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Instrument's Validity and Reliability for Assessing Teaching Practicum: A Case study in Construction Technology at Vocational Colleges

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Abstract: Teaching practicum is one of the important aspects of professional education, especially teaching in the field of Technical and Vocational Education and Training (TVET). This study aimed to identify the validity and reliability of instrument in construction technology at vocational colleges. This study deployed a mixed method approach using quantitative and qualitative analysis. The instruments comprised a questionnaire, observation review, and interview protocol that were modified to ensure compliance with the set objectives. The instrument was implemented based on predetermined procedures and it met the measurement standards for validity and reliability. The research conducted content validity and face validity on the constructed questionnaire, either by using construct determination, expert validation, or factor analysis for quantitative methods. Meanwhile, qualitative validity was implemented by triangulation, expert evaluation, and a review by the pilot study participants. The overall findings showed a high level of validity after some improvements were implemented. The findings of the Cronbach's alpha test for reliability analysis showed 0.90 and above for each item that was determined. Meanwhile, for qualitative study Cohen kappa analyses yielded a value of 0.87 for interviews and 0.83 for observations. This showed a high level of validity and reliability of the study instrument and thus it could be used in the actual study.

Keyword: Teaching practicum, instrument validity and reliability, construction technology

1. Introduction

The vocational education system in Malaysia has begun to pay special attention when vocational education, formerly considered as a second-class education, was transformed to vocational education. The transformation was introduced by the Malaysia government in 2012. According to the Minister, the vocational course reform was to ensure that there was no stigma in the vocational field, as students were previously being channelled into the field if they did not excel academically.

Practical teaching is closely related to the vocational field, whereby students are given the opportunity to apply the theory learned, and thus develop relevant practical skills (Ahmad et al., 2015). Prior to the teacher's presentation, students will present a demonstration. Students will ask questions during the demonstration and practise on their own, with monitoring from the teacher. Widiana et al., (2019) stated that practicality was a complex method that involved three teaching techniques, namely explanation, practical work, and discussion. Practicality is a very important teaching method in vocational teaching, involving hands-on training to teach the vocational students to become skilled workers in line with the construction technology field that prioritises the skills of the workers.

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Effective teaching practices are influenced by four factors, which are quality teaching, appropriateness of teaching level, incentives, and time. These four factors include planning, implementing and evaluating teaching (Slavin, 1994). From this point of view, it can be concluded that every teacher needs to implement a practice that is appropriate to his teaching process to ensure the quality of teaching that he wants to convey to the students regarding the pre, current, and post-teaching aspects (Ibrahim et al., 2020). In addition, effective teaching practices should also be incorporated into practical teaching to produce students who are skilled and competent in technical and vocational areas, which are in line with the Technical and Vocational Education Division (BPTV) vision to be the leading technical and vocational education leader in meeting the country's current needs.

This study will discuss the concept of validity and reliability based on the implementation of practical teaching practices in construction technology amongst lecturers in Negeri Sembilan and Melaka zones. This study was conducted by using a mixed-method analysis which involved a combination of qualitative and quantitative studies and the use of questionnaires, observations, and interviews for data collection. The definition of validity and reliability, as presented by the research experts, is the need to ensure that the direction of study is of better quality, has strong strength, and applicable (Mohamad et al., 2019). Therefore, this study aims to provide a clearer picture of how the researchers determine the validity and reliability of practical teaching practice instruments in construction technology amongst lecturers in the Negeri Sembilan and Melaka zones.

2. Methodology

This study was a descriptive study and used quantitative methods as the main method. Meanwhile, interview and observation methods were the main contributors to this study. The study population consisted of 20 construction technology lecturers who teach at six vocational colleges in Malacca and Negeri Sembilan. The selected sampling method was stratified random sampling. Every questionnaire had a number code slip. Slips were copied to represent each boring questionnaire. The slips were folded and included in six different containers which represent the vocational college set. Six slides were removed for each container, whereby each element in the population was selected. Instrument validation was done by submitting the questionnaire to a lecturer in University Tun Hussein Onn Malaysia (UTHM) who are specialist in language to confirm the use of accurate translation.

The interview was used to support the questionnaire. Respondents were amongst lecturers in construction technology who were experts in construction technology. The lecturers have Certificate of Skills Malaysia (SKM) at Level 3 and Level 4 and belong to a group of specialist teachers. In addition, an observation method was used to get information and sources of information. To obtain information, the study investigated pre-teaching, current teaching, and post-teaching practices conducted by the construction technology lecturers who were expert teachers. Everything that the lecturers did was recorded. Indirectly, the observation method, interviews, and analysis of documents had strengthened the data in interviews.

2.1 Validity

The instrument will produce high validity if it can measure based on the overall needs and meets the study objectives (Mohd Majid, 2005; Creswell, 2009, 2011; Pallant, 2010). This opinion was supported by studies (Sekaran, 1992; Mohd Najib, 2003; Tabachnick & Fidel, 2013) which stated that an instrument had high validity if it measured what should be measured. The determination of this validity was measured based on four main stages, namely:

- Domain identification
- Verification of instrument content
- Pilot study testing
- Validity analysis

2.2 Domain Identification

The items for this teacher teaching practice were determined through a literature review related to the three main frameworks, namely pre-teaching, current teaching practice, and post-teaching practices of construction technology. Based on the identification of these three components, 60 relevant items and discussion elements of practical teaching practice of construction technology lecturers were successfully identified.

All these items were written in the form of positive statements and constructed in a five-level Likert scale form of implementation, whereby high scores showed a high-frequency level of the lecturers' practical teaching practices implementation and vice versa.

The identification of each domain prior to the construction of questionnaire items was done along with guidelines set by the research through two main approaches. In the first approach, observations were conducted at three vocational colleges in Melaka to identify the lecturers' construction of practical teaching practices in construction technology The second approach was thorough research on several research instruments and policy documents for implementing *Sijil Kemahiran Malaysia* (SKM) by the Department of Skills Development (JPK), namely:

- Competency standard assessment document (DPSK)

- Vocational college standard curriculum (KSKV)
- National occupational skill standard (NOSS) - Residential building construction [BC-030-3: 2013]

2.3 Instrument Content Verification

Through this study, questionnaires and interview questions were constructed and tested on the face validity and content validity. Three experts in construction technology and three experts in technical and vocational education were referred. They comprised local university lecturers and officials at the Ministry of Education Malaysia. A brief profile of these experts is shown in the appendix.

This expert verification process was implemented in 8 months, starting from February to September 2020. During that period, modification for each item was repeated to ensure that the items produced could measure as set out in the study objectives. The determination of the questionnaire format structure was set according to the format such that each item was ensured in terms of instructions, clarity of meaning, and problem items built (Mohd Majid, 2005; Frankeal & Wallen, 2006; Pallant, 2010). Each item appropriateness structure was aligned between items with study objectives, item ability to measure study constructs, processing in terms of language usage, absence of repetition problems, and item organization.

Difficulty in forming the competency-based questionnaire items was amongst the reasons for the long time taken to process the construction of the item. All comments and remarks received from these experts were improved and applied to strengthen the quality of meaning, language, questionnaire content, and format structure used. This review process is continuously done until the expert panels were satisfied that items in the instrument had met the study objectives, suitability criteria, applicability, and completeness, including coherence with the identified components. This procedure had reduced the teacher teaching practice items from a total of 125 items to 60 items, in which 23.8% of items were removed from the list because they were not very relevant to the practical teaching practice indicators of the lecturers, as mentioned earlier. The instrument was structured into four parts, namely Part A (respondent demographic information) and Part B (practical pre-teaching practice), Part C (practice during practical teaching), and Part D (post-practice).

2.4 Pilot Study Testing

A pilot study was conducted to confirm the reliability level of the questionnaire distributed so that the findings were valid and reliable (Sekaran, 1992; Merriam, 2009). Reliability refers to the consistency or stability of data obtained through the conducted data collection (Neuman, 2003; Noraini, 2010). In addition, the level of study reliability also depends on the construct and content of items in the questionnaire. Meanwhile, validity refers to the assessment made on the appropriateness in the translation and the action taken on the test scores (Neuman, 2003; Ramlee Ismail et al., 2011). Therefore, this study has structured the pilot study test at several levels to ensure the production of items had a high level of validity and reliability.

2.4.1 Testing the First Pilot Study

A total of 20 lecturers from four vocational colleges in Negeri Sembilan and Melaka zones were asked to answer the questionnaires provided. This was to assess the suitability of the items provided. After the questionnaires were answered, the pilot study respondents were asked to comment, specifically in relation to the clarity of items, relevance to aim, understanding of the subject, and correct use of language. The pilot study respondents could answer all items presented. They did not give comments or suggestions to remove any items. However, improvements were made based on the views of pilot respondents, i.e., Section A, Section B, Section C, and Section D in the instrument should be separated into two different pages and not arranged continuously through the same page. At the first stage, The results of the pilot study showed that all items applied to their domain were not vague, confusing, or had potentially caused discomfort to the study respondents.

2.4.2 Second Pilot Study Test

After completing the pilot study test for the first time, it was continued with the second stage, which comprised 60 lecturers from 10 vocational colleges in Negeri Sembilan, Melaka, and Johor zones. They were asked to answer the provided questionnaire to confirm the suitability of items. These items were improved in terms of constructs, content and relevance to the study objectives. This was based on the feedback received from the study respondents at the first stage of the pilot study. Two weeks was set for respondents to answer the questionnaire. Then, the questionnaires were regrouped for analysis. As a token of appreciation, souvenirs were given to all respondents who had cooperated well to ensure that the study was implemented in an orderly and timely manner. After obtaining the entire instrument, it was analysed based on validity by factor analysis to ensure that each item was measured accordingly and met the prescribed construct.

2.5 Validity Analysis

To check the validity of structural aspects of items and determine how each item was within the predetermined factors a subsequent analysis was conducted. The validity of this construct was identified by performing an exploratory factor analysis (EFA) to identify the latent constructs in the instrument. Adequacy of criteria for performing factor analysis were reviewed based on sample size,) linearity check and factor review, which was to identify the significance of Bartlett's test of sphericity and Kaiser-Meyer-Olkin (KMO) (Hair et al., 2009; Tabachnick & Fidel, 2013). A subsequent key component analysis was performed on 60 items in this instrument by using Varivax rotation because this method provided a simple structure as compared to column rotation. A factor load value of 0.40 or more was set as a criterion to identify the resulting factors. In addition, Eigen value ≥1, high item load, and simple structural concepts, as suggested by Hair et al., (2009) and Piaw (2014), were also used as criteria in the determination of constructs.

2.6 Validity Construct

Through this study, the validity of the construct was determined based on two approaches, namely correlation and factor analysis, whereby the details of how the validity of the construct was determined to form the integrity of each item.

2.6.1 Relationship Per Item (Correlation)

Meanwhile, the validity of a questionnaire construction can be measured by evaluating the correlation between the score of each item and the total score. This was done by using Pearson correlation analysis if the data were normally distributed between the score of each item and the total score according to the construct. According to Mohd Najib (2003) and Malhotra (2007), the minimum and acceptable value of the correlation coefficient was 0.30, while Noraini (2010) and Piaw (2011) stated that the correlation value between items and a total score that exceeded 0.25 was high. Cohen et al. (2007) stated that the correlation value of 0.10 to 0.29 was small, the value of the correlation coefficient between 0.30 and 0.49 was moderate, and the value of correlation coefficient between 0.50 and 1.00 was high. In addition, Mohd Majid, (2005) and Rozmi, (2013) stated that the validity of the instrument could be seen in the value of item correlation corrected with the total score (corrected item-total correlation), which was the Pearson correlation coefficient between the score of each item and total score without the items. Therefore, to determine the validity of the questionnaire construct, this study used two methods, namely by using the correlation value between the score of each item and the total score, and by using the correlation value of items corrected with the total score (corrected item-total correlation).

2.6.2 Factor Analysis (EFA)

The process of validity by using factor analysis requires several conditions, amongst which the study data must use the interval-scale data and ratio implemented in the pilot study. Therefore, there were two elements in the pilot study. Firstly, was to test the level of validity of the construct, and secondly to test the level of reliability of the instrument. However, factor analysis requires a large sample size as compared to reliability tests, such as internal consistency tests through Cronbach's alpha values. The scale of this instrument used a Likert scale (interval scale). Therefore, all variables were suitable for correlation analysis through factor analysis techniques. In addition, sample sizes of over 100 sufficed for the factor analysis. A check of linearity by using the scatter plots method (Tabachnick & Fidell, 2013) showed that the problem of linearity did not occur. Factor reviews were also performed by examining measures of sampling adequacy (Bartlett's test of sphericity and KaiserMeyer-Olkin) before factor analysis was performed. The Kaiser-Meyer-Olkin (KMO) value was 0.56. This value was higher than the minimum requirement, which was 0.5, as suggested by (Hair et al., 2009; Tabachnick & Fidell, 2013). Revision of the value of Bartlett's test of sphericity was significant. This showed that the correlation that existed between items was not a matrix of identity. All values of the correlation coefficient on the correlation matrix table for the items in this instrument were moderately high, and the determinant value of each was equal to 136, which was 0.0000. These findings further supported that the research data did not have multicollinearity problems. This provided evidence of the factorability of the items in the questionnaire. Then, based on all findings, the analytical factors could be implemented on all items listed in the practical teaching practice instrument of the construction technology lecturers. The factor rotation method was separately done for each construct, namely pre-practical teaching, during practical teaching, and post-practical teaching.

2.6.2.1 Practical Pre-Teaching

Determination of each component was separately carried out, with factor analysis performed for the initial component of teaching. Based on the criteria that only factors that Eigen value ≥1 will be maintained (Field, 2009; Hair et al., 2009; Piaw, 2014), it was found that there were seven factors which showed igen1 and Eigen values were maintained for rotation, which were 3.67 and 2.18. 1.51, 1.35, 1.30, 1.18, and 1.07 were against the overall variance. All 7 factors influenced 72.28% of the change in the overall variance of the research study data. However, the

examination of the distribution plot (scree plot) showed the occurrence of a clear graph, landing on the third factor. This was logical because Factor 1 to Factor 3(three factors) affected 38.49% of cumulative variance as compared to Factor 4 to Factor 7 (four factors), which only affected 37.28% of cumulative variance. Therefore, these findings suggested that three sub-components could have a significant influence on the overall variance change of the items, as compared to the other four factors. Therefore, three factors were maintained based on the literature review conducted for the next stage of analysis. As a result, five items (items 4, 7, 8, 11, and 14), which showed low factor load value (<0.4) and lack of relevance to other factors, were removed from the analysis after a subjective evaluation and parallel analysis of the meaning of items was made. Other items which were found to have a loading factor of over one factor were placed on the factor, whereby the load value of the items was the highest and the difference between load factor values of item exceeded 0.10 (Hair et al., 2009, 2013).

2.6.2.2 During Practical Teaching

Determination of the components implemented by factor analysis was done for the components of teaching development. Based on the criteria that only factors that Eigen value ≥1 will be maintained (Field, 2009; Hair et al,, 2009; Piaw, 2014), it was found that 12 factors showed Eigen values which were maintained for rotation, which were 5.33, 2.38, 2.19, respectively, while 1.87, 1.75, 1.64, 1.45, 1.42, 1.31, 1.18, 1.09 and 1.00 were against the overall variance. All 12 factors influenced 73.09 % of changes in the overall variance research study data. However, the examination of the distribution plot (scree plot) showed the occurrence of a clear graph, landing on the fifth factor. This was logical because Factor 1 to Factor 5 (five factors) affected 39.11% of cumulative variance as compared to Factor 6 to Factor 12 (six factors), which only affected 38.28 % of cumulative variance. Therefore, these findings suggested that only sub-components could have a significant influence on the overall variance change of the item as compared to the other six factors. Therefore, five factors were maintained based on the literature review which was conducted for the next stage of analysis. For exploratory, factor analysis (EFA) after the factors were determined by implementing the rotation of varimax on 45 items which represented the five implementations of practical teaching practices of construction technology lecturers. As a result, eight items (items 28, 29, 32, 36, 37, 38, 47, 56) showed low load factor value (<0.4) and lack of relevance to other factors. They were removed from the analysis after subjective evaluation and analysis parallel to the meaning of the items were made. Other items found to be loaded with over one factor were placed, whereby the load value of the item was the highest and the difference between the factor load values of the items exceeded 0.10 (Hair et al.,2009; Tabachnick & Fidell, 2013).

2.6.2.3 Post-Teaching Practices

Determination of the components implemented by factor analysis was set for the third stage, which is for the closing component of teaching. Based on the criteria that only factors in which the Eigen value ≥1 will be maintained (Field, 2009; Hair et al., 2009; Piaw, 2014), it was found that there were eight factors which showed the Eigen value ≥1 was maintained for rotation, which were 5.52 and 2.43. 2.20, 1.90, 1.63, 1.41, 1.31, and 1.22 were against the overall variance. All eight factors influenced 65.40% of the change in the overall variance of research study data. However, the examination of the distribution plot (scree plot) showed the occurrence of a clear graph, landing on the third factor. This was logical because Factor 1 to Factor 3 (three factors) affected 34.84% of cumulative variance as compared to Factor 4 to Factor 8 (five factors), which only affected 31.40% of cumulative variance. Therefore, these findings suggested that only sub-components could have a significant influence on the overall variance change of the item as compared to the other five factors. Therefore, three factors were maintained based on the literature review which was conducted for the next stage of analysis. For exploratory factor analysis(EFA) after the factors were determined by implementing varimax rotation on 27 items, representing the three implementations of practical teaching practice of construction technology lecturers. As a result, two items (Item 53 and Item 56) which showed low factor load value (<0.4) and lack of relevance with other factors, were removed from the analysis after subjective assessment and parallel analysis of the meaning of the items were made. Other items found to be loaded with over one factor were placed on the factor, whereby the load value of the item was the highest and the difference between the factor load values of the item exceeded 0.10 (Hair et al., 2009; Tabachnick & Fidell, 20).

2.7 Qualitative Validity (Observations and Interviews)

Validity in qualitative research is defined as the extent to which an image is observed to represent a phenomenon that is referred to and studied. In this study, validation for observation, review, and interview protocol were done in three main methods. This was to ensure that each item has a high level of validity (Merriam, 2009; Marohaini, 2013).

- Triangulation
- Expert evaluation
- Review by participants for pilot study

2.7.1 Triangulation

For research studies that use a qualitative approach through interviews, observations, and documents, the use of the triangulation technique can strengthen the validity of a study. The simultaneous use of triangulation techniques (questionnaires, interviews, and observations) in a study should be made in the form of the equivalent form (criteria and constructs of the same item in various types of instruments) (Marohaini, 2013; Creswell, 2014). This approach was used in this study because of the questionnaire construction, each of the same constructs was used to produce interview protocols and observation observations through modifications to meet the criteria for implementing qualitative methods. After completing this triangulation approach, validation and evaluation from the designated experts were used.

2.7.2 Expert Assessment

According to Othman (2007) and Morse (2011), the validity of the content can be explained through the views and evaluations of several external experts on the content of the interview and observation protocol. The research used two experts, comprising qualitative experts and content experts. These experts were given a month to test the instruments produced. These experts comprised the local University lecturers.

- Expert 1 (qualitative) –Universiti Tun Hussein Onn Malaysia
- Expert 2 (content) -Universiti Teknologi Malaysia

Through the findings from this assessment, correction based on recommendations was made. Once the correction was done, the instrument for re-evaluation was again submitted. Once the experts were satisfied, the Cohen Kappa test was continued to ensure a high level of reliability and it could be used for field studies. Once the expert evaluation was obtained, a pilot study for qualitative methods was conducted and reviewed by the study participants to ensure high validity.

2.7.3 Review by Pilot Study Participants

Cresswell (2009) and Mokhtar (2011) stated that the review by participants was a determination of verification which could be implemented through the return of interview transcripts and review of attention to the pilot study participants for review and recognition. In this study, the instrument was built, and pilot study respondents were asked to review and ensure that the instrument used was under the observation and interview constructs. This review process was conducted for two weeks a day with 10 participants involved. From this review, several improvements were implemented, involving sentence structure, grammar, defined meaning, construct structure, sentence comprehension, and the concept of variables. Therefore, based on the suggestions from the respondents, corrections were made to meet the requirements set by the respondents.

3. Result

3.1 Trustworthiness

Reliability refers to the extent to which the findings of a study, when re-done, can produce the same results (Othman, 2007; Romzi, 2013). Therefore, reliability is concerned with the consistency, accuracy, or accuracy of a measure implemented. Instrument reliability is checked by using internal consistency testing procedures and instrument stability testing. Cronbach's alpha coefficient was used to determine the value of internal consistency of each synthesised factor, and all items for this instrument exceeded 0.90, which showed good internal consistency for an instrument that adapted several other instruments to a new instrument (Sekaran, 1992; Nunnally & Bernstein, 1994; Siti Rahayah, 2003; Neuman et al., 2003; Mohd Majid, 2005).

3.2 Cronbach’s Alpha

The reliability of these study instruments referred to the internal stability and consistency of the questionnaire (Sekaran, 1992; Creswell, 2009; Pallant, 2010). To measure the internal consistency of a construct, the value of Cronbach’s alpha should be the reference (Cronbach, 1946). Therefore, in the pilot study, the data were obtained, collected, and measured the level of reliability by using Cronbach’s alpha statistical test in statistical packages for social science (SPSS) Version 20.0 software. This statement was often used by (Mohd Majid, 2005; Pallant, 2010) who stated that Cronbach’s alpha values of above 0.60 were used to measure the reliability index of a study instrument. For (Sekaran, 1992), Cronbach Alpha values less than 0.60 were not acceptable, values between 0.60 and 0.80 were acceptable, and values above 0.80 were good and usable. Therefore, in determining the reliability of research instruments, Cronbach’s alpha values were used based on views (Sekaran, 1992; Mohd Majid, 2005; Creswell, 2009 & Pallant, 2010). This determination is as in Table 1.

Based on Table 1, if the Cronbach’s alpha value showed a value exceeding 0.70, it could be concluded that the study questionnaire had a high consistency of constructs, as suggested by (Sekaran, 1992; Mohd Majid, 2005; Pallant,

2010). However, improving the items would also be done, including the corrected scores with total scores (corrected item-total correlation) for the questionnaire items passed the value of 0.30 and improved the statement of items based on the views and recommendations of the appointed reference experts (Hair et al., 2009; Piaw, 2011). The results of the reliability analysis of the questionnaire instrument, which was conducted through a pilot study as in Table 2.

Table 1 - Classification of reliability index

Indicator	Alpha Cronbach Value
Highest	>0.90
High	0.70-0.89
Medium	0.30-0.69
Low	<0.30

Source: (Sekaran, 1992; Mohd Majid, 2005; Creswell, 2009: Pallant, 2010)

Table 2 - Cronbach's Alpha Value

Practice	Aspect	Cronbach Alpha Value
Pre teaching	Provide lesson plans (RPH)	0.902
	Provides training session plans (RSL)	0.901
	Provides teaching aids	0.902
	Teaching aids are used	0.903
During teaching	Teaching induction set	0.901
	Teaching methods	0.902
	Delivery of teaching	0.898
	Check student understanding	0.900
Post teaching	Reflection of teaching	0.901
	Provide training	0.901
	Student assessment	0.902
	Teacher advanced teaching	0.901
Overall Value		**0.902**

3.3 Qualitative Reliability (Observations and Interviews)

Qualitative data by using the Cohen kappa scale analysis were used to determine the level of agreement between testing experts. The cooperation of two experts in the qualitative field was sought to test the observational and interview data based on pre-defined themes (Merriam, 2009; Marohaini, 2013; Piaw, 2014). After the evaluation was conducted by two experts based on the theme, calculations were made based on the formula as prescribed.

K Formula
K = Approval Coefficient Value
Fa = Agreed units (i.e., scores from experts 1, 2, and 3)
Fc = Probability unit set at 50% of N
N= number of units / themes tested

$$= \frac{fa - fc}{N\text{-}fc}$$

Based on the calculation formula of Cohen kappa above, the results of the analysis of both expert panels showed a high value of agreement that was 0.87 observations and 0.83 interviews. The example of Cohen kappa calculation and Cohen Kappa agreement is as in Table 3. Below 0.81 and 1.00 are high agreement values, while 0.61 to 0.8 are good agreement values. Those from 0.41 to 0.60 are moderate agreement values, while from 0.21 to 0.40 are less than satisfactory agreement values. However, from 0.00 to 0.20 are unsatisfactory agreement values and below 0.00 are weak agreement values. Based on the view (Mokhtar, 2011; Morse, 2011), the value of 0.81 to 1.00 were high agreement values; 0.61 to 0.80 were good agreement values, 0.41 to 0.60 were moderate agreement value; 0.20 to 0.40 are the unsatisfactory agreement values and 0.00 to 0.20 are the unsatisfactory agreement values and below 0.00 are weak agreement values.

Overall, a study process by using mixed-method design analysis requires a comprehensive implementation of validity and reliability, a longer period, involving a variety of analyses and the production of complex instruments. Overall, preparing instruments for questionnaires, observations, and interviews were determine by seven experts to ensure the validity of the face and its contents. Four experts were to confirm the quantitative study, while three experts were involved in the qualitative study. Meanwhile, the validity of the construct was determined by i) the correlation

value of the item score with total score ii) the correlation value of the item corrected with the total score (corrected item-total correlation). Validity was continued with the factor analysis (EFA) test. The results found that out of 99 items, 39 items needed to be removed because they did not meet the pre-requisites for retention, and only 60 items were maintained under the 11 factors that were set. For qualitative research, triangulation methods, expert evaluation, and review of pilot study participants were used. For the method in determining the reliability of research instruments, Cronbach Alpha values were used based on views (Mohd Majid, 2005; Creswell, 2009; Pallant, 2010). The test results found that the whole construct recorded 0.902, which showed a high level of reliability. For observation and interview instruments, the Cohen kappa test showed high values. Determining the validity and reliability of these questionnaires, observations, and interviews allowed the research to achieve the study objectives which were set and met the criteria of the research instrument to be used in the field study.

Table 3 - Examples of Cohen Kappa calculations for observational and interview data

Type of Data	Expert 1	Expert 2	Approval Coefficient Value	Cohen Kappa
Observation	K=$\frac{38-20}{40-20}$	K=$\frac{37-20}{40-20}$	$\frac{0.9+0.85}{2}$	
				0.87
	=$\frac{18}{20}$	=$\frac{17}{20}$		
	=0.9	=0.85		
Interview	K=$\frac{28-15}{30-15}$	K=$\frac{27-15}{30-15}$	$\frac{0.86+0.8}{2}$	
				0.83
	=$\frac{13}{15}$	=$\frac{12}{15}$		
	=0.86	0.85		

4. Conclusion

Based on the study results, it was found that lecturers at the Vocational College Construction Technology in Malacca and Negeri Sembilan have implemented good teaching practices and appropriate subjects, involving practical work. Indirectly it can be concluded that the lecturers of construction technology have knowledge of pedagogy in carrying out their teaching activities. However, there is a lack of student supervision in the element of training and practical evaluation. Therefore, teachers need to immediately correct any weaknesses identified to prevent leakage in teaching activities and provide effective learning for students in line with (Shahril, 2016) view, whereby effective teaching is the ability of teachers to convey teaching information effectively, which indirectly motivates students to excel.

To realise this, cooperation from various parties, such as the Ministry of Education, administrators, parents, and the community must be enhanced to assist teachers in producing outstanding students in line with the national education philosophy, which is to create intellectually, spiritually, emotionally, and physically based on trust and obedience to God.

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