

Construction and Validation of Scale to measure Perceptions of Students towards Blended Learning in Higher Education

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ABSTRACT

Purpose: The use of blended learning is gaining acceptance in the educational system. It is observed that the educational stakeholders hold different opinions regarding blended learning. The change in the perceptions towards blended learning can impact on the implementation of blended learning. It is imperative to understand the students' perspectives of the blended learning instruction; which would be significant to manage and enhance the blended learning process in Indian context. Therefore, in this background, the present paper aims on the development of a scale to study the perceptions of students of higher education towards the blended learning

Design/Methodology/Approach: In order to validate the scale to know the perceptions of students of higher education towards blended learning, a five-point Likert Scale was developed, after a comprehensive review and analysis of the available literature. To validate the present scale an exploratory factor analysis and Monte Carlo PCA were conducted. The scale was administered on a representative sample of 211 students from higher education.

Findings: The final scale to measure the perceptions of students of higher education consisted of 35 items. The final scale with five dimensions (dimension 1=15 items, dimension 2= 5 items, dimension 3= 6 items, dimension 4= 4 items, and dimension 5= 5 items) found valid and reliable to study the perceptions of students towards blended learning instruction.

Research Limitations/Implications: The increasing number of research studies on blended learning leads to the need for the development of valid and reliable psychometric scale for the assessment of perception towards it. Thus, the present scale would be helpful in assessing perceptions of students of higher education towards blended learning. Since, the scale has been designed, developed and validated in the contexts and Indian higher education institutional settings, the scale would be useful for comparative purposes also.

Originality/Value: The present paper presents the process of the construction, validation and factor analysis of an-empirically-based psychometric scale to study the perceptions of students.

Paper Type: Empirical Research Paper

KEYWORDS: Blended learning | Students | Higher Education | Perception

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Introduction

Blended learning offers a diverse range of models and approaches that prioritize student-centered instruction (Khan, 2004a; Khan, 2004b; Khan, 2005a; Khan, 2005b; Khan, 2007, Khan, 2001; Cleveland-Innes & Wilton, 2018; Aisha & Ratra, 2020a; Aisha & Ratra, 2020b). The various strategies adopted in the implementation of blended learning offers a huge practicability, flexibility to the students while keeping in view the learning context as well as the learning needs of the students, thereby enhancing the learning experiences (Singh, 2021; Aisha & Ratra, 2021; Singh & Reed, 2001). The various available technological options foster the learning content, communication and interaction among teachers and students (Khan & Joshi, 2006; Khan, 1997), as well as among students themselves (Khan, 2004; Khan, 2005a; Khan, 2007, Khan, 2010; Cleveland-Innes & Wilton, 2018; Garg, et al., 2006; Mishra, 2009; Panda & Garg, 2019; Dikshit, et. al., 2013). Blended learning also provides wide range of student-support. Due to this involvement of huge diverse contexts, contents, media and methods in blended learning (Driscoll, 2002; Panda, 2005; Aisha & Ratra, 2020b; Mohanasundaram & Sivasankar, 2010), it is perceived differently by different stakeholders (Aisha & Panda, 2020; Hinrichsen & Coombs, 2013; Oliver & Trigwell, 2005; Garrison & Kanuka, 2004). In the present study, the students from higher educational institutions are being focussed. Blended learning is increasingly researched by the educationist and researchers these days (Garg, et al., 2006; Mishra, 2009), as blended learning finds its roots in distance education and educational technology (Graham, et al., 2014); also, it has been claimed to have relationship with online and face-to-face teaching and learning to bring about quality in blended learning (Ginns & Ellis, 2007). The increasing number of research studies on blended learning leads to the need for the development of valid and reliable psychometric scale for the assessment of perception towards it. Thus, the scale would be useful for comparative purposes also. Blended learning has a broad meaning and is differently taken by different stakeholders as per their own contexts of learning (Moore, 2013; Gagnon et al., 2013; Mishra & Koehler, 2006; Graham, et al., 2014; McDougall & Jones, 2006; McShane, 2010; Roblyer, 2005; Roblyer & Knezek, 2003). But, keeping the core meaning of blended learning (Khan, 2004; Khan, 2005a; Khan, 2007, Khan, 2010; Cleveland-Innes & Wilton, 2018); the present scale has been constructed which can be applicable for the students undertaking blended learning worldwide. However, this is to be mentioned that the sample considered in the present study and the institutions were from Indian settings.

Objective

The objective of the present study is to describe the steps undertaken in the construction & validation of a scale to measure perceptions of students towards blended learning in higher education in Indian context.

Method

Participants and Procedure: The process of the development of a psychometrically sound scale that can study students' perceptions towards blended learning, an extensive review of literature was carried out. A five-point Likert Scale (Likert, 1932) was decided, where each statement has five-points from Strongly Disagree (SD)=1, Disagree (D)=2, Neutral (N)=3, Agree (A)=4 and Strongly Agree (SA)=5. An item pool was prepared from the help of the review of literature, which were shown to 12 experts and on getting their expert opinion and suggestions some of the items were deleted, modified and reframed to bring clarity in the statements in terms of language as well as relevance to the related field and increase the validity. Thus, in this way the draft contained 48 item statements on including the expert advices.

Further, the standardization process began on the 48-item scale, which was administered, on representative sample of 211 students from various higher education institutions randomly from the Delhi-NCR, India.

Description of Scale

Demographics: Some of the items to collect the information the socio-demographic details of the sample were appended to the questionnaire in three categories viz, demographics socio-demographics and ICT related information; also, students' institution, name and level of the programme they were pursuing, year of their enrolment, medium of instruction and educational background in demographic details. In socio-demographic details information like gender, age group, social background, employment status, monthly family income and disability of the students and their usage of any assistive device was appended. And, in third category ICT related items appended like level of ICT skills, preference of digital device, usage of digital device for studies and status of their possession of digital device.

Also, two more questions were appended to collect the information regarding the students' own understanding about blended learning and what motivates for their learning; which would be helpful to analyse their perceptions in particular with these aspects.



Statistical Analyses

The need to construct and validate a scale to find the perceptions of students towards blended learning stems from the unavailability of such a scale with established psychometric properties. However, some of the studies were found that considers the perceptions of students about blended learning but they lack the standardization of a scale to be considered. Thus, the present study addressed the gap by constructing and validating the blended learning perception scale for students in India. Exploratory factor analysis and Monte Carlo PCA were performed. The analysis (Field, 2005) was done using SPSS version 22. Further, the criteria for composite reliability, convergent validity and discriminant validity were also checked.

Results

Reliability and Content Validity

Before running any other statistics, the researcher conducted the Cronbach coefficient alpha test for checking the reliability of the research scale, which comes out as .807. But Cronbach coefficient alone is not able to determine the correlations among the various items of the scale. Therefore, a bivariate inter-item correlation analysis was conducted to check the inter-item correlation coefficient. The correlational analysis was conducted to check the inter-item correlation coefficient. The critical value for the same has been checked, the correlational analysis showed that there were some items that the values were lower than the critical value (<.1946). Therefore, 10 items were found to have lower values than the critical value, thus they were removed from the analysis process. After removing the items, the reliability was checked again. The new outcomes showed high reliability Cronbach alpha value as =.876.

Then, the inter-item correlation outputs were observed, and the items with a correlation between .20 to 0.80 were determined. Since, the inter-item correlation has already been checked out by calculating the overall values by running correlational analysis, it has been discussed that the items are valid to be used further.

The below table indicates the item-total statistics. In the last column (Cronbach's Alpha if the Item is deleted) if the value would get increased after deleting the item, the researcher should delete it. However, at this stage, it seems there are no inappropriate items to be deleted since this process already has been done by running a correlational analysis to clean invalid items.

Also, as explained above there were no items to be deleted for increasing the total reliability. Only items 5, 34, and 44 show a slight increase if these items would be deleted. But

since the current reliability is enough strong and these items' values do not have differences after removal and already these items have been checked by correlational analysis, the researcher would keep these items to not be deleted. Finally, after running the analysis, it would be concluded that the current scale has strong validity and reliability to be used further.

Exploratory Factor Analysis

The next step was to check whether there were any underlying variables or not. Exploratory factor analysis has been run to conduct factor analysis. Before conducting factor analysis, it was needed to check all the required assumptions. The required assumptions for the factor analysis include adequate sample size and factorability of data. One of the most important assumptions of the EFA is an adequate sample size. There are various thresholds for sample size. Tabachnick and Fidell (2007) suggest at least 300 sample size for EFA. However, they agreed that a small sample size like 150 would be sufficient. Other researchers suggested a formula like the number of items based on the cases. Nunnally (1978), recommends a 10 to 1 ratio; that is, ten cases for each item to be factor analyzed. Others suggested five cases for each item (Tabachnick & Fidell, 2007). In the present study, there were 38 items and 211 samples for students' group. Therefore, the first assumption is followed perfectly. The other assumption of Factorability of Data suggested to check whether the data are suitable for EFA, there are some statistical tests that should be considered.

Correlation matrix table

In this table, a relationship between items with a medium correlation and not too high and not too low was desired. If all items are positive (in the questionnaire) then the correlation of all items is positive. The value of the determinant should be greater than 0.00001. That indicates there is no multicollinearity problem between the items. (And the data is suitable for factor analysis). If the items have a relationship (>0.30) and are significant ($p < 0.05$) (in the bottom section of the correlation matrix table) it shows that the items have self-consistence and there is harmony between the materials. And it provides good results regarding construct validity.

Determinant Value (from the correlation matrix table)

When the multicollinearity arises, the correlation between the items will be very strong and the strengths between the items cannot be clearly understood. Items were able to show themselves sufficiently in factor analysis. To be considered suitable for factor analysis, the correlation matrix should show at least some correlations of $r = .3$ or greater.

Two statistical measures are also generated by SPSS viz., Bartlett’s test of sphericity, and Kaiser Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser 1970, 1974) were checked to assess the factorability of the data. Bartlett’s Test analysis the correlation index between data (sig<0.05) and the KMO test analysis the size of the sample for factor analysis (KMO>0.50, the sample size is adequate). From the KMO table Bartlett’s test of Sphericity should be statistically significant at $p < .05$ and the Kaiser-Meyer-Olkin value should be .50. The KMO varies between 0 and 1, and values closer to 1 are better. A value of .6 is sufficient. (Tabachnick & Fidell 2007).

Selecting the number of factors

For selecting the number of factors, usually, the Eigenvalues is considered. However, a parallel analysis has been conducted to ensure the determination process is valid. The initial Eigen value which has been generated by the SPSS were observed. Then, KMO and Bartlett’s Test was checked. To find out the factorability of data the value of KMO was examined. The minimum value should be >.50. Furthermore, some researchers suggest the value should be higher than .60. However, in the current test, the KMO value is .819 which is higher than the threshold (>.50). Therefore, it would be pointed out that the data are suitable for running factor analysis test.

Besides, to check out the adequacy of the sample size for EFA, the value of Bartlett’s Test of Sphericity should be checked out. Bartlett’s Test of Sphericity should be significant. In other words, Bartlett’s Test of Sphericity should be less than .05. As the value of Bartlett’s Test of Sphericity was found significant which was less than .05 (<.05), therefore, it would be concluded that the data and sample size both are valid and adequate for EFA.

In the next step, the initial EFA has been conducted to examine the number of initially generated factors. In this step, the Eigenvalue was considered as per the criteria for selecting the factors, which is Eigenvalue>1. The initial factors were determined as 10 factors as their Eigen values were greater than 1. But the process would not get stopped at this stage. For the determination of the exact number of factors, an additional analysis was conducted. The Monte Carlo PCA for Parallel Analysis has been run to check whether the number of factors that have been generated by SPSS is valid or if any further investigation should be done. After running Parallel Analysis, the below results have been given.

Interpretation of the MCPCA

In the MCPCA Table 1, the random Eigenvalue should be compared with the generated Eigenvalue from FA. If the MCPCA Eigen value is higher than FA-generated values, then the factor would not be considered as a part of the factors.

Table 1: Monte Carlo PCA for Parallel Analysis

Version 2.5

Number of variables: 38

Number of subjects: 211

Number of replications: 100

Eigenvalue #	Random Eigenvalue	Standard Dev
1	1.9207	.0622
2	1.8016	.0471
3	1.7148	.0462
4	1.6386	.0372
5	1.5797	.0317
6	1.5148	.0305
7	1.4574	.0275
8	1.4102	.0294
9	1.3609	.0289
10	1.3156	.0269
11	1.2676	.0228
12	1.2251	.0221
13	1.1815	.0203
14	1.1447	.0223
15	1.1058	.0206
16	1.0695	.0204
17	1.0317	.0211
18	0.9980	.0237
19	0.9631	.0222
20	0.9282	.0226
21	0.8949	.0220
22	0.8620	.0183
23	0.8269	.0162
24	0.7979	.0168
25	0.7634	.0198
26	0.7353	.0188
27	0.7038	.0163
28	0.6751	.0177
29	0.6468	.0192
30	0.6159	.0179
31	0.5882	.0182
32	0.5580	.0186
33	0.5282	.0176
34	0.5010	.0179
35	0.4701	.0184
36	0.4381	.0201
37	0.4032	.0215
38	0.3615	.0236



As indicated in the above table, factor number 6, shows a higher Eigenvalue than the EFA-generated Eigenvalue (1.260). Therefore, the number of fixed factors is 5. It is in contrast with the number of factors that were generated by EFA. The communalities were observed, it indicated the proportion of each variable's variance that can be explained by factors. The Cumulative variance should not be less than .50. In the present data, it is greater than .50. Also, the number of fixed factors is 5 with an Eigen value higher than 1. If the cumulative variance (extraction section) is greater than 0.50, it means that the measurement scale can achieve the purposed goal. Finally, another EFA has been conducted with 5 factors to check the number of factors and determine the details of factors. The below table shows the new results after determination the number of extracted factors.

The initial Eigenvalues and Extraction Sum of Squared Loadings were checked, and observed the five factors. The number of selected factors were determined in the scree plot. At this point that the shape of the curve gets changed like elbow shape sand the factors were observed.

Then the number of variables for each factor were observed in factor loading. It is suggested that there should not be less than three items under each factor in factor analysis. As observed, there were more than 3 variables under all 5 factors. The criteria for selecting an item to be included under a factor are that the value should not be less than .40. Therefore, at the time of rotation, the minimum threshold (.40) was determined to not load any items as a factor less than .40 values. It was observed that two items 21 and 39 were unloaded due to their low threshold values. Also, item No. 4 is loaded under two factors: factor 2 (.435) and 5 (.445). If one item comes under two factors (component) commonly (which means it is loaded in two columns at the same time) then the difference between the two columns should be calculated. If the difference is greater than 0.10, then we add this one as a factor. If it was found less than 0.10, then we remove the item as it indicates an overlap between the factors. In this case, item 4 was loaded under factors 2 (.435) and 5 (.445). The difference was found less than .10 (.435-.445=.01). Therefore, this item was deleted. For finding the number of factors and the variables under each factor, PCA was used; with the orthogonal rotation method.

Construct Validity

Composite Reliability: Through this a researcher may assess the items' internal consistency. It is advised that a construct's reliability be at least 0.70 (Hair et al, 2009). It's quite likely that all of the items consistently measure the same construct if the composite reliability is high. The computations of composite reliability showed that all factors established

composite reliability. Further, convergent validity and discriminant validity were also assessed. The degree to which an action is comparable to other operations that it should, in theory, be similar to is known as convergent validity. The components should be related to each other; and the degree to which a scale effectively distinguishes between groups that ought to vary or not, as determined by theory or prior study.

Convergent Validity: To find out the convergence validity the average variance extracted (AVE) was calculated. If the AVE was greater than .50, it would be stated that the component establishes the convergence validity (Fornell & Larcker, 1981). If the obtained values for each factor each higher than .50, therefore that factor establishes convergence validity. In the above table, factor 2 and 4 values are higher than 0.50. However, factor 1 is very close to .50 which would point out that this factor establishes convergence validity. But, factors 3 and 5 AVEs are lower than .50. But since the CRs for all factors were above .70, it would be pointed out that the convergent validity is acceptable for these factors (Hair et al, 2014). If the items explain more errors than the variance in the constructs, the AVE is less than 0.50.

Discriminant validity: One of the most widely used methods for evaluating the discriminant validity of measurement models is the Fronell-Larcker criterion. This criterion states that the correlation between a construct and any other construct must be greater than the square root of the average variance retrieved by the construct. Discriminant validity is proven when this prerequisite is met. The steps required to establish the Fronell-Larcker criterion considers to calculate the average for each of the constructs; the average computed for each construct must be used to determine the correlation between the constructs. The next step was to calculate the square root of the AVE, then the obtained value should be compared with the component correlation. If the square roots of the AVE, was greater than the correlation coefficient of the factors, therefore discriminant validity is established. The correlation matrix of the factors was checked. If the square root of AVE is greater than the factors, therefore it would be pointed out that discriminant validity is established. The data revealed that the square root of AVEs was greater than the correlations of each component. Therefore, the discriminant validity was established and the scale was thus completely valid and reliable.

After conducting the exploratory factor analysis, 35 items were finalized for the present scale to study the perceptions of the students towards blended learning. Moreover, the overall reliability of the 35 items has been checked and the results of the final reliability coefficient Cronbach's alpha value was determined = .864.

Discussion and Conclusion

The purpose of this study was to construct and validate a scale to find the perceptions of the students towards blended learning in Indian settings. The present questionnaire is based on 5-point Likert-Scale from strongly disagree, disagree, neutral, agree and strongly agree. The scale was administered on a representative sample of 211 students from higher education. The data analysis and, exploratory factor analysis (EFA) was done using SPSS version 26. Monte Carlo PCA was done to examine the factor structure. By performing an exploratory factor analysis, it is concluded that the five-factor structure of the present scale is applicable in the Indian-context. Accordingly, the final scale with five dimensions consisted of 35 items; and the final reliability with Cronbach's alpha value 0.864. Then, the scoring was illustrated for measuring the perceptions of the students towards blended learning. The total highest score denotes good perceptions, an average score demonstrates moderate perceptions and low score demonstrate bad perceptions and no acceptance towards blended learning. The final scale has five dimensions (dimension 1=15 items, dimension 2= 5 items, dimension 3= 6 items, dimension 4= 4 items, and dimension 5= 5 items), dimension-wise scoring was also illustrated. Thus, it is concluded that the present the scale is completely valid and reliable to be used to assess the perceptions of students of higher education institutions towards blended learning in Indian context.

References

- Aisha, N. and Panda, S. (2020). A Review on the Potential Problems and Challenges in the Implementation of Blended Learning Programmes. In A. Husain, and R.P. Bahuguna (Eds). *Distance Education and Educational Technology*, pp. 235-245. Maktaba Jamia Ltd, New Delhi. - ISBN 788194314776.
- Aisha, N and Ratra, A. (2020a). Technology Integration as Disruptive Innovation in Education: Implications for Teaching-Learning in Post Pandemic Era. In M. Tekerek. (Eds.), *EDUCCON 2020-Empower Teaching Studies*, ISBN: 978-625-409-178-0, available at <https://books.google.com.tr/books?id=VXsREAAAQBAJ>
- Aisha, N and Ratra, A. (2020b). Changing Paradigms of Open and Distance Learning Systems with Blended Learning: Indian National Education Policy, 2020. *Learning Community*, 11(2), 91-100. Online ISSN: 2231-458X. print ISSN: 0976-3201. DOI: 10.30954/2231-458X.02.2020.4
- Aisha, N and Ratra, A. (2021). Technology Integration through National Education Policy 2020: Implementation of Blended learning for Equitable Quality Education. *Aarhat Multidisciplinary International Education Research Journal*, 10(1), 262-272. ISSN: 2278-5655
- Beavers, S. A., Lounsbury, J.W., Richards, J. k., Hucks, S.W., Skolits, G. J. and S. L. Esquivel, (2013). Practical considerations for using exploratory factor analysis in educational research, *Pract. Assess. Res. Eval.* 18, 1.
- Brown, T. A. (2015). *Confirmatory Factor Analysis for Applied Research*, 2nd ed. (Guilford Publications, New York, NY).
- Cleveland-Innes, M. & Wilton, D. (2018). *Guide to Blended Learning*. Commonwealth of Learning. Retrieved from http://oasis.col.org/bitstream/handle/11599/3095/2018_Cleveland-Innes-Wilton_Guide-to-Blended-Learning.pdf?sequence=1&isAllowed=y
- DeVellis, R. (1991). *Scale development: Theory and applications*. Newbury Park: Sage.
- Dikshit, J., Garg, S. and Panda, S. (2013). Pedagogic Effectiveness of Print, Interactive Multimedia, and Online Resources: A Case Study of IGNOU. *International Journal of Instruction*, 6(2): 193-210. 11.
- Driscoll, M. (2002). Blended learning: Let's get beyond the hype. *E-learning*. 3. Retrieved from https://www.researchgate.net/publication/286029739_Blended_learning_Let's_get_beyond_the_hype
- Field. A.P. (2005). *Discovering statistics using SPSS*. (2nd edition). London: sage.
- Fornell, C. and Larcker, D.F. (1981) Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18, 39-50. <https://doi.org/10.2307/3151312>
- Gagnon, M. P., Gagnon, J., Desmartis, M., and Njoya, M. (2013). The Impact of blended teaching on knowledge, satisfaction, and self-directed learning in nursing undergraduates: a randomized, controlled trial, *Nurs. Educ. Perspect.*, 34(6), pp.377-382.
- Garg, S., Panda, S., Murthy, C. R. K. & Mishra, Sanjaya (Eds). (2006). *Open and Distance Education in Global Environment*. New Delhi: Viva Books.
- Garrison, D.R. and Kanuka, H. (2004). Blended learning: uncovering its transformative potential in higher education. *The Internet and Higher Education*, 7(2): 95-105.
- Ginns, P. and Ellis, R. (2007). Quality in blended learning: Exploring the relationships between on-line and face-to-face teaching and learning. *Internet and Higher Education*, 10: 53-64.
- Graham, C. R., Henrie, C. R., & Gibbons, A. S. (2014). Developing models and theory for blended learning research. In A. G. Picciano, C. D. Dziuban, & C. R. Graham (Eds.), *Blended learning: Research perspectives*, volume 2 (pp. 13-33). New York, NY: Routledge.
- Griethuijzen, R.A.L.F. van, Eijck, M.W. van, Haste, H. et al. (2015). Global Patterns in Students' Views of Science and Interest in Science. *Res Sci Educ.* 45, 581–603 (2015). <https://doi.org/10.1007/s11165-014-9438-6>
- Hinrichsen, J. & Coombs, A. (2013). The five resources of critical digital literacy: a framework for curriculum integration. *Research in Learning Technology*, 21.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate data analysis* (7th ed.). Prentice-Hall.
- Hair, J., Hult GTM, Ringle C, Sarstedt, M. (2014). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. (Los Angeles: SAGE Publications, Incorporated).
- Hulin, Charles & Netemeyer, Richard & Cudeck, Robert. (2001). Can a Reliability Coefficient Be Too High?. *Journal of Consumer Psychology*. 10. 55-58. 10.2307/1480474.
- Kaiser, H. F. (1970) A second generation little jiffy. *Psychometrika*, 35(4):401–415.



- Krejcie, R.V., & Morgan, D.W., (1970). Determining Sample Size for Research Activities. Educational and Psychological Measurement.
- Khan, B. H. (Ed.). (2007). Flexible learning in an information society. Hershey, PA: Information Science Publishing.
- Khan, B. H. (2005a). Managing e-learning: Design, delivery, implementation and evaluation. Hershey, PA: Information Science Publishing.
- Khan, B. H. (2005b). E-learning QUICK Checklist. Hershey, PA: Information Science Publishing.
- Khan, B. H. (2004a): People, process and product continuum in e-learning: The e-learning P3 model. Educational Technology. Vol.44, No. 5. pp. 33- 40.
- Khan, B.H. (2004b). Comprehensive approach to program evaluation in open and distributed learning (CAPEODL) model. Introduced in the Program Evaluation course. George Washington University.
- Khan, B. H. and Joshi, V. (2006). E-Learning: Who does what and how? Journal of Creative Communication. 1(1), 61-74.
- Khan, B. H. (Ed.). (2007). Flexible learning in an information society. Hershey, PA: Information Science Publishing.
- Khan, B. H. (Ed.). (2001). Web-based training. Englewood Cliffs, NJ: Educational Technology Publications.
- Khan, B. H. (Ed.). (1997). Web-based instruction. Englewood Cliffs, NJ: Educational Technology Publications. Use YouTube <http://www.youtube.com/watch?v=ALrT5FJuKkw>
- Likert, R. (1932). A technique for measurement of attitudes. Archives of Psychology, 22 (140), 5-55.
- McDougall, A., & Jones, A. (2006). Theory and history, questions and methodology: Current and future issues in research into ICT in education. Technology, Pedagogy and Education, 15(3), 353–360. doi:10.1080/14759390600923915
- McShane, K. (2010). Blended teaching and learning: Balancing control and uncertainty in university teaching and learning. In D. Gibson & B. Dodge (Eds.), Proceedings of Society for Information Technology & Teacher Education International Conference 2010 (pp. 722-729). Chesapeake, VA: AACE.
- Mishra, S., and Panda, S. (2007). Development and Factor Analysis of an Instrument to measure Faculty Attitude towards e-Learning. *Asian Journal of Distance Education*. 5(1). 27-33.
- Mishra, P. & Koehler, M. J. (2006) Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers College Record, 108(6), 1017–1054.
- Mishra, S., Ed. (2009). E-Learning, New Delhi: IGNOU (STRIDE Handbook 8). Retrieved from <http://www.ignou.ac.in/userfiles/Handbook%208%20pdf%20compressed.pdf>
- Mohanasundaram, K., & Sivasankar, A. (2010). Blended Learning, A new horizon. University News, 48(3),1-4.
- Moore, M. G. (2013). The theory of transactional distance. In M. G. Moore (Ed.), Handbook of distance education (3rd ed., pp. 66–85). Mahwah, NJ: Lawrence Earlbaum Associates.
- Nunnally, J.O. (1978). Psychometric theory. New York: McGraw-Hill).
- Oliver, M. & Trigwell, K. (2005). Can ‘Blended Learning’ Be redeemed? *E-Learning*, 2 (1), 17-26.
- Panda, S. & Garg, S. (2019). India. In Eds. O. Zawacki-Richter and A. Qayyum (eds.), Open and Distance Education in Asia, Africa and the Middle East, Springer Briefs in Open and Distance Education. https://doi.org/10.1007/978-981-13-5787-9_4
- Roblyer, M. D. (2005). Educational technology research that makes a difference: Series introduction. Contemporary Issues in Technology and Teacher Education, 5(2), 192–201.
- Roblyer, M. D., & Knezek, G. (2003). New millennium research for educational technology: A call for a national research agenda. Journal of Research on Technology in Education, 36(1), 60–71.
- Singh, H. (2021). Building effective blended learning programs. In B. Khan, S. Affouneh, S. H. Salha, & Z. N. Khlaif (eds). Challenges and Opportunities for the Global Implementation of E-Learning Frameworks (pp. 15-23). IGI Global.
- Singh, H., & Reed, C. (2001). A white paper: Achieving success with blended learning. Centra Software. Retrieved from <http://www.centra.com/download/whitepapers/blendedlearning.pdf>
- Sherry, L. (1995). Issues in distance learning. International Journal of Educational Telecommunication, 1, 337-365.
- Tabachnick, B.G. & Fidell, L.S. (2007). Using multivariate statistics (5th ed.). Boston: Pearson Education.
- Taber, K.S. (2018). The Use of Cronbach’s Alpha When Developing and Reporting research Instruments in Science Education. Research in science Education, 48, 1273-1296. <https://doi.org/10.1007/s11165-016-9602-2>

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Annexure 17.4.5

Submission Date	Submission Id	Word Count	Character Count
23-Oct-2025	5179811 (DrillBit)	5065	35220

Analyzed Document	Submitter email	Submitted by	Similarity
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3	7	A	A-Satisfactory (0-10%) B-Upgrade (11-40%) C-Poor (41-60%) D-Unacceptable (61-100%)
SIMILARITY %	MATCHED SOURCES	GRADE	

LOCATION	MATCHED DOMAIN	%	SOURCE TYPE
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14	link.springer.com	<1	Internet Data
15	lup.lub.lu.se	<1	Publication
16	Thesis Submitted to Shodhganga Repository	<1	Publication
17	repository.up.ac.za	<1	Publication
18	An organizational perspective on brain drain What can organizations do to stop by Wanniarachchi-2020	<1	Publication
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3	Thesis Submitted to Shodhganga Repository	3	Publication
4	gjeis.com	3	Internet Data
5	clock.uclan.ac.uk	2	Publication
6	gjeis.com	1	Publication
7	Thesis Submitted to Shodhganga Repository	1	Publication
8	gjeis.com	<1	Publication
9	aits-tpt.edu.in	1	Publication
12	uir.unisa.ac.za	1	Publication

Reviewers Memorandum

Reviewer's Comment 1: The manuscript presents a well-structured and methodologically rigorous effort to develop and validate a psychometric scale for measuring students' perceptions of blended learning in higher education. The study is timely and relevant, especially in the context of increasing adoption of blended and digital learning models in India. The detailed explanation of scale construction, expert validation, and statistical testing—particularly the use of exploratory factor analysis and Monte Carlo PCA demonstrates strong methodological depth and enhances the credibility of the instrument developed. The final five-factor structure with 35 items appears robust and reliable. As a suggestion for future research, the study could be extended by applying confirmatory factor analysis (CFA) on an independent sample to further validate the scale structure and strengthen its generalizability across contexts.

Reviewer Comment 2: This paper makes a valuable contribution by addressing a clear gap in the literature regarding the lack of standardized tools for assessing student perceptions of blended learning. The comprehensive approach to reliability and validity testing, including Cronbach's alpha, inter-item correlation, and construct validity measures, is commendable. The sampling approach, involving students from diverse institutions, adds practical relevance to the findings. However, one area that could be further explored in future studies is the applicability of the scale across different educational disciplines or international contexts. Comparative validation across varied institutional settings could enhance the scale's broader usability and academic impact.

Reviewer Comment 3: The manuscript is well-written and provides a clear step-by-step account of the scale development process, which is particularly useful for researchers working in educational measurement. The discussion effectively links the findings to the broader blended learning literature and highlights the importance of understanding student perceptions in improving instructional design. A minor limitation, which also presents an opportunity for future research, is the reliance on cross-sectional data. Longitudinal studies could help capture how student perceptions of blended learning evolve over time, especially with increasing exposure to digital education technologies. Additionally, incorporating qualitative insights could complement the quantitative findings and provide richer interpretation.



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Conflict of Interest: Author of a Paper had no conflict neither financially nor academically.

**Editorial Excerpt**

The article has 3% plagiarism, which is within the accepted percentage as per the norms and standards of the journal for publication. As per the editorial board's observations and blind reviewers' remarks, the paper had some minor revisions, she was communicated promptly to the authors (Noor and Amiteshwar), and all necessary corrections were incorporated as and when directed. The comments related to this manuscript are closely aligned with the theme "Construction and Validation of Scale to measure Perceptions of Students towards Blended Learning in Higher Education" both subject-wise and research-wise. The manuscript offers a significant and well-executed contribution to educational research by developing a validated scale tailored to the Indian higher education context. The study is methodologically sound, clearly presented, and grounded in relevant literature. The detailed statistical validation enhances the reliability of the findings, making the scale a useful tool for both researchers and practitioners. While minor enhancements such as cross-validation, broader contextual application, and longitudinal testing could further strengthen the study, the current work stands as a strong academic contribution. After detailed review and editorial observations, the manuscript has been placed under the "Empirical Research Paper" category for publication..

Acknowledgement

The acknowledgement section is an essential part of all academic research papers. It provides appropriate recognition to all contributors for their hard work and effort taken while writing a paper. The data presented and analysed in this paper by the authors (Noor and Amiteshwar) were collected and wherever it has been taken the proper acknowledgment and endorsement depicts. The author is highly indebted to others who facilitated accomplishing the research. Last but not least, endorse all reviewers and editors of GJEIS in publishing in the present issue.

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