help of blended learning approach will be help find in developing the positive attitude and self-confidence among the learners.
29.	The text-congruent activities planned with the help of blended learning approach may prove to be a powerful medium to develop teaching values among the prospective teachers.
30.	The text-congruent activities planned with the help of blended learning approach will prove to be helpful in growing team spirit among the learners.
31.	By means of blended learning approach, the overall assessment of the learning skills of the learners will be possible.
32.	The blended learning approach will play an important role in the continuous and overall assessment of the learners.
33.	By means of blended learning approach, it will be possible to pursue remedial teaching by diagnosing the learning difficulties of the learners.
34.	An accurate evaluation of the learning skills of learners will be possible by means of innovative evaluation methods like e-portfolio, e-rubric, e-presentation etc.
35.	From the economic perspective of time, human labour and money, innovative electronic methods can prove to be more suitable for the assessment of the learning skills of learners in the blended learning approach.

Conclusion

Thus, the development and standardisation of scale for assessing the readiness towards using blended learning approach in pre-service internship activities is discussed and presented in this research article. Although, there are two different processes for scale development generally discussed in the available literature as exploratory and confirmatory, the investigators were not able to find out which one is a better option for such kind of scale, therefore, it was decided to use the best available process mentioned in the published literature. Finally, the developed scale is found reliable as all the sub-scales except flexibility in learning and learning resources show reliability coefficient more than 0.50, which is an acceptable value. Similarly, the correlation coefficient of all dimensions were found significant at 0.01 level of significance. This indicates that all the dimensions of the scale have good construct validity. This scale can be used to assess the readiness of different stakeholders including pupil teachers, research scholars and teacher educators towards blended learning.

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