

Development of Basic Quantity Surveying Learning Module Through 21st Century Learning Activity

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Abstract: Technical and Vocational Education in Malaysia (TVET) is one of the most important branches of education to produce a balanced human capital. Not only the skills in the field need to be emphasized, but the skills also need to be enhanced under the 'Eleventh Malaysia Plan ' (RMK-11). 21st century learning is a student centered learning process based on 4C's elements which are communication, collaborative, critical thinking and creativity. The importance of producing 21st century learning based modules is essential to ensure that TVET students, especially at the Vocational College, are exposed to 21st century learning activities and can apply the 4C's element. Therefore, this study was conducted to develop Basic Quantity Surveying Learning Module Through The 21st Century Learning Activity that tested its validity and credibility as reference material or teaching aids to assist teachers and students taking this course. This module design has two stages beginning with goal building and ending with a complete module that is ready to use. The module validation process involves using the instrument and involving three experts for verification. The evaluation of the module validation consists of a questionnaire consisting of 28 items based on the format and content of the module. The findings show that Basic Quantity Surveying Learning Module Through The 21st Century Learning Activity is highly validated. Analyst views are presented as a percentage. Based on the result, 96% agree on the design of the module while 98.46% agree on the content of the module developed. Through the analysis of the findings, the Basic Quantity Surveying Module Through The 21st Century Learning Activities has high content validity.

Keywords: 21st Century Learning, 21st Century Learning Activity, Basic Quantity Surveying

1. Introduction

Various efforts must be made in the country's education system to produce high-quality generation and skills to meet the challenges of the 21st century. TVET is considered to be very important because through it, the country can produce a skilled, semi-skilled and professional workforce. TVET is an educational process that provides specialized training, technical skills in specific areas. The main purpose of TVET is to produce highly-skilled, knowledgeable, innovative and capable human capital with high challenges and competition and to meet the needs of the industry to contribute to the country's economic development in line with globalization. The Ministry of Education Malaysia (MOE) has made a change in the Education System and TVET by emphasizing the development of potential students with a wide range of interests and abilities in the Malaysian Education Development Plan 2013 - 2025 TVET education is considered to be increasingly important for the country's economic development. It is designed to prepare students for the challenges of 21st century education. 21st century learning was introduced to prepare the generation with such challenges. 21st century learning is learning that incorporates 4C elements of communication, collaborative, critical thinking and creativity. This is because 4C-based learning in the face of the industrial revolution era can be done by instilling four skills that enable students to develop their own capabilities (Juwita, 2019). The need for 21st-century skills is essential to prepare students to meet future challenges, especially in the field of TVET, which is now focused on improving economics. Vocational College is one of the institutions involved.

1.1 Research background

There are some issues and problems that arise in the implementation of this 21st century learning. Among these issues and concerns, a study by Yusak and Ladin (2019) found that the 21st century learning strategy used by teachers was still low, in which not all school teachers could use the 21st century learning strategy during lessons and learning sessions. This is due to a sense of inadequacy. Moreover, based on a previous study by Shaari et al. (2017) explain that 21st century learning emphasizes communication, collaboration, criticality and creativity. Many teacher educators prefer to use teacher-centered instruction. Problem-solving and decision-making abilities are important 21st-century skills. A study conducted by Peng and Nadaraja (2016) found that students take longer to apply thinking skills in the learning process. This is because teachers do not use proper questioning techniques which cause the students not to think quickly.

In addition, according to a study conducted by Yamin (2018), he thinks that many students still have problems with practical communication skills. This is because students encounter problematic communication skills with educators, peers. In a recent study conducted by Dazali and Awang (2016), the effectiveness of the teaching and learning process would be compromised if teachers failed to establish excellent communication as students would have problems when graduating if these skills were not implemented in the education setting. In a recent study conducted by Hamdan (2018), it was found that among the complaints received from employers was that most of the graduates in engineering were excellent academically but lacked communication skills. This shows that students' interpersonal skills are also missing.

According to Ilias et al. (2013) found that the existence of personal factors preventing the use of teaching aids was due to the widespread experience of teachers. Personal factors are those that affect one's ability to effectively manage teaching aids. Therefore, mastery in the use of teaching aids is important in teaching and facilitating. Based on a study conducted by Mohsin and Hassan (2011), the diversity in the use of teaching aids to create an environment that is of interest to students today is increasingly being given priority. In the technological sector, there are few references or studies on the

creation of modules or teaching aids that contribute to 21st-century learning. In order to extend the usage of government student-centered interventions, it is crucial to increase the use of 21st century learning in teaching and learning, especially for TVET students.

1.2 Problem statement

The first issue that could be identified through the previous study was the problem of teachers using student-centered approaches or better known as SCL (student-centered learning). In 21st century learning it has been stated that the implementation of teaching and learning needs to be student centered so that the implementation of 4C's elements can be applied more effectively. Therefore, teachers' understanding of 21st century learning needs to be enhanced in order to effectively and effectively deliver teaching and learning. The next problem that can be seen is the problem faced by the students, which is their communication skills. Then, critical and creative thinking skills are also evaluated by the employer. This is because they need graduates who can solve problems quickly and effectively. vocational college students' exposure to student-based learning approaches through 21st century learning Learning activities can help students to apply 21st century skills and also help teachers to use existing 21st century learning activities appropriately. Therefore, it is important to provide modules as a guide to use during teaching and learning, especially for technical courses at Vocational College today that only receive notes or slides from teachers.

The objectives of this study are:

- i. Design the development of the Basic Quantity Surveying Learning Module Through the 21st Century Learning Activity suitable for Construction Technology courses.
- ii. Verify the contents of the Basic Quantity Surveying Learning Module Through the 21st Century Learning Activity suitable for Construction Technology courses.

1.3 The Module Development Process and Evaluation

The study of module development requirements, the discovery of appropriate models for module development, and the initial assessment of module material are the three sections of the module development process. The needs analysis implemented is to identify the existing teaching methods as well as feedback from some teachers who teach this course. The conclusion is that they suggest a module with the SCL concept so that students have reference material. 21st century learning emphasizes SCL, therefore criteria in 21st century learning is applied in this module. Sidek's Module Development Model is used in the module development process. However, it does not consider the whole process proposed by Sidek due to the time factors and the level of this study conducted. The process only considers the level of development and initial evaluation of the module only. Figure 1 explained the process of module development.

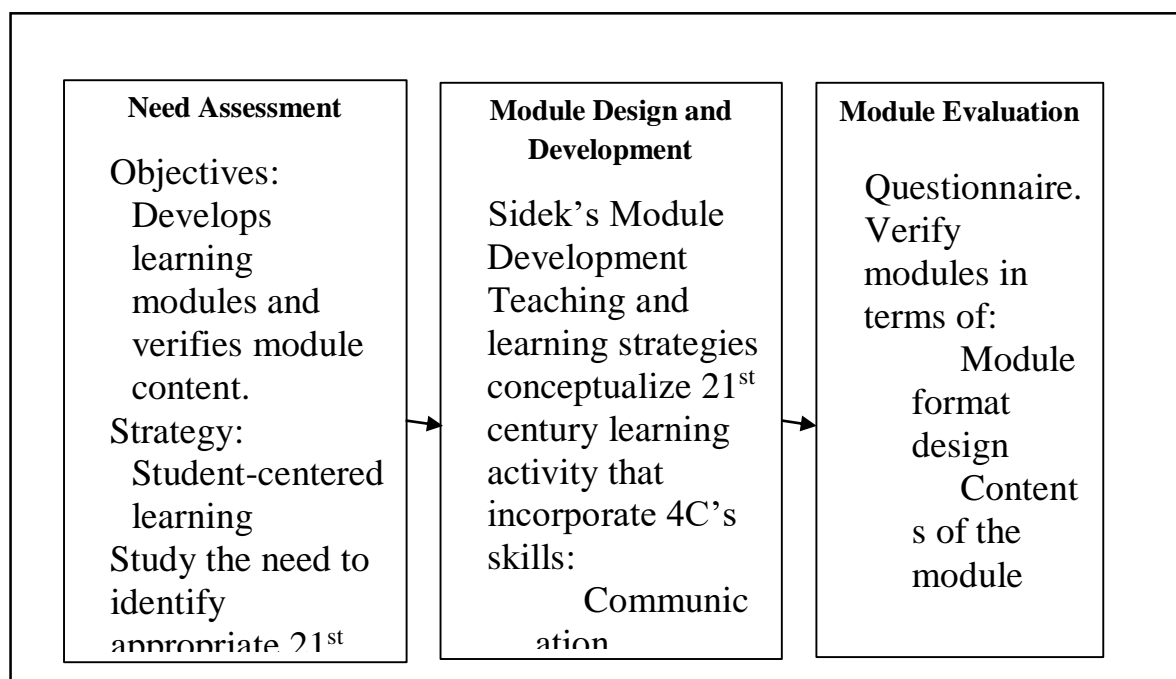


Figure 1: Module Development

1.4 21st Century learning

To ensure that the country's economy thrives in education is important for a first step - the starting point. This is because, with the knowledgeable and highly skilled community in the field of technology and communication, the country's economy will grow. Although information and communication technologies are the catalysts for the transfer of learning from the industrial age to the knowledge age, it is a non-determinant tool in the learning process (Wijaya et al., 2016). MOE is continually striving to improve their educational performance (Iberahim et al., 2017). The 21st century skills are essential learning skills that students need to compete in this century (Iberahim et al., 2017). According to a study conducted by Saleh and Rosli (2018), the application of 21st century learning is applied through the concept of today's learning life to ensure mastery in creative, critical thinking, collaborative and theoretical and practical aspects. 21st century competence is a key competency that students must have to participate in real life in the 21st century (Wijaya et al., 2016).

A recent study conducted by (Mohamod, 2011), teachers in the 21st century need to have the strength of mind, the agility of their creativity, the strength of their idealism and their strength. Mahbib & Esa (2014) agree that teachers not only need to succeed in the academic field, but they must master 21st century teaching techniques. However, if a teacher is not able to master the techniques involved in a method, then the likelihood of the method will fail (Mohamod, 2011). In this regard, teacher education programs are essential to equip teachers with professional skills to enable them to teach more effectively (Zawawi, 2011). Furthermore, according to Berret (2012), there are teachers who claim that technology does not improve education but gives them worse teaching experience and tasks. In contrast to the study conducted by Fletcher (2017), it is argued that many modern societies have viewed the advancement of

educational technology as a potential catalyst for major reforms in education. Therefore, education is no exception to the use of technology. Lecturers and teachers need to master the use of technology in line with the passage of time in the teaching and learning process. Students need to be exposed to technology so that they do not miss out.

1.5 Concept in 21st century learning

The features of 21st century learning include all 21st century skills including skills and creativity, entrepreneurship, soft skills and technological skills embodied in vocational college standard curriculum through the use of the '4C' concept of creativity, critical thinking, collaboration and communication. The findings of a previous study conducted by Eow (2018), found that significance for all 4C skills and 21st century learning practice culture showed that the interventions performed were better than conventional teaching and learning. The results of the study conducted by Ismail and Ismail (2018) also show that the knowledge and concepts of 4C applied by trainee teachers are at a high level. Therefore, educators need to leverage existing skills by actively engaging students with a variety of teaching methods and strategies that can train students to master these 21st century skills. Figure 2 shows the 21st century learning skills (<https://www.aeseducation.com/blog/what-are-21st-century-skills>).



Figure 2: 21st Century Learning Skills

1.5.1 Communication

According to a previous study by Jagadheeswari et al. (2019), he argues that students need to focus on communication skills to become the dynamic and effective communicators that are most needed in today's corporate world. The study is similar to the study conducted by Ahmadian and Amirpour (2018). As such, communication skills are not only needed during the course of study, but they extend into the workforce. Jones (2015), in her study as educators, should also help our students develop strong communication skills for our current modes, and skills-based communication for future modes enhanced with rapidly evolving technologies. A recent study conducted by Ismail and Ismail (2018) found that effective communication was a key element in establishing a cooperative attitude among students, fostering good moral values and fostering community-friendly relationships.

1.5.2 Collaboration

Based on previous studies by Coetzee et al. (2018), one of the strategies that can be used to develop the knowledge and skills of the students mentioned above is collaborative learning. It is often considered a social context created by having students in small groups work together during learning. Typically, assignments are given through group projects (Retnowati et al., 2018). In addition, according to (Othman & Harun, 2015) collaborative learning methods are able to develop student potential and give students confidence in managing and training their teammates to succeed.

1.5.3 Critical thinking

In a recent study conducted by Nordin (2017), he noted that a new element in pedagogy is the use of classroom strategies by teachers which means teachers are given the discretion to manage learning in a variety of ways as long as it is student centered and promotes critical thinking, creative and innovative. Therefore, in a recent study by Sun and van Es (2015) suggested that in culture, the learning environment in the classroom should impact students' ability to think critically. The same viewpoint presented by Tandiseru (2015) is that critical thinking and creative thinking skills can be developed in a student-centered learning environment, which provides space for a growing intellectual and independent thinker.

1.5.4 Creativity

Jantan (2016) argues that aspects of creativity and innovation have begun to be the focus of the country in strengthening the fields of Science, Technology, Engineering and Vocational especially through systematic exposure and training on the country's human resources. However, in the context of present-day reality, creativity, and innovation have not yet been fully applied and practised (Salam, 2008). Based on a study conducted by Lu (2017), who found that experiences with the environment can benefit students by increasing their creativity. However, understanding the actual concept of creativity is especially important for educators who play a role in fostering student creativity in the classroom. According to a study conducted by Buntat and Mohamed (2010), it has been proven that technical teachers also use creative and critical thinking tools in the teaching of technical subjects. As such, it clearly shows that creativity can not only exist on its own, but it needs something to motivate an individual to become creative (Buntat et al., 2011).

1.6 21st Century learning activities

The Ministry of Education Malaysia (2013), stated that there are various strategies in 21st Century skills activities. According to a recent study by Zamri (2012), the form of teaching and facilitating in the 21st century was still teacher centered, but it plays an important role in engaging students in school-based learning activities. Therefore, knowledge of 21st century skills is important for teachers and students to master classroom learning and teaching in an effortless and fun environment (Ibrahim et al., 2017). With 21st century learning these activities, teachers can increase students' interest in their learning.

1.6.1 Adaptation of technology to learning activities

One of the activities that involve the use of technology and information is flipped classroom. Students are given a video to watch before entering class. In the classroom, there is only a learning session with learning activities. Other than that, the activity of producing video clips is also the use of technology in learning. According to a recent study conducted by Sidek and Hashim (2016), video-based teaching plays a role in promoting student-centered learning (SCL) strategies among students.

1.6.2 Student presentation skills in activities

Among the activities involved are gallery walk activities. Based on a recent study by Anwar (2015), he states that gallery walk is a method of presentation where students individually or in groups display their work products (often on posters) and then walk around the room looking at their work. Next, activities involving presentation skills are hot seat activities. This activity will be done when a learning topic is completed by the teacher. Students will be given time to read individually or in groups. One of the students will be randomly selected in the chair provided and be an 'expert' who will answer any other student's questions. Through this activity, students will be able to use critical thinking skills.

1.6.3 Thinking skills in activity

In a study conducted by Syafii and Yassin (2013) it was argued that skills can be trained through cognitive activities such as problem solving, critical thinking, and creative thinking. Therefore, there are cognitive activities that can train students in thinking skills. The first activity is, I see, I think, I wonder. This activity encourages students to make careful observations and wise interpretations while stimulating curiosity and setting the stage for investigation. The activity that can help students think is to do I-think map creation activities. This is because according to Sidik et al. (2019), in applying high-level thinking skills, the use of i-think maps will enable students to use it as a basis for fast and effective understanding of learning content, as well as enhanced understanding.

1.6.4 Group discussion activities

The first activity that can enhance collaboration is round table activity. The round table is made up of small groups of students, and each student is given a role to talk specifically on the topic. The benefits of this activity are that students can build relationships with their peers in the classroom and be able to integrate listening and speaking skills further, developing students' confidence and speaking fluency. The next activity that involves collaboration is think pair share activity. Based on a recent study by Kaddoura (2013), a teaching strategy that gives students the opportunity to share their thoughts with at least one other student is Think Pair Share.

1.7 Module Development Model

The development of a good module should consider various rules and procedures to produce the best effect (Sidek Mohd Noah & Jamaludin Ahmad, 2005). Rules and procedures are the basis for the development of a module to ensure that the module produced is based on legitimate and reliable sources several approaches in module construction introduced by several researchers include Sharifah Alwiah Alsagoff (1981), Russell (1974), Design and Development Research –DDR (Richey, Klein, & Nelson, 2004), and Sidek-MPMS Module Construction Model (Sidek Mohd Noah & Jamaluddin Ahmad, 2005). Figure 3 shows the overall process of Sidek’s Module Development. Due to demarcation and limitation for the level of the program to conduct research, this study only focuses on Stage I; prepare a draft modul.

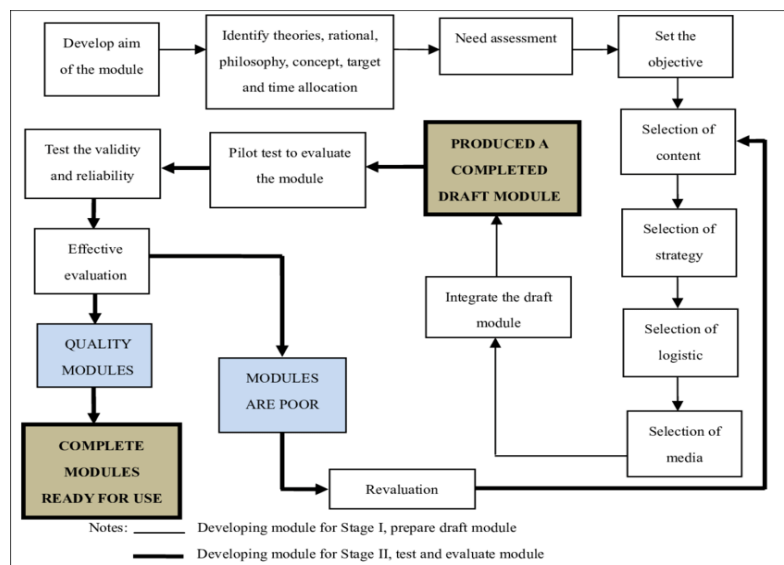


Figure 3: Sidek’s Module Development

2. Methodology

The design of this study is a study of product development and survey studies which is intended as the Basic Quantity Surveying Learning Module Through 21st Century Learning Activity to serve as a learning and reference material for students and lecturers in the field of Construction Technology at vocational college. Researchers have used the Vocational College Standard Curriculum as a reference in producing content in the development of the module. In this study, the researcher has selected the Sidek Module Development Model as a reference to develop the module. The model is adapted and divided into two stages of the development process. The research method used in the preparation of this study is by using a quantitative approach, this is because this study can be described numerically. Five respondents involved in module evaluation to evaluate in terms of format and content.

2.1 Research Procedure

The emphasis of this research is on the 4C concept of communication, collaboration, critical thought, and creativity in 21st-century teaching and learning for students and lecturers of Construction Technology courses at vocational colleges. To develop this learning module, the model chosen by the researcher to be used as a guide is the Sidek Module Development Model. This model approach has two different levels that have different goals for each level. This stage has nine steps that begin with the purpose of setting the module and end with a combination of activities into one complete module. The second stage is to evaluate the draft module. If the draft module is proven to have high validity and reliability, then the process in developing the module is considered complete. In this study the module development process will go through two stages by adapting through the Sidek model. however, it is modified according to the suitability of the context and the time limit of the study conducted. In that stage there are several steps that will be used according to the suitability of the study. Figure 1 shows the steps that will be used through the Sidek module development model.

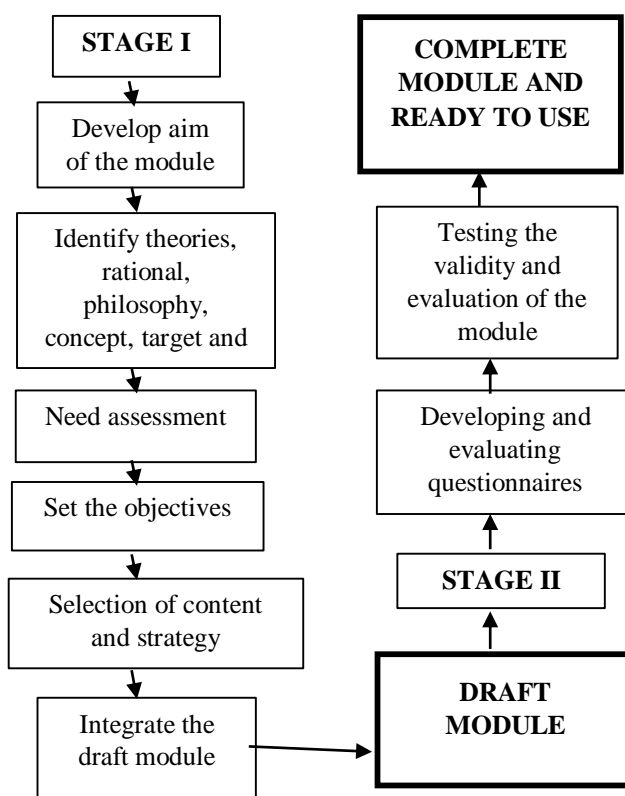


Figure 4: Module development procedure

2.3 Research Instrument

The information gathered is primary data, which is information taken from a primary source and used to answer the study query. In this study, a set of questionnaires used for the module evaluation process by the five experts mentioned. This is because the questionnaire is an easy-to-use instrument in addition it also saves time for data collection. The questionnaire in this study was developed and obtained instrument confirmation from experts. The questionnaire is divided into part A, part B and part C. In part A, it is information about the demographics of the respondents which includes gender, field of expertise, level of education and teaching experience. Next, in part B is to verify the design of the module development format, in part C is to verify the content of the module development and part D is the comments and suggestions of the respondents. The likert scale will be used to evaluate the responses provided by the respondents in the survey. As a result, all of the information gathered from the respondents was processed using Microsoft Excel software to calculate percentages and then displayed in tabular form. The purpose of the analysis method using this software due to the number of respondents does not exceed 30 people.

3. Results and Discussion

Data were analyzed and presented in a percentage (%). Based on the analysis of Table 1 shows that respondents provided positive feedback on the design of the module developed. It can be inferred from this study that almost all respondents approve of the format design in this module. Most respondents give positive responses for the module design. Module development that truly meets the needs of the user takes a long time. To produce teaching and learning materials that can help students to study well, the material should be assessed for its suitability based on the syllabus so that the content does not stray from what should be. Even so, it does not mean preventing students from finding other sources but based on a syllabus set, then not too widely students need to learn according to their age (Rasik & Ismail, 2019).

Table 1: Analysis feedback on module design

No	Item	Percentage (%)				
		Disagree		Uncertain	Agree	
		1	2	3	4	5
1.	This module has an easy to carry size	0	0	0	80	20
2.	The use of colors in modules is suitable	0	0	0	40	60
3.	The subtopic arrangement is suitable	0	0	20	40	40
4.	The layout for all topics in the module is uniform	0	0	0	80	20
5.	The sentence structure in the module is clear	0	0	0	40	60
6.	The sentence structure in the module is easy to understand	0	0	0	60	40
7.	The subtopic layout is easy to refer to	0	0	0	80	20
8.	The size of the text used is appropriate	0	0	40	20	40
9.	The type of writing is easy to read	0	0	20	20	60
10.	This module has organized text order	0	0	0	40	60
11.	This module has a clear diagram	0	0	0	60	40
12.	This module has diagrams placed in the right place for reference	0	0	0	80	20
13.	The size of the diagram used in this module is suitable	0	0	0	60	40

14.	The graphic used in the module represent what you want to say	0	0	0	80	20
15.	The module cover suitable to the module title	0	0	0	40	60
Average		0	0	4.00	54.67	41.33

(Notes: 1: 1: Strongly disagree, 2: Disagree, 3: Average agree, 4: Agree, 5: Strongly agree)

According to the data in Table 2, respondents responded positively to module content with an average score of 98.46 percent. However, an average of 1.54% showed modest agreement and needed improvement to the module. It can be concluded that almost all respondents agree on the validity of the content in this module. This is in line with Iberahim et.al (2017), stating the knowledge of 21st century skills is important for teachers and students to master classroom learning and teaching in an effortless and fun environment. With 21st century learning these activities, teachers can increase students' interest in their learning.

Table 2: Analysis feedback on module design

No	Item	Percentage (%)				
		Disagree 1	2	Uncertain 3	4	Agree 5
1.	The objectives of the module are clearly stated	0	0	0	60	40
2.	The instructions in the module are easy to understand	0	0	0	80	20
3.	The examples given suitable to the topic	0	0	0	60	40
4.	The examples provided are relevant to the topic	0	0	0	80	20
5.	The contents of the module correspond to the student level	0	0	0	80	20
6.	The contents of the module correspond to the syllabus	0	0	0	40	60
7.	The content description on each topic is clear	0	0	20	60	20
8.	The content description on each topic is easy to understand	0	0	0	60	40
9.	Assignments for each topic meet the learning objectives	0	0	0	60	40
10.	The contents of the module are relevant to the learning outcomes	0	0	0	60	40
11.	The use of language in modules is easy to understand	0	0	0	20	80
12.	The contents of the module are sufficient for all topics	0	0	0	80	20
13.	Subtopic distribution in the module is sufficient for each topic	0	0	0	60	40
Average		0	0	1.54	61.54	36.92

(*Notes: 1: 1: Strongly disagree, 2: Disagree, 3: Average agree, 4: Agree, 5: Strongly agree)

4. Conclusion

Developing a Basic Learning Module of Quantity Measurement Through 21st Century Education Activities is an excellent step towards improving education in Malaysia. This is due to the module's potential to adapt 21st-century skills such as communication, collaboration, critical thinking, and creativity to contemporary educational needs, especially in the field of TVET. Furthermore, with such

modules, the teaching delivery process can be enhanced, especially in terms of content and learning quality. Educators should use the right teaching and learning methods, student-centered strategies, to meet the demands of the twenty-first century. With this student-centered strategy, educators can continue teaching and learning by applying educational activities that can apply 21st century skills. With such learning activities, a constructive learning environment can be created where the teaching and learning process will become more interesting as it stimulates students' interest in learning.

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