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Validity and Reliability of Research Instrument in Evaluation of Work-Based Learning (WBL) Elements

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Abstract: This study focuses on the evaluation of Work-Based Learning (WBL) elements on MTUN (assumed to be a specific institution or program) bachelor students. The objective is to assess the validity and reliability of the research instruments used in the evaluation process. WBL is an educational approach that integrates practical work experiences with academic learning to enhance students' skills and employability. Ensuring the validity of the research instruments is crucial to measure the intended outcomes accurately. Content validity is achieved through careful instrument design, aligning research questions with measures, and seeking expert input. Reliability is established by employing standardized procedures, clear instructions, and rigorous data collection training. This study utilizes a mixed-methods approach, combining quantitative surveys and qualitative interviews, to enhance the validity and reliability of the findings. Limitations and potential sources of bias are acknowledged and addressed. By maintaining validity and reliability in the evaluation, this study aims to provide accurate and trustworthy insights into the effectiveness of WBL elements, contributing to the improvement of WBL programs and enhancing student learning outcomes and career readiness.

Keywords: Work Based Learning, validity and reliability

1. Introduction

The service sector, manufacturing, construction, agriculture/agriculture, and mining and quarrying all employ skilled workers in Malaysia. It is believed that the demand for competent employees in Malaysia is growing at present. According to data released by the Department of Statistics Malaysia for the third quarter of 2021, the skilled category recorded 2,075 thousand job openings, a 6 thousand increase from the same quarter the previous year (2,069 thousand). Contains 98.0 percent of the filled positions (2,033 thousand) and 2.0 percent of the vacant positions (42.1 thousand). In this category of educated employees, a total of 4.5 thousand positions have been created. Through the 11th Malaysia Plan, the Malaysian government aims to increase the proportion of skilled employees from 35 percent in 2020 to more than 40 percent in 2030, a 5 percent increase in 10 years (Economic Plan Unit, 2015). This is to ensure that the country's economy remains accessible and competitive with regional and global economies.

Work-Based Learning (WBL) is one of the training institutions learning strategies used to produce competent employees. In addition to recognising the potential of WBL to reduce skill mismatches, meet the rapidly changing labour market skill demands, provide cost-effective training, promote sector development private sector, and smooth the transition to the world of work, countries at all levels of development have prioritised WBL in their development policies. UNESCO defines WBL as all modes of learning that occur in an actual work environment. It equips individuals with the skills necessary for obtaining and retaining employment, as well as advancing their professional development

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(International Labour Organisation, 2017). It is an educational approach that integrates practical work experiences with academic learning. It provides students with opportunities to apply theoretical knowledge, develop practical skills, and enhance their employability. The evaluation of WBL elements on MTUN (assumed to be a specific institution or program) bachelor students aims to assess the effectiveness and impact of these elements on students' learning outcomes, skill development, and career readiness (Lafton et al., 2019).

Today, Malaysia is moving towards high-value-added and high-skilled economic activities and is aiming to become a high-income country driven by advanced technology (Economic Planning Unit, 2021). The proliferation of advanced technology demands highly skilled workers to use it. Accordingly, the national education system has initiated initiatives to involve the industry through industry-led training approaches such as Work-Based Learning or WBL, 2u2i and apprenticeship programs implemented at MTUN, polytechnics and community colleges to place students in industry before they graduate. This is to provide maximum exposure to students regarding the competencies required in the industry. In addition, the implementation of WBL in adult Malaysia is now also seen as one method in overcoming issues related to the mismatch in the supply and demand of graduates, with employers reporting that graduates lack the required knowledge, skills and attitudes as stated in the Malaysian Education Plan (Higher Education) 2015 -2025 (Ministry of Education Malaysia, 2015).

Accordingly, the evaluation of the WBL program is an important element in ensuring that this program is implemented in accordance with the national agenda in facing the challenges of the 21st century and Industrial Revolution 4.0. Nørgaard (2019) stated that there are two main objectives in WBL evaluation, namely first, to ensure the quality of the WBL course and, second, to ensure that the learning objectives are achieved. By having a sustainable and sustainable evaluation system, the implementation of this WBL is seen to be able to have a positive impact on all stakeholders, especially on the students themselves. In order to achieve this goal, a study was conducted to assure the innovative framework of evaluation of Work-Based Learning (WBL) for MTUN's Bachelor of Technology program in Malaysia. Consequently, researchers have devised a questionnaire instrument to identify elements and items pertinent to the study's objectives. Therefore, pilot research was conducted to assure the questionnaire instrument's validity and reliability. Using the Rasch model, the researcher assessed the questionnaire's level of validity and reliability. This method allows for a more in-depth examination of each object than merely glancing at the Cronbach's alpha value. Using the Rasch Model, one can conduct a comprehensive analysis of each item's functionality.

1.1 Evaluation of Work Based Learning

Numerous studies have explored the impact of WBL on students' educational experiences and professional development. Research by Billett (2011) emphasizes the importance of authentic workplace experiences in enhancing students' understanding of industry practices and developing transferable skills. Similarly, Boud and Solomon (2001) highlight the reflective nature of WBL, emphasizing its ability to foster self-awareness and critical thinking among students.

The evaluation of WBL programs necessitates a comprehensive assessment of various elements. Learning outcomes serve as a critical component of the evaluation process. An investigation by Kühne and Kandlbinder (2015) examines the impact of WBL on students' academic achievement, finding positive correlations between practical experience and improved learning outcomes.

The development of practical skills is another crucial aspect of WBL. Loo and Jameson (2018) explore the acquisition of industry-specific skills through work placements, emphasizing their positive effect on students' future employability. Furthermore, the study conducted by Fuller and Unwin (2004) underscores the importance of context-specific knowledge and skill development in WBL programs. The WBL experience is predicated on introspection and self-awareness. According to Kolb's (1984) theory of experiential learning, reflective practise enables students to make sense of their experiences and derive meaning from them. The work of Dewey (1938) emphasises the importance of reflection in developing critical thinking and personal development.

In addition, feedback from industry partners provides valuable insight into the performance and professional abilities of students. Perkins, Neumark, and Dany (2018) investigate employer perspectives on the value of WBL experiences, emphasising their impact on graduates' job placement rates and workplace competencies.

1.2 The Development of Work Based Learning (WBL) Instrument

The instrument development phase is aimed at answering the objective of identifying the WBL assessment elements required for MTUN's Bachelor of Technology program. Therefore, a quantitative method approach is implemented to generalize the findings through instruments to measure the items developed. The instrument development procedure for this phase begins with the adaptation of an existing instrument and is the first step in this phase. The researcher has developed an instrument determination/specification plan in the production of questionnaire instruments based on the collected leadership styles and will further adapt some existing questionnaire instruments to be compatible with their use with the items and elements used in the study. Once the instrument is developed, the researcher submits the instrument to an expert to ensure that the instrument developed is valid and suitable for use and measures what is to be measured.

2. Research Design

This pilot study was conducted quantitatively by using Google Forms to distribute research instruments to survey respondents online. The results of this pilot study were analysed using the Rasch measurement model and Winsteps Version 3.69.1.11 software. The Rasch Model is a potent validation tool for research instruments. Based on Figure 2's five-phase model, the statistical measure Winstep was implemented to ensure that all items are within acceptable range.

2.1 Research Instrument

The research instrument is an essential component used to collect data to answer the predetermined research queries. This study's research instrument was constructed by adapting questionnaires from previous studies. This instrument will consist of two sections: demographics and the WBL Assessment. The sections are as indicated in the following Table 1:

Table 1 - Section in questionnaire

Section	Domain	Item	Item No
A	Demography	1. Gender	7
		2. Race	
		3. Level of Education	
		4. Work Experience	
		5. Job	
		6. Field of Specialization	
		7. MTUN	
B	WBL assessment	1. Logbook	9
		2. Portfolio	6
		3. Case Study	5
		4. Interview (Ethics)*Weekly*	9
		Performance	10
		5. Project/Assignment	12
		6. Presentation	10
		7. Site Inspection	10
		Total	**78**

2.2 Sampling

This study focuses on instructors who teach undergraduate technology programmes, with the study sample consisting of instructors from Universiti MTUN, Universiti Tun Hussein Onn (UTHM), Universiti Teknikal Malaysia Melaka (UTEM), Universiti Malaysia Pahang (UMP), and Universiti Malaysia Perlis (UNiMAP). 250 individuals from diverse industries make up the total population. As shown in the Table 2, this study's sample was comprised of 150 individuals from across Malaysia.

Table 2 - Population for multiple samples

No	MTUN	Sample
1	Universiti Tun Hussein Onn	39
2	Universiti Teknikal Malaysia Melaka	37
3	Universiti Malaysia Pahang	37
4	dan Universiti Malaysia Perlis	37
	Total	**150**

3. Results

A pilot study was conducted to test the reliability and validity of the instrument that had been developed. According to Popham (1990) and Gallagher (1998), the goal of the pilot study is to improve the quality of the items and confidence in interpreting the data after the analysis process. A pilot study for this perception item was carried out by involving a total of 30 instructors involved in the Bachelor of Technology program at MTUN. All respondents involved in this pilot study were excluded from answering the questionnaire during the actual study. Reliability in a quantitative study refers to a pilot study conducted to measure the consistency of measurements for each item and value for Cronbach's Alpha where Reliability and validity of the instrument found that each construct and item in the questionnaire reflects internal stability and consistency (Creswell, 2007).

3.1 Reliability Index and Separation Index

Based on the Rasch measurement model approach, the acceptable value of Cronbach's Alpha (α) for its reliability is between 0.71 - 0.99, where it is at the best level (71% - 99%) described as in Table 3 (Bond & Fox 2007).

Table 3 - Interpretation of Alpha-Cronbach scores (Bond & Fox 2007)

Score (Alpha-Cronbach)	Reliability
0.9 – 1.0	Very good and effective with a high level of consistency
0.7 – 0.8	Good and acceptable
0.6 – 0.7	Acceptable
<0.6	The item needs to be repaired
<0.5	Items need to be dropped

Statistical analysis using the Rasch measurement model technique was performed to identify the reliability values and item segregation in order to assess the reliability of the instrument's items. As can be seen in the Table 4, the results of the analysis of the pilot research revealed that the reliability value derived based on the Cronbach's Alpha value is 0.89. The instrument employed is in excellent and acceptable condition with a high degree of consistency, which may be utilised in real research, if it can clearly demonstrate this value.

Table 4 - Cronbach's Alpha (α) value

Person RAW Score-To-Measure Correlation	Cronbach Alpha (KR-20) Person Raw Score Reliability
.88	.89

The respondents' separation value was 5.02, while their dependability value was 0.96 (Table 5). This shows that the responders' high and positive dependability is clear. This is because dependability levels more than 0.8 are seen as acceptable and generally accepted, according to Bond and Fox's explanation in 2007. Although the respondents' separation value on the item's degree of difficulty revealed a good separation value, Linacre (2005) noted that a value higher than 2.0 is a good value.

Table 5 - Reliability index and separation index

	Reliability Index	Separation Index
Respondent	.96	5.02
Item	.70	2.50

3.2 Item Fit

Inspection of the suitability of the constructed item refers to the value recorded on the outfit mean Square (MNSQ) index. Researchers need to make observations on the values on this index to determine whether the items developed are appropriate (item fit) to measure an element or latent variable. Based on Bond & Fox (2007), in order to determine the appropriateness of the constructed study items, the MNSQ outfit value should be in the range between 0.6 to 1.4. The results of the analysis of this pilot study found that all items that are not in the set range should be dropped. The items can be seen in the Table 6 below.

Table 6 - Summary of questionnaire items

Outfit		*ITEM*
MNSQ	***ZSTD***	
1.54	1.7	P3
1.99	2.5	PM1
1.61	0.8	PK1

3.3 Distribution of Item Difficulty Levels and Respondents' Ability

According to Bond and Fox (2007), a map of item difficulty and respondent ability is used to establish if the given test or instrument is appropriate for the sample's ability or achieves the goal. It may demonstrate the differences in students' perceptions of each component as well as the distribution of items and responders. The variable maps column is as illustrated in the following Table 7 to display item and responder maps. The item/respondent map shows that, according to the findings of the research that was provided, all items may be agreed upon or that it is easy for respondents to assent. The distribution of the items, however, suggests that the degree of difficulty is almost evenly distributed, i.e., there are both challenging and simple objects.

Table 7 - Item Difficulty Levels and Respondents' Ability

```
INPUT: 121 Person  73 Item  MEASURED: 121 Person  73 Item  5 CATS WINSTEPS 3.69.1.11
-------------------------------------------------------------------------------
MAP OF Person AND Item
MEASURE                              |                              MEASURE
<more> -------------------- Person  -+- Item    ----------------- <rare>
X  |
|
XX T|
6                               X  +                                  6
|
X  |
XXX  |
X  |
5                              XXX  +                                 5
XXX S|
XXXXXX  |
X  |
XXXXXXXX  |
4                            XXXXXX  +                                4
XXXXXX  |
XXXXXXXX  |
XXXX M|
XXXXX  |
3                            XXXXXXX  +                               3
XXXXXX  |
XXXXX  |
XXXXX  |
XXXXX  |
2                           XXXXXXXX S+                               2
XX  |
XX  |
XXXXX  |
X  |
1                                    +                               1
X  |
T|T XX
X  |  XXXXXXXXX
|S XXXXXXXXXXXXX
0                                   +M XXXXXXXXXXXXXXXXXX            0
X  |S XXXXXXXXXXXXXXXXXX
|  XXXXXXXX
|T XX
|
-1                                   +                               -1
<less> -------------------- Person  -+- Item    ----------------- <frequent>
```

3.4 Eliminated Item

Following the data analysis, each item was evaluated based on the index standards and the conditions that must be fulfilled to attain the standard of validity and instrument reliability according to the Rasch measurement model. Referring to and contemplating expert opinions and evaluations facilitates the removal and refinement of items. According to the results of the pilot study, 3 items do not satisfy the established analysis requirements and must be eliminated. In addition, items with MNSQ values exceeding 1.30 are considered underfit. These undersized products were deemed perplexing and will barely affect the model's proportions. The items of the overall query are summarised in Table 8 below;

Table 8 - Summary of questionnaire items

No	Element	Maintained Item	Total Maintained Item	Removed Item	Total Removed Item
1	Logbook	BL1, BL2, BL3, BL4, BL5,BL6,BL7,BL8, BL9	9	None	0
2	Portfolio	P1,P2,P4,P5,P6, P7	6	P3	1
3	Course work	KK1,KK2,KK3,KK4,KK5	5	None	0
4	Ethics Tasks	TE1,TE2, TE3,TE4,TE5,TE6,TE7,TE8, TE9	9	None	0

5	Weekly Performance	WP1,WP2,WP3,WP4,WP5,WP6,WP 7,WP8,WP9, WP10	10	None	0
6	Assignment Project	PT1, PT2,PT3, PT4, PT5, PT6,PT7, PT8, PT9, PT10, PT11, PT12	12	None	0
7	Presentation	PM1,PM2,PM3,PM4,PM5,PM6,PM7 ,PM8, PM9, PM10	10	PM11	1
8	Site Inspection	PK2,PK3,PK4,PK5,PK6,PK7,PK8,P K9,PK10	9	PK1	1
Total Maintained Item			**70**	**Total Removed Item**	**3**

4. Conclusion

This study aims the evaluation of Work-Based Learning (WBL) components requires ensuring the validity and dependability of research instruments. Researchers can collect accurate and reliable data to inform decision-making and programme enhancements by employing rigorous methods and employing appropriate measures. This conclusion emphasises the significance of validity and dependability in assessing WBL elements.

Validity is the degree to which a research instrument measures what it is designed to measure. Validity can be obtained in the evaluation of WBL elements through meticulous instrument design that aligns research questions and objectives with the selected measures. Using established frameworks, theories, and previous WBL-related research can ensure content validity.

Reliability, on the other hand, alludes to the instrument's consistency and stability. To ensure the reliability of WBL element evaluations, researchers should employ standardised procedures, provide participants with explicit instructions, and train data collectors to minimise measurement errors. The test-retest reliability of a research instrument can be determined by administering it to a sample of participants at various time intervals and analysing the consistency of their responses.

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