Psychometric Validation Of Nursing Student's Learning Experiences Questionnaire On Using Virtual Reality

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Abstract

The use of virtual reality can provide a transformative learning experience for nursing students, which can be evaluated with an instrument. A valid and consistent instrument can provide correct data, so an instrument needs to be tested psychometrically so that the validity and consistency of the instrument can be known, especially on adapted instruments. To translate and test the validity and reliability of the Indonesian version of the Web-Based Learning Tools (WBLT) Evaluation Scale. The research design used was descriptive-quantitative with a cross-sectional approach. The study population was undergraduate students of the Faculty of Nursing at Universitas Padjadjaran, with a total sample size of 104 through purposive sampling. The Web-Based Learning Tools were used, with validity and reliability testing using SPSS based on Pearson correlation values and Cronbach's alpha. Results: The Pearson correlation test yielded results of r-count > 0.2279 and Cronbach's alpha test = 0.919. Based on the results of the study, the instrument has good validity and very high reliability. The Indonesian version of the WBLT instrument is valid and reliable, so further research can use the instrument to evaluate the use of virtual reality on the learning experience of nursing students.

Keywords: learning experience; reliability; translation; validity; virtual reality.

Introduction

Technological advances have been utilized in various fields of life, including the field of education. According to Lestari (2018), technology in education is a system that is usually used to support learning so that the desired results can be achieved. One of the educational technologies that are currently trending is virtual reality (VR) (Andre et al., 2019; Endarto & Martadi, 2022; Rasim et al., 2022). VR has been developing since the 1800s; however, VR is a new technology used in education (Erbas & Demirer, 2019). Virtual reality (VR) is a three-dimensional (3D) technology with realistic visual results or atmospheres where users can interact with virtual environments simulated by computers (Fardani, 2020). This will support VR users as if they were interacting in the real world.

In education, there are learning activities that are carried out. This activity does not only extend to the delivery of material but must reach further, namely generating learning experiences (Lase, 2015). According to Tylor, learning experiences are experiences gained and experienced by students as a result of learning and interaction with learning content and activities (Lase, 2015). Students must be provided with learning experiences for their learning process and learning outcomes to be more meaningful. In this regard, students who use VR, including nursing students, can gain learning experiences. Nursing students can use VR as an effort to increase knowledge, skills, critical thinking, and decision-making in various cases of disease and perform nursing actions to resemble real conditions in health services. In addition, VR can also be used as a means of accessing information, supporting learning activities and assignments, as well as an alternative to traditional nursing learning practices (Lestari, 2018).

According to Goldman Sach (2016), virtual reality can revolutionize teaching for students as it creates a simulated and immersive learning environment that provides a transformative learning experience. VR is considered to have a positive impact on learning achievement because students can simulate and interact more deeply with digital environments. Thus, the learning environment can be more impressive, interesting, and fun compared to conventional learning, which tends to be boring and easily forgotten (Endarto & Martadi, 2022). In addition, the density of concepts in conventional learning can also make it difficult for students to understand the teaching materials provided while learning using VR can produce a spatiotemporal alignment of information that can help students develop a deeper understanding of concepts and ultimately can improve the achievement of learning outcomes.

Achievement of learning outcomes can be seen in knowledge, skills, and other areas. The results of several studies show that learning using VR simulators is effective and has an effect on nursing student's knowledge and skills (Butt et al., 2018; Chen et al., 2020; Günay Ismailoglu & Zaybak, 2018; Padilha et al., 2019). This is due to the compatibility between VR learning media and students, where VR can make it easier to analyze learning knowledge, is more acceptable and understood by the younger generation, and can provide new experiences for learning material in the form of visualizations that can look similar to the original through 3D displays (Endarto & Martadi, 2022).

The Web-Based Learning Tools (WBLT) Evaluation Scale can be used to assess the suitability of learning media, particularly VR, for learning experiences. WBLT is a measurement scale developed by Kay in 2011 based on the revision of the Learning Object Evaluation Scale for Students (LOES-S) instrument developed by Kay and Knaack in 2009. WBLT has three main aspects for assessment: learning, design, and student engagement of the media used during learning. Currently, there is still no Indonesian version of the measuring instrument, and it is only available in English. Therefore, this study aims to translate the English version of the WBLT measuring instrument into Indonesian and conduct psychometric tests, which include validity and reliability tests, to test the feasibility of the translated instrument.

Research Methods

This research is a quantitative study with a descriptive research design using a cross-

sectional approach. Descriptive research is used because this method has the function of describing or providing an overview of the object under study through data or samples that have been collected as is (Sugiyono, 2014). Meanwhile, the cross-sectional approach is used for observational studies that analyze data from the population at one point in time (Wang & Cheng, 2020).

The population of this study was active undergraduate students of the Faculty of Nursing, Universitas Padjadjaran, from the classes of 2019, 2020, 2021, and 2022, totaling 778 students. There are 104 students met the inclusion and exclusion criteria and were willing to participate in the study. The sample has exceeded the minimum size and can minimize any bias that may occur due to sample bias. The sampling technique used in this study was purposive sampling with inclusion criteria, namely: 1) active undergraduate students of the Faculty of Nursing, Universitas Padjadjaran, Class of 2019, 2020, 2021, and 2022; and 2) have tried VR simulation in VNursLab Plus with suction, urinary catheter insertion, or wound care. The research exclusion criteria are nursing students who are not willing to become respondents.

This study used the Web-Based Learning Tools (WBLT) Evaluation Scale instrument developed by Robin Kay in 2011. This measuring scale was developed based on the revision of the Learning Object Evaluation Scale for Students (LOES-S) instrument developed by Kay and Knaack in 2009. The WBLT instrument has 13 statement items with three main aspects of learning, design, and engagement that use a five-point Likert scale from 1 to 5, with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. In the English version, the WBLT is a valid and reliable instrument with Cronbach's alpha results of 0.93 for learning, 0.87 for design, and 0.92 for engagement.

The collected data is processed through editing, coding, processing, and cleaning so that data errors can be minimized. The level of validity and reliability of the instrument is known by analyzing the questionnaire data that has been obtained using IBM SPSS software. For instrument validity, item analysis is carried out, or the score of each item is correlated with the total score. The instrument is said to be valid if the calculated correlation value is greater than the table correction value (r count > r table); the r table in this study is 0.2279 with a significance level of 1%. The first step in testing the validity of the statement items on the questionnaire is to find the Pearson correlation number. The classification of the value of the validation results is as follows:

Table 1. Classification of validity results

Result Value	Description
0.81 – 1	**Very Good**
0.61 – 0.8	**Good**
0.41 – 0.6	**Moderate**
0.21 – 0.4	**Bad**
0 – 0.20	**Very Bad**

Source: Sofnidar and Yuliana (2018)

Furthermore, reliability testing is carried out after the instrument validity test is carried out because only valid statement items can be measured for reliability. The reliability test was carried out using Cronbach's alpha method, which is suitable for interval data types. Calculations using Cronbach's alpha formula are acceptable if the calculation results are r count > r table. The classification of the value of Cronbach's Alpha results is as follows:

Table 2. Classification of reliability results

Result Value	Description
< 0.5	**Very Low**
0.5 – 0.6	**Low**

0.6 – 0.7	**Enough**
0.7 – 0.8	**High**
> 0.8	**Very High**

Source: Sumintono and Widhiarso (2014)

Research Procedure

The research was conducted from September 2022–January 2023 at the Faculty of Nursing, Univeritas Padjadjaran. Researchers considered research ethics during implementation, which includes the principles of veracity, autonomy, justice, and confidentiality. Furthermore, the instruments were first translated from English into Indonesian using a cross-cultural adaptation of the back translation method (Cheung et al., 2020):

a. The determination of the translators consisted of expert translators from the Language Center of the Faculty of Cultural Sciences of Universitas Padjadjaran (A1 and A2) and lay translators, namely 7th-semester students of the English education study program from IAIN Syekh Nurjati Cirebon (B1 and B2). The translation process by experts is done to translate the language by the rules of good and correct language, while the translation by laymen is done so that the language can be translated by the language that is often used in everyday life.

b. Forward translation, the original instrument was translated into Bahasa Indonesia by the translators (A1 and B1). After the translation process, two translated versions were obtained, which were then compared to see the similarity in meaning.

c. Back translation, the instrument that has been translated into Indonesian is translated back into English by the translators (A2 and B2) to see the consistency of the language.

d. The two instruments that have been translated into English are compared again to see the differences in the meaning of each statement. After being translated and compared, the results of this stage became the instrument that would be tested for validity and reliability.

Researchers collected data from December 24 to December 31, 2022, and related research information was socialized to the population via the Whatsapp chat group for the class of 2019, 2020, 2021, and 2022. Prospective respondents who meet the criteria are directed to fill out a Google Form link to obtain consent (informed consent). Prospective respondents who are willing to take part in the study will be directed to fill in demographic data, while respondents who are not willing will be directed to the final page without filling in demographic data. After filling in the demographic data, respondents will be directed to fill out the questionnaire, which takes 3-5 minutes.

Results

Translation Process

The instrument translation process was carried out using the back translation method, where the original version of the instrument was translated into the target language and the translation results were translated back into the language of the original version of the instrument. The original version of the WBLT questionnaire and the results of its translation into Bahasa Indonesia are presented in Table 3 and Table 4 below.

Table 3. The English version of the WBLT Questionnaire

Dimensions	Statement
	Working with the virtual reality helped me learn
	The feedback from the virtual reality helped me learn
Learning	**The graphics and animations from the virtual reality helped me learn**
	The virtual reality helped teach me a new concept
	Overall, the virtual reality helped me learn

Design	**The help features in the virtual reality were useful**
	The instructions in the virtual reality were easy to follow
	The virtual reality was easy to use
	The virtual reality was well organized
Engagement	**I liked the overall theme of the virtual reality**
	I found the virtual reality engaging
	The virtual reality made learning fun
	I would like to use the virtual reality again

Table 4. The Indonesian version of the WBLT Questionnaire

Dimensions	Statement
Pembelajaran	**Bekerja dengan virtual reality membantu saya belajar**
	Penilaian dari virtual reality membantu saya belajar
	Gambar dan animasi dari virtual reality membantu saya belajar
	Virtual reality membantu mengajarkan saya konsep baru
	Secara keseluruhan, virtual reality membantu saya belajar
Desain	**Fitur bantuan dalam virtual reality sangat membantu saya belajar**
	Instruksi pada virtual reality sangat mudah untuk diikuti
	Virtual reality sangat mudah digunakan
	Virtual reality terorganisir dengan baik
Penggunaan	**Saya menyukai keseluruhan tema virtual reality**
	Virtual reality ini sangat menarik
	Virtual reality membuat pembelajaran menjadi menyenangkan
	Saya akan menggunakan virtual reality ini lagi

From the translation process that has been carried out, each statement has almost the same meaning as the original version of the instrument.

Sociodemographic Characteristics of Respondents

The number of samples involved and meeting the inclusion and exclusion criteria in the study was 104 students. The characteristics of respondents can be seen in Table 5.

Table 5. Characteristics of Research Respondents (n =104)

Characteristics	f	%
Class of		
2019	**37**	**35.6**
2020	**9**	**8.7**
2021	**12**	**11.5**

2022	**46**	**44.2**
Campus Region		
Jatinangor	**103**	**99**
Pangandaran	**1**	**1**
Age		
< 18 years	**2**	**1.9**
18 – 20 years	**66**	**63.5**
> 20 years	**36**	**34.6**
Gender		
Male	**5**	**4.8**
Female	**99**	**95.2**
Nationality		
Sundanese	**79**	**76.0**
Java	**14**	**13.4**
Betawi	**3**	**2.9**
Batak	**1**	**1.0**
Minang	**5**	**4.8**
Malay	**2**	**1.9**
VR Simulation of Nursing Actions		
Urine Catheter Insertion	**50**	**48.1**
Suction	**46**	**44.2**
Wound Care	**8**	**7.7**

Almost half of the respondents were 2022 nursing students who came from the Jatinangor campus. The majority of respondents were female and aged between 18-20 years. In addition, most respondents were Sundanese and had tried VR simulation for urinary catheter insertion.

Validity Test Results

The results of the WBLT questionnaire were then tested for validity to determine the feasibility of the translated instrument. The following table shows the results of the validity test for each item of the instrument:

Table 6. Indonesian Version of WBLT Validity Results

Dimension	Statement Item	Pearson Correlation Coefficient	Conclusion	Category
Pembelajaran	Bekerja menggunakan virtual reality membantu saya belajar	0.664	Valid	Good
	Penilaian dari virtual reality membantu saya belajar	0.702	Valid	Good
	Gambar dan animasi dari virtual reality membantu saya belajar	0.828	Valid	Very Good
	Virtual reality mengajarkan saya konsep baru	0.685	Valid	Good
	Kesimpulannya, virtual reality membantu saya belajar	0.766	Valid	Good
Desain	Fitur bantuan dalam virtual reality sangat membantu	0.673	Valid	Good
	Instruski pada virtual reality sangat mudah untuk diikuti	0.595	Valid	Moderate
	Virtual reality sangat mudah digunakan	0.547	Valid	Moderate
	Virtual reality terorganisir dengan baik	0.737	Valid	Good
Penggunaan	Saya menyukai keseluruhan tema virtual reality	0.835	Valid	Very Good
	Virtual reality ini sangat menarik	0.793	Valid	Good
	Virtual reality membuat pembelajaran menjadi menyenangkan	0.735	Valid	Good
	Saya akan menggunakan virtual reality ini lagi	0.829	Valid	Very Good

Note: r table = 0.2279 with a significance of 1%

If the results of r count > r table, the instrument is said to be valid. Overall, each statement in the questionnaire is correct because the r count is greater than 0.2279. The results of the Pearson correlation coefficient are also categorized based on the classification by Sofnidar and Yuliana (2018), which shows that 3 statements are categorized as "very good," 8 statements are categorized as "good," and 2 statements are categorized as "moderate."

Reliability Test Results

The instrument reliability test was carried out using Cronbach's alpha method. Based on Cronbach's alpha test results, the overall statement in the WBLT questionnaire was declared reliable with a value of 0.919. Each aspect of the WBLT questionnaire also has a Cronbach's alpha value which is said to be reliable, namely 0.894 for learning, 0.785 for design, and 0.910 for engagement.

Discussion

A measuring instrument in research can be obtained by creating a new instrument or by modifying an instrument that has been made in another language by making transcultural adaptations (Zakyah & Laviana, 2021). Making an instrument requires a lot of time and money while modifying an existing instrument is simpler and can maintain the main characteristics of the instrument that has been developed. The purpose of this study is to adapt the Web-Based Learning Tools (WBLT) Evaluation Scale in its Indonesian version as a measuring tool that can be used to evaluate the use of VR on the learning experience of nursing students. In modifying an instrument that has another language, it is necessary to carry out a translation process and test the validity and reliability of the instrument that has been translated into the target language. The language translation process is carried out to adapt the instrument, which in the process uses a methodology to produce instruments that can be used by the prevailing culture (Lino et al., 2017). Meanwhile, validity and reliability tests are performed to determine the instrument's feasibility following the translation process, which is critical in the test or scale level property (Marvianto & Widhiarso, 2019).

Translating the Web-Based Learning Tool (WBLT) Evaluation Scale

In the language translation process, the concept of cross-cultural adaptation is needed. This cross-cultural adaptation is a process to modify an instrument into a version based on social and cultural values, including language, without changing the meaning of the original version of the instrument (Putra et al., 2020). The translation process with cross-cultural adaptation is considered quite good, resulting in minimal ambiguity, appropriate translation, and good meaning for each word (Dhamayanti et al., 2018).

The process of translating instruments for cross-cultural adaptation needs a good procedure. According to Brislin, a common and highly recommended translation procedure is translation and back translation (Astuti & Kao, 2022). This study follows this recommendation by translating the instrument from the original version to the target language, then translating back from the translated version to the original version language without any communication between the forward and back translators. In the forward translation process, the similarity of the translator's translation results shows good adaptation (Hidayat et al., 2020). In this study, the results of forward translation have the same meaning from both translators, which can be interpreted as meaning that the instrument is well adapted from the original instrument. Furthermore, back translation is carried out to validate the similarity or accuracy of meaning after the translation process. This is in line with the statement of Hidayat et al. (2020), where the back translation is a technique used to check the accuracy of translation in research. Based on the research results, the results of back translation still have similar meanings to the original instrument, although there are some differences in the translated words.

Validity and Reliability of the Indonesian Version of the Web-Based Learning Tools (WBLT) Evaluation Scale

A research instrument needs a validity test combined with a reliability test. This is necessary because to get the right data with conclusions that match the actual conditions, an instrument must be valid, consistent, and precise in providing research data (Yusup, 2018). In the process of cross-cultural adaptation of instruments, translational validation is one of the important processes that need to be carried out (Putra et al., 2020). This is because translational validation is needed to ensure the suitability of measuring instruments under local conditions. In addition, instrument validation is also used to measure the level of validity of an instrument (Hasanuddin, 2021).

The validity of an instrument can be proven in several ways, namely, validity by content (content validity), criteria (criterion validity), and construct (construct validity). The validity test in this study is construct validity, which is done by analyzing questionnaire items and correlating the score of each item with the total score of all items. Construct

validity is carried out to determine the extent to which the items of a test or instrument can measure what will be measured by a predetermined concept (Putra et al., 2020). This validity is measured using the Pearson Product Moment Correlation Test. If r count > r table, the instrument is said to be valid. High correlation results indicate that the instrument has strong concurrent validity (Amalia & Dianingati, 2022). Based on the results of the Pearson correlation test in this study, it can be stated that the Indonesian version of the WBLT instrument is valid, with an average of having a good category to evaluate the use of VR on the learning experience of nursing students.

The next test required for an instrument is the reliability test. The reliability test is carried out to measure the extent to which the measurement of an instrument can provide stable results (Taherdoost, 2016). The reliability of an instrument can also reveal reliable data in a study (Yusup, 2018). The WBLT reliability test in this study used Cronbach's alpha test, which is suitable for interval data types (Hikmah & Muslimah, 2021). This method is also suitable for instruments such as essays, questionnaires, or questionnaires that have more than one answer or scale (Yusup, 2018). An instrument can be said to be reliable if r count> r table. Based on the results of Cronbach's alpha for the Indonesian version of the WBLT questionnaire in this study, it can be stated that the questionnaire is reliable. According to Sumintono and Widhiarso (2014), Cronbach's alpha values greater than 0.8 indicate that the instrument has very high reliability, while values between 0.7 and 0.8 indicate that the instrument has high reliability.

A valid and reliable instrument is one of the criteria for a measuring instrument to be considered good. Experts have established several criteria for instruments that are said to be good, namely valid, reliable, standard, economical, and practical (Arifin, 2017). A good instrument has a very important role because the quality of a study can be known. This is also to Arifin (2017) statement that if the instrument made has good criteria, the quality of the research will also be good. This can happen because the instrument has a function to reveal a fact in data, so if the instrument is said to have good quality, the data obtained will also be by the facts or conditions in the field.

Nursing Implications

The results of this study, namely the Indonesian version of the Web-Based Learning Tools (WBLT) Evaluation Scale, can be used to evaluate learning media that will be used by nursing education institutions, especially virtual reality learning media. This evaluation is carried out to see the effectiveness of the teaching media on nursing student learning. In learning, several components must be considered and adjusted to the objectives and capacities of students, one of which is learning media. This media or learning tool serves to help smooth the implementation of learning to be more efficient and effective in achieving learning goals (Pane & Dasopang, 2017). Learning media that is suitable for students can cause the material taught to be more easily understood and understood by nursing students so that this can support the improvement of learning outcomes, which include student knowledge and skills. This increase in knowledge and skills can also increase the competence of these students to be able to provide quality nursing care and support client health and safety.

Research Limitations

This study has limitations in time, so some students meet the criteria but have not had time to fill out questionnaires or participate in the study. In addition, not all students in the population have tried VR simulations related to nursing actions, so the distribution of respondents is uneven in each class and nursing action. Based on these limitations, the researcher suggests that the research can be carried out earlier so that students have more opportunities to take part in the research. Simulation of nursing actions through VR also needs to be introduced to students in each generation so that each student can feel and have experience performing nursing actions using VR.

Conclusion

Based on the results of the study, it can be concluded that the Indonesian version of the Web-Based Learning Tools (WBLT) Evaluation Scale questionnaire is valid and reliable for use in evaluating the use of virtual reality on the learning experience of nursing students. With the research that has been done, the research can be done earlier so that students have more opportunities to take part in the research. In addition, further research can use the Indonesian version of the WBLT questionnaire as an evaluation of the use of virtual reality on student learning experiences.

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