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Original Article

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Indonesian version of blended learning satisfaction scale: a translation, validation, and reliability study

Septa Meriana Lumbantoruan[1]*, Alice Yvonne Yovita Pangemanan[1], Abialbon Maharai Bureni[1], Elvinazune Lisfareva Hicha[1], and Elina Dewi Sabatani[1]

[1] Faculty of Nursing, Universitas Pelita Harapan, Tangerang, Indonesia

*Correspondence: Septa Meriana Lumbantoruan. Address: Faculty of Nursing, Universitas Pelita Harapan, Tangerang, Indonesia.
E-mail: septa.lumbantoruan@uph.edu
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ABSTRACT

Introduction: Since COVID-19 2019 became a global pandemic, the blended learning method has gained popularity, including in nursing education. A valid and trustworthy questionnaire is required in Indonesia to measure blended learning satisfaction. The purpose of this study was to evaluate the psychometric properties of Indonesian BLSS, a validated tool from Taiwan, among nursing students.

Methods: This study employed a cross-sectional design to assess the validity and reliability of BLSS. The sample included 231 first-year nursing students from a university in Indonesia. The splitting sample method was utilized for exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The BLSS was translated using forward and backward translation. Three experts validated the content, while EFA and CFA investigated the structural validity. Reliability was assessed using Cronbach's alpha.

Results: The content validity index (CVI) of BLSS was 0.975. The mean age of the respondents was 19.26 (0.05), with the majority being female (85.07%). In EFA, one factor was retained based on cumulative variance, a scree plot, and parallel analysis. The CFA also showed one factor as retained. The factor loading of each item was greater than 0.5 both in EFA and CFA. This instrument has an internal consistency of 0.955 according to Cronbach's alpha.

Conclusions: The Indonesian BLSS is good, based on CVI, EFA, CFA and internal consistency analysis, which were used to measure satisfaction with blended learning. By measuring satisfaction following blended learning using BLSS, we hope that the learning process can be regarded as satisfactory and improved among nursing students.

Keywords: blended learning, satisfaction, translation

Introduction

The blended learning method has become popular in education since the novel coronavirus 2019 (COVID-19) emerged in 2019, reducing social and physical distancing between students (Cobo-Rendón *et al.*, 2022; Yu, XU and Sukjairungwattana, 2022). The blended learning method is continuously used nowadays in education because it offers flexibility and accessibility for students compared to traditional methods (Abd *et al.*, 2022; Yu, XU and Sukjairungwattana, 2022). However, the traditional learning method has become infamous since then due to the difficulty of maximizing class activity (Cobo-Rendón *et al.*, 2022). Blended learning utilizes both the face to face learning method and virtual learning via learning method systems (LMS) (Margulieux, McCracken and Catrambone, 2016). A previous study found that blended learning is an effective method compared to the face-to-face method among high school students (Abd *et al.*, 2022; Yu, XU and Sukjairungwattana, 2022).

The blended learning method is also widely used in healthcare majors including in nursing education (Li *et al.*, 2019; Andersen, Jørnø and Nortvig, 2021). It was found that using the blended learning method effectively improved both knowledge and skills among nursing students compared to the traditional method (Li *et al.*, 2019; Andersen, Jørnø and Nortvig, 2021). This flexibility allows nursing students to easily access the study materials from both theory and the practicals (Sáiz-

Manzanares, Escolar-Llamazares and Arnaiz González, 2020). Moreover, using the blended learning method and project-based learning method in nursing majors allows the students to gain capabilities in both critical thinking and their nursing skills (Sáiz-Manzanares, Escolar-Llamazares and Arnaiz González, 2020).

The satisfaction with the blended learning method is higher than with the traditional learning method (Li *et al.*, 2019). This is because the blended learning method provides various interactive teaching models with which to engage students (Gerdprasert *et al.*, 2010). A previous study found that the score for satisfaction was higher for the traditional method compared to the blended learning method (Blissitt, 2016). Studies on the level of satisfaction with blended learning among nursing students have been done in previous decades (Li *et al.*, 2019). Limited studies have been conducted in nursing education in Indonesia, especially when looking to measure the satisfaction with blended learning after the COVID-19 pandemic. This inconsistence in the findings needs to be identified more in further research.

There are limited scales with which to measure satisfaction with blended learning in nursing education. The blended learning satisfaction scale (BLSS) was originally developed by Hsu (2011) to measure satisfaction with blended learning, specifically among nursing students. This scale measures the blended learning method and its relationship to the course, classmates, teachers, and patients. The limited scale hinders the evaluation of blended learning in nursing education. Therefore, the goal of this study was to evaluate the psychometric testing of Indonesian version of BLSS to adapt the scale to Indonesian nursing education.

Materials and Methods

Study design

This study has investigated a psychometric test and scale using a cross-sectional design in Tangerang, Indonesia. The respondents were first-year nursing students in one of the private universities in Indonesia. The nursing students in this setting came from various places in Indonesia such as Sumatera, Java, Kalimantan, Sulawesi, and Papua islands. The respondents were in their first semester in nursing, and fluent in *Bahasa Indonesia*. The principal investigator first asked for permission from the dean of the nursing department in the study setting before approaching and explaining the study details to the students. The respondents voluntarily joined. Sufficient sampling is important in EFA and CFA, with 5 to 10 respondents for one item considered to be enough (DeVellis and Thorpe, 2021; Sürücü et al., 2022). There were 18 items evaluated in this study. Therefore, the minimum sample size was 90 - 80 respondents. The sample size of 231 respondents was sufficient to analyze EFA and CFA in this study. The splitting sample method was utilized in the EFA and CFA analysis (Lorenzo-Seva, 2022). The equivalent sample number of 115 respondents for EFA and 116 respondents for CFA was applied. Data collection was done from March until April 2024. The description of the study was explained to the respondents, and they were able to voluntarily join the study or decline. An informed consent form was given containing the study information and space for the respondent's signature, which the respondents filled in when they agreed to participate in the study.

The blended learning process for the first semester students in this setting started with the shared material being uploaded to the learning management system before the class began. The students were instructed to learn the material independently. The material consisted of learning videos, PowerPoint materials, quizzes, and a forum discussion. Following this, the session continued with an in-person laboratory class for courses with practicum credits. After 2 or 3 weeks of asynchronous classes, the students will have synchronous classes, and all previously shared materials will then be discussed during the lecture.

Ethical permission was obtained from the ethics committee of the Faculty of Nursing, Universitas Pelita Harapan with number No.083/KEPFON/I/2024. The study consisted of two steps, including the translation process and examination of the psychometric properties.

Instrument

The satisfaction of blended learning was measured using the Blended Learning Satisfaction Scale (BLSS), a self-administered scale made by Hsu (2011) in Taiwan. This scale consists of 18 items on a 5-point Likert scale with the minimum score of 18 and a maximum score of 90, where a higher score means a higher satisfaction with blended learning. The original BLSS has only one factor with a content validity of 0.81 and internal consistency Cronbach's alpha of 0.91 (Hsu, 2011). The indicators assessed in this scale include the blended learning method, interactions with classmates and instructors, and the effect on relationships. Permission to use this instrument was obtained directly from Hsu via email correspondence.

Translation and adaptation process

The BLSS was translated into the Indonesian language according to World Health Organization (WHO) process translation (WHO, 2009). Forward translation was performed by an English lecturer with an educational background of Master of Science in Teaching English to Speakers of Other Languages, who has been teaching English for more than 5 years. The forward translator had never seen the scale previously. The forward translation and original translation were then given to another English lecturer with an educational

Tabel 1. Demographic data of the respondents (n = 231)

Characteristics	n	%	Mean ± SD
Gender			
Male	45	19.48	
Female	186	80.52	
Age			19.41 ± 0.88

background of a Master of Humanities, who had also been teaching English for more than 5 years. The backward translator was assigned to ensure the quality. Finally, the forward and backward translations of the BLSS were reconciled, and the adaptation was used to produce the final version.

Validation process

The validation of this scale was measured using content validity and construct validity. The content validity was evaluated by three experts (Polit and Beck, 2006), i.e. three lecturers in nursing with a master's degree as their educational background. They were asked to evaluate the relevancy of the BLSS scale of the final version of translation. The score ranged from 1 as item not relevant, 2 as inaccessible to relevance without revision of statement/slightly relevant and requires very significant changes, 3 as relevant but requires minor changes, to 4 as very relevant and clear. The construct validity was evaluated using EFA and CFA.

Reliability test

Reliability was measured using internal consistency, the Cronbach's alpha coefficient. The cut-off point of Cronbach's alpha was above 0.70 and considered here to have acceptable reliability (Taber, 2018). The feasibility of this study was done with 30 respondents with a Cronbach's alpha coefficient of 0.96.

Data analysis

The data was analyzed using statistical software for data science (STATA) version 18. For content validity index (CVI), the item-CVI and summarize-CVI were both calculated. Values 3 or 4 from the experts were defined as 1 or good validity, and an acceptable CVI was 0.7. This study applied EFA and CFA to analyze the variable of BLSS according to the underlying latent variable (DeVellis and Thorpe, 2021).The goal of EFA was to observe the variables and group them into latent variables based on shared variances (Sürücü, YIKILMAZ and MASLAKÇI, 2022). Meanwhile, the aim of CFA was to find out the confirmation of the number of factors underlying the theory (Sarmento and Costa, 2019). The utilizing of both EFA and CFA in this study was to confirm the findings (Sarmento and Costa, 2019).

EFA was done by fulfilling the assumptions related to EFA including sample size, normal distribution, no collinearity, and linear (Yong and Pearce, 2013). In EFA, an acceptable item factor loading (FL) is above 0.30, and the Kaiser-Mayer-Olkin Measure (KMO) and Bartlett's Sphericity Tests were also checked (Yong and Pearce, 2013). The KMO value must be above 0.80, and the Bartlett's Test must $p < 0.05$. The number of factors retained from EFA is based on Kaiser's criterion, as well as a scree plot and the variance explained (Ruscio and Roche, 2012; Taherdoost et al., 2022). For the CFA, the scale must meet the requirements to do this analysis, including the Cronbach's alpha value. The type of the

Table 3. Factor loading for the EFA of BLSS (n = 115) using the principal component analysis method

Item no	Factor 1	Uniqueness	Communality
1	0.639	0.58	0.42
2	0.568	0.49	0.51
3	0.558	0.61	0.49
4	0.600	0.63	0.36
5	0.717	0.46	0.64
6	0.537	0.69	0.41
7	0.733	0.35	0.65
8	0.767	0.33	0.77
9	0.537	0.62	0.38
10	0.780	0.37	0.73
11	0.805	0.25	0.75
12	0.794	0.35	0.65
13	0.649	0.17	0.83
14	0.673	0.16	0.84
15	0.784	0.33	0.67
16	0.811	0.31	0.69
17	0.782	0.35	0.65
18	0.797	0.31	0.79

Table 2. Factor loading of the EFA of BLSS (N = 115) using the principal axis factor analysis method

Item no	Factor 1	Factor 2	Factor 3	Uniqueness	Communality
1		0.631		0.45	0.55
2			0.730	0.32	0.68
3			0.824	0.27	0.73
4			0.627	0.44	0.66
5		0.655		0.38	0.72
6		0.703		0.45	0.55
7		0.645		0.34	0.76
8		0.628		0.32	0.78
9		0.670		0.47	0.53
10		0.632		0.33	0.77
11	0.786			0.18	0.82
12	0.743			0.29	0.71
13	0.903			0.16	0.84
14	0.903			0.15	0.85
15		0.634		0.32	0.68
16		0.584		0.30	0.70
17	0.649			0.35	0.65
18	0.702			0.30	0.70

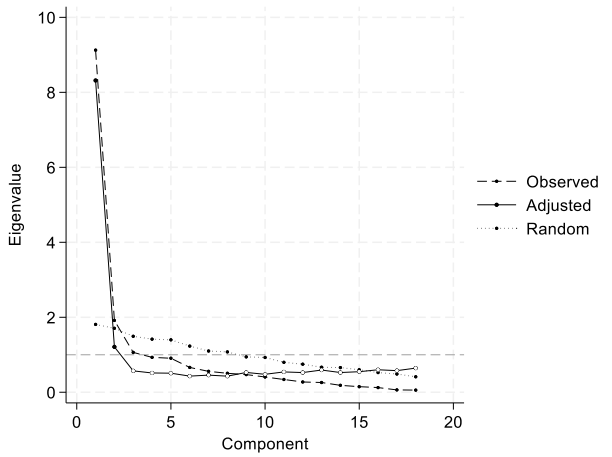

Figure 1. Scree plot and parallel analysis (n = 115)

model must be fit according to the chi-squared test, which should be nearer to zero, as well as the normed fit index (NFI) greater than 0.90, comparative fit index (CFI) greater than 0.90, relative fit index (RFI) greater than 0.90, Tucker-Lewis's index (TLI) greater than 0.90, root mean square error of approximation (RMSEA) of $p \geq 0.05$, and the standardized root mean square residual (SRMR) must be between 0.05 - 0.08 (Sarmento and Costa, 2019).

Results

The results of this study show the demographic status of the respondents. Most of the participants were female (80.52%), with average of age of 19.41±0.88. The demographic data is shown in Table 1.

The Validity of BLSS

Content Validity

After the forward and backward translations, three experts were asked to evaluate the relevancy of BLSS by themselves. The experts then met in an online meeting application to discuss the values they gave. For the 18 items of BLSS, 14 items had a score of 4 (very relevant and clear). The I-CVI ranged from 0.83-1.00, the S-ICVI/average of the scale was 0.975, the S-CVI/UA was 0.77 and the S-CVI Ave was 1.0.

Construct Validity

We employed the principal axis factor analysis method since the data did not have a normal distribution (Shapiro-Wilk test $p < 0.05$), using the Varimax rotation method. The matrix correlation of 18 items was good, where the r among the factors ranged between 0.266 and 0.932. Based on eigenvalues > 1, three factors were retained with a cumulative variance of 50.70% for the first factor, 61.34% the second factor, and 67.25% the last factor. The factor grouping consisted of 6 items for the first factors (item number 11, 12, 13, 14, 17, and 18), 6 items also for the second factors (item 1, 5, 6, 7, 8, 9, 10, 15, 16), and three factors for the third factors (item number 2, 3, 4) (Table 2). Overall, the FLs of the items were good > 0.50. The highest FLs were for item 13 and 14 (0.903), and the lowest FL was item 16 (0.584). The KMO of the scale was marvelous with a value of 0.88, and the Bartlett test's result was a chi-square of 1671.21 (df = 153) p-value < 0.001 (Table 2).

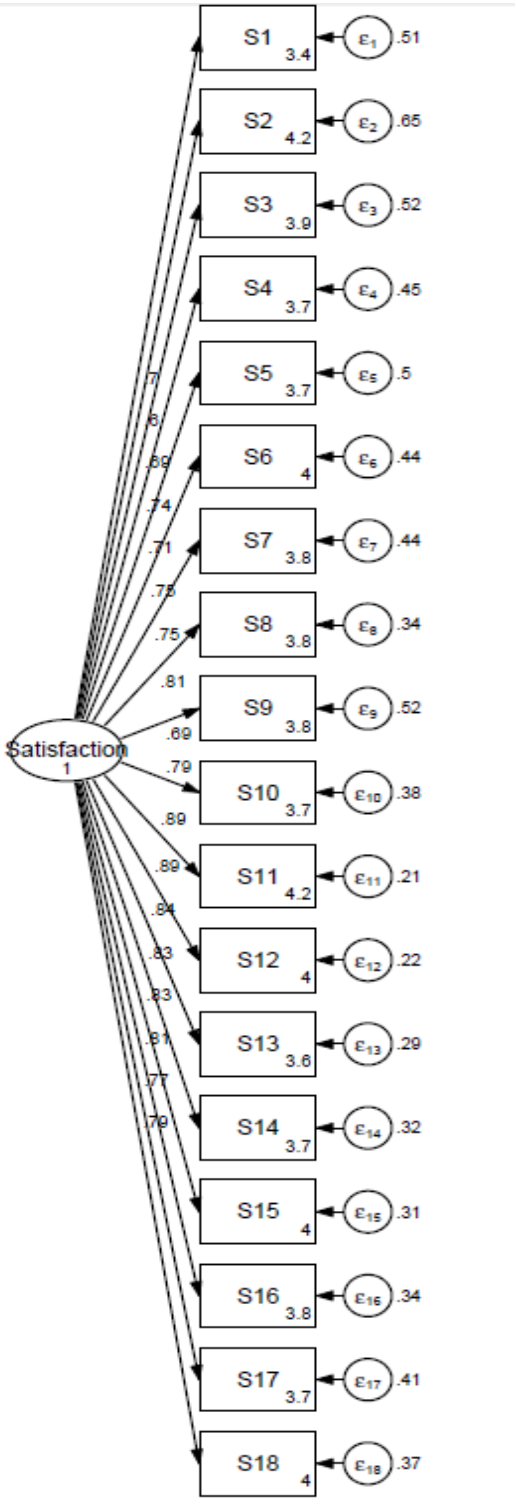

Figure 2. Confirmatory factor loading of BLSS (n = 116)

The principal component analysis method (or principal factor in STATA) was applied to compare the results. The unrotated method was also implied due to the one factor retained in the original study. Based on eigenvalues > 1, only one factor was retained with a

cumulative variance of 71.47%. Overall, the FLs of each item showed as good at > 0.50. The highest FL was item number 16 (0.81), and the lowest FL was item number 6 (0.53) (Table 3). The KMO and Barlett test results were the same as with the previous extraction method.

To confirm which extraction method results will be used in this study, the scree plot and the parallel analysis methods were utilized. The scree plot analysis showed that only one factor was retained that had an eigenvalue greater than 1.00. The parallel analysis also showed the same results, with only one factor retained, including the observed, random, and adjusted samples (Figure 1). These results indicate that the most appropriate extraction method to retain the factor was the principal component analysis method.

CFA was to test the structural validity of the model that fit the EFA model. CFA was analyzed using a separate sample. The results of the CFA model did not display an optimal fit to the data: X2 was 1,983.39 (df = 136) p-value < 0.001, RMSEA was 0.167, CFI was 0.784, the TLI was 0.756, and the SRMR was 0.07. The factor loading of BLSS based on the CFA analysis ranged from 0.60 - 0.89, indicating good results. The lowest FL was item number two (0.69), and the highest FLs were item numbers 11 and 12 (0.89) (Figure 2).

Discussions

This study adopted the BLSS scale and tested its properties psychometrically for the Indonesian version. The BLSS in the original study consisted of one domain to measure satisfaction among nursing students (Hsu, 2011). Content validity was measured by the accuracy of each item and items overall. Face validity was not employed in this study, as it is considered to be the weakest form of the validity test (Tidbury *et al.*, 2021). The content validity of the Indonesian version of BLSS was very similar to the original study (Hsu, 2011). The content validity of this scale reflected the relevancy of the items (Polit, 2004). The value of I-CVI in this study also showed a good index over 0.8 (Almanasreh et al., 2019; Polit and Beck, 2006). Only item number 7 "*I was able to mobilize various learning resources (the internet, video, etc.) in this course*" had a lower I-CVI index (0.83). Based on the expert discussion, the word "*mobilize*" in that sentence was not one that was familiar if translated into Indonesian. The word was then changed to "*use,*" which is similar to mobilize.

In the EFA analysis, due to the assumption of normality test not being fulfilled, the extraction method applied in the analysis was the principal axis factoring method (Brown, 2015). Three factors were retained following this method. This finding was different from the original scale (Hsu, 2011).

The principal component analysis method was subsequently used, as a different number of factors were retained compared to the original scale. Moreover, as the items of BLSS are correlated each other (Taherdoost, Sahibuddin and Jalaliyoon, 2022), the principal component analysis method was suitable. The principal component analysis method also reduces the dimensionality of the data (Brown, 2015). The unrotated method was used to minimize the retained factor (Taherdoost, Sahibuddin and Jalaliyoon, 2022), aligned with the original scale (Hsu, 2011). There was one factor retained using this method similar to the original study (Hsu, 2011), based on eigenvalues > 1 (Taherdoost, Sahibuddin and Jalaliyoon, 2022).

In order to confirm the findings of the principal component analysis, both a scree plot and PA were utilized, confirming that only one factor was retained for the BLSS. The determination of retaining factors in EFA can be confirmed in various ways, including through the cumulative percentage of variance, eigenvalues, a scree plot, and PA (Ruscio and Roche, 2012; Taherdoost et al., 2022). However, the most accurate retaining factors was based on PA, as it accounts for the randomly generated sample (Hayton, Allen and Scarpello, 2004).

The FLs of each item of BLSS were good (ranging between 0.52 and 0.81), indicating that they were statistically meaningful. As the previous study recommended, a factor loading of 0.32 gives 10% overlapping variance and is the cut-off point for factor loading in EFA (Yong and Pearce, 2013). The lowest factor loading was item number 9: "*Compared to classroom learning, I found it easier to participate in online discussions in blended learning*" which put the subject after the object. We recommend that the sentence becomes "*I found it easier to participate in online discussions, compared to classroom learning.*"

CFA analysis was done in this study to validate the results of EFA (Sarmento and Costa, 2019). CFA analysis found that all items of the BLSS scale were underlaid in one factor, similar to the original scale (Hsu, 2011). The overall FLs from CFA were > 0.50, indicating a good relationship between the observed variable and the latent factor (Tavakol and Wetzel, 2020). Based on these results, it can be inferred that all items of BLSS assess a single latent factor of satisfaction. The model specification of the CFA demonstrated a good fit with the X^2 and SRMR values. The most accurate model specification of CFA was obtained from the SRMR value (Hussey and Hughes, 2020; Shi et al., 2012). The SRMR value obtained was 0.07, which falls within the accepted SRMR value range of 0.05-0.08 (Brown, 2015; Sarmento and Costa, 2019).

This study acknowledges a limitation: the data was only obtained from first-year nursing students. However, the number of respondents who participated in this study has contributed to variations in the results. We acknowledge that the respondents in this study consisted of 80.52% being female nursing students. This might limit the generalization of this scale to a population with

different characteristics. However, since nurses in Indonesia are dominated by females (75.01%) (Badan Pusat Statistik Kota Pontianak, 2021), we believe that this scale can be utilized to measure nursing student satisfaction with the blended learning method in Indonesia specifically.

Conclusion

The Indonesian version of BLSS is a valid and reliable scale to evaluate the nursing students' satisfaction with the blended learning method. In the future, it is advised to utilize this scale to assess the level of satisfaction with blended learning, particularly among nursing students.

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Availability of data and materials

The data was stored by the author and is available upon request.

Authors' contributions

SM contributed to conceptualization, framework design, data analysis, and manuscript writing. AP assisted with manuscript preparation and data collection. AB, ELH, and EDS contributed to data collection and instrument selection.

Declaration of Interest

We declare that there were no conflicts of interest in this study.

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