

# E-Learning Web Elements for Brickwork Course in the Construction Technology for Vocational Training

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## Abstract

E-learning web is a learning material delivered in electronic media through HTML (Hyper Text Markup Language), programming for the Construction Technology Program. This study was conducted to design and develop reference material as an e-learning web for the brickwork course based on modifying the ADDIE model. The objective of this study is to identify the aspects of web element requirements, the appropriateness of design, format, and content in the e-learning web of the brickwork course and the usability of the e-learning web. This study is a development and survey involving three types of respondents: three creative multimedia experts from Universiti Tun Hussein Onn Malaysia, lecturers, and students in construction technology programs from vocational colleges. The questionnaires and feedback forms were used using dichotomous and Likert scales. The results of the study indicated that all lecturers and students agree with the appropriateness of the design, format, content, and usability of the e-learning web. Overall, the development of the e-learning web of the brickwork course for the construction technology program is expected to help improve student understanding and be beneficial as an input for web developers, especially for developing educational materials for Web 4.0.

## 1. Introduction

Vocational College is one of the educational institutions under the Technical and Vocational Education and Training (TVET) program and is monitored by the Malaysian Ministry of Education (KPM). In the beginning, Vocational College was known as Vocational Secondary School (SMV) before changing to Vocational College in 2012. The transformation that took place in the education system in Malaysia was not just upgrading the institution's name, but the learning structure also changed to realize this transformation (Mohd Yusof et al., 2020).

Following the transformation, the lecturers must develop their learning modules according to the format of their respective Vocational Colleges. Consequently, each module developed is not uniform and not used by all students who take the course even though it is the same in terms of code and course name (Abdul Kadir & Ali, 2021). This will impact student achievement because the exam questions developed are not in line with their learning content.

Modules are developed based on the Vocational College Standard Curriculum, which has been set to standardize the use of modules throughout Malaysian Vocational Colleges (Ali & Abdul Kader, 2021). However, the module developed in the form of a textbook has caused students to feel bored and less involved. To realize this transformation with quality, the teaching and learning process needs to be innovated by using different styles in the delivery and learning style using technology that is compatible with the development of the times.

The education system in Malaysia has undergone changes and reforms due to the development and passage of time. Towards the 21st century, through the Malaysian Education Development Plan 2013-2025, the Ministry of Education recommends the use of Information and Communication Technology (ICT) in education to improve the quality of learning in Malaysia (Ag. Damit & Omar, 2019). E-learning is 'e', which means electronic, and e-learning refers to ICT learning (Hossain Khan et al., 2019). Learning that uses this technology approach has advantages in delivering information or learning info more clearly (Sadeghi, 2019).

In this study, the researcher chose a brickwork course as a material for developing an e-learning web. The course selection is based on the results of the preliminary research analysis that has been carried out regarding the courses that are most difficult for construction technology students to master's in vocational colleges (Mahmud et al., 2023). Besides, students also have difficulty mastering the brickwork course at the vocational college. This is very worrying because the brickwork course is a basic course that students should master in addition to having continuity with other courses such as Door and Window Installation, Plastering, and Finishing (Abdul Kadir, 2020).

Web e-learning is e-learning created using the web as an alternative to traditional learning or can be used as additional reference material in existing learning. The web is an info page or information that can be updated continuously through internet access by the author of the said page and will then be published publicly (Alias, 2020). Besides, the addition of multimedia elements such as pictures, videos, graphics, audio, and tables contained in the e-learning web will help students to improve their understanding in the learning. The advantage of using the e-learning web is that the time and place when using it are not limited if it has an internet connection.

The e-learning web development in the brickwork course is for the use of Malaysian Vocational Certificate (SVM) students in the Construction Technology program at Vocational Colleges throughout Malaysia. The selection of the brickwork course is based on findings obtained from preliminary studies that have been carried out in several Vocational Colleges in the Construction Technology program. Based on the findings of the study, students face difficulties in mastering the brickwork course. The brickwork course is a basic Construction Technology course linked to subsequent courses such as Door and Window Installation, Plastering and Finishing.

This problem will cause difficulty in understanding the next speciality if the student cannot master this basic speciality. The lack of consistent reference materials, inappropriate teaching and learning strategies and lack of variety of teaching methods in the classroom are the main problems in mastering this course. Through discussion of the background of the problem, it was found that the module developed is in the form of a printed module, which is a book. In addition, teacher-centred teaching strategies will cause students not to actively engage in class because they are completely dependent on the lecturer. Therefore, the development of reference materials requires methods that can attract students' interest, such as including elements of diagrams, videos, reinforcement exercises, and so on that can help improve student achievement.

## 2. Methodology

In this study, the development of web e-learning is based on modifying the ADDIE Model, which uses the 3 phases of the Addie Model: Analysis, Design and Development. ADDIE Model is frequently used as a foundation for developing other teaching design models because it provides dynamic and flexible guidelines to develop appropriate educational instruction and materials (Boyman et al., 2020). This study is a survey design. The purpose of the survey is to identify the elements required in e-learning web development, the appropriateness of design, format, and content, and the usability of the web after the development. A quantitative approach was used in this study. The quantitative approach aims to get the truth in the research more easily and clearly. The quantitative method prioritizes quantity, and this approach can measure the objectives and research questions absolutely and clearly (Chua, 2020). The data was collected through the Google Forms questionnaire and feedback forms and then analyzed using Microsoft Excel.

### 2.1 Analysis

During the analysis phase, the researcher conducts a comprehensive needs analysis on several essential items that must be emphasized before going through the design phase. The important items that need to be identified in this phase are elements required in e-learning web development, including material form, software, font type, font size, font colour, graphic features, arrangement and the importance of the web.

#### 2.1.1 Research Sample

This study consists of three creative multimedia experts from Universiti Tun Hussein Onn Malaysia, 16 lecturers and 30 students of the Malaysian Vocational Certificate (SVM) Construction Technology program in Seri Iskandar

Vocational College, Lebu Cator Vocational College and Ipoh Vocational College. The researcher chose lecturers and students at three vocational colleges because of the ease of access in collecting data.

### 2.1.2 Research Instrument

Three questionnaires were used as research instruments to collect the types of respondents' needs for the e-learning web. The questionnaire for three experts uses a dichotomous scale, which is (Yes or No) while the questionnaire for lecturers and students contained 8 items. Multiple choices are used in each item because each question contains more than one list of options. These things have been compiled from the design and graphic features contained in the e-learning web. Instruments validation was done by three experts in multimedia creative from Universiti Tun Hussein Onn Malaysia and two experts in Construction Technology from Seri Iskandar Vocational College.

### 2.2 Design

Once the analysis phase is completed, the design phase, which is the second phase in the ADDIE model, will be implemented. This phase involves the planning process in developing the product according to the user's wishes so that the product produced coincides with the set plan. In addition, the transfer of information from the analysis phase to an e-learning web development design sketch. In this study context, product design is developing an e-learning web. Based on the results of the needs study conducted, the selection of the e-learning web as a form of reference material to be delivered is due to considering the selection factors from the respondents or users.

In addition, the researcher also included elements suggested by experts and respondents as well as from previous research references to improve the quality of e-learning web development. What will be considered in this process is the e-learning web design process, which includes content selection, teaching and learning activities, and delivery methods. Researchers also use graphic elements such as diagrams, infographics, tables, and related videos to be included in this e-learning web. These graphic elements are included to attract students' interest and convey learning information. In addition, simple language, font type, writing size and appropriate layout are also considered in e-learning web development.

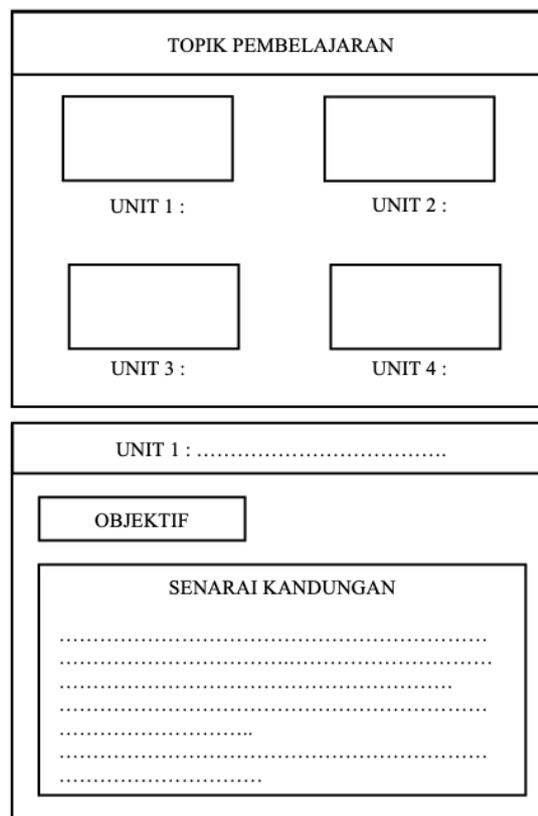


Fig. 1 Structure of the e-learning website

## 2.3 Development

The development phase is the output from the analysis and design phases. The development process uses graphic elements and technologies that have been selected according to the needs of the product. In this study, the researcher used Google Sites software to deliver learning info equipped with the addition of graphic elements and appropriate formats in e-learning web development.

### 2.3.1 Research Sample

This phase consists of 10 lecturers and 30 students in the construction technology program from Seri Iskandar Vocational College, Lebu Cator Vocational College and Ipoh Vocational College. Lecturers and students are needed to get feedback on the appropriateness of design, format, and content, as well as the usability of the web.

### 2.3.2 Research Instrument

Two feedback forms were used in this phase. The questionnaire contains two sections, while the feedback form involves four sections for lecturers and three for students. The feedback forms use a 5-point Likert scale. These feedback forms have been verified by three experts in multimedia creative from Universiti Tun Hussein Onn Malaysia and two experts in Construction Technology from Seri Iskandar Vocational College.

## 3. Results and Discussion

Data analysis and interpretation were made after the questionnaire was obtained by three experts in the field of creative multimedia from UTHM, and feedback was collected from 10 lecturers and 30 students from Seri Iskandar Vocational College, Lebu Cator Vocational College and Ipoh Vocational College.

### 3.1 The Required Elements in E-Learning Web Development

Based on Table 2, 100% of experts also agree that the elements required in the web include web design, multimedia elements, content, topography, header, footer, visual, web loading, and applicability. The design for a website must have an e-learning web front page related to the module title; the page layout must be easily accessible, a clear page layout to follow, an attractive design, easy-to-read colours, and a name or logo as a web identity. Web elements play a crucial role in establishing the identity and conveying the essence of a course or website.

The elements of a website can significantly impact users' perception and judgment of its content. The web elements should align with its identity and purpose to create a cohesive and engaging user experience. Liang and Acuna (2020) suggest that the design and presentation of a journal's website can influence how users perceive its quality and credibility. This concept can be extended to various websites, educational platforms or courses. Users often make quick judgments based on a website's appearance and usability, which can directly impact their perception of the course content and its value.

Besides, the multimedia elements required on the web are related text, diagrams, graphics, and videos. This is because multimedia combines more than one type of media, such as text, pictures, audio, video, and graphics, usually with the help of technology to improve understanding or memorization (Abdul Rahman et al., 2021). In addition, these experts also agree that the content on the web must use materials related to the course, the learning outcomes must be clearly stated at the beginning of the web page, the learning objectives of each unit must achieve the web objectives, the order of the content is easy to understand, and subunits in each unit are arranged in an orderly and systematic manner. According to D'Souza (2018), the breakdown of content, organization and how to link between pages must be logical.

In addition, the typography used on the web must be appropriate, considering the font's suitability of the type, size and colour. Then, visuals on the web must use consistent image elements and image elements that have descriptions and resolutions that all types of devices can use. 100% of respondents also agree that web loading must be appropriate where the file size is not too large and the type of website that all types of devices can access. Lastly, all experts think that learning activities encourage active involvement, and this web can motivate students to carry out independent learning outside the classroom and contribute to effective learning. All aspects of the e-learning web can be used as a good reference source.

**Table 1** Experts' view on required elements in web development

| Item              | Frequency (f)   |    | Percentage (%) |     |   |
|-------------------|---|----|----------------|-----|---|
|                   | Yes   | No | Yes            | No  |   |
| <b>Web Design</b> |   |    |                |     |   |
| B1                | The front page of the e-learning website corresponds to the module title. | 3  | 0              | 100 | 0 |
| B2                | Easy-to-access page layout.   | 3  | 0              | 100 | 0 |

|                            |  |   |   |            |          |
|----------------------------|--|---|---|------------|----------|
| B3                         | Clear page layout to follow.   | 3 | 0 | 100        | 0        |
| B4                         | Design can attract students' interest.   | 3 | 0 | 100        | 0        |
| B5                         | The colours used are easy to read.   | 3 | 0 | 100        | 0        |
| B6                         | Have a name or logo as a web identity.   | 3 | 0 | 100        | 0        |
| <b>Multimedia Elements</b> |  |   |   |            |          |
| B7                         | Text   | 3 | 0 | 100        | 0        |
| B8                         | Diagram  | 3 | 0 | 100        | 0        |
| B9                         | Graphics   | 3 | 0 | 100        | 0        |
| B10                        | Videos   | 3 | 0 | 100        | 0        |
| <b>Content</b>             |  |   |   |            |          |
| B11                        | The content is material related to the course.   | 3 | 0 | 100        | 0        |
| B12                        | Learning outcomes are clearly stated at the beginning of the web.                                  | 3 | 0 | 100        | 0        |
| B13                        | The learning objectives of each unit achieve the web objectives.                                   | 3 | 0 | 100        | 0        |
| B14                        | The content is easy to understand.   | 3 | 0 | 100        | 0        |
| B15                        | Sub-units in each unit are arranged in an orderly and systematic manner.                           | 3 | 0 | 100        | 0        |
| <b>Typography</b>          |  |   |   |            |          |
| B16                        | Arial font type.   | 3 | 0 | 100        | 0        |
| B17                        | Font size 12.  | 3 | 0 | 100        | 0        |
| B18                        | The font is black.   | 3 | 0 | 100        | 0        |
| B19                        | Line spacing 1.5 for easy reading.   | 3 | 0 | 100        | 0        |
| <b>Header</b>              |  |   |   |            |          |
| B20                        | Describes the entire content of the web.   | 3 | 0 | 100        | 0        |
| B21                        | Facilitates the search of other or subsequent pages.   | 3 | 0 | 100        | 0        |
| <b>Footer</b>              |  |   |   |            |          |
| B22                        | Ease into the home page.   | 3 | 0 | 100        | 0        |
| B23                        | Facilitates the search of other pages.   | 3 | 0 | 100        | 0        |
| <b>Visual</b>              |  |   |   |            |          |
| B24                        | Consistent picture elements.   | 3 | 0 | 100        | 0        |
| B25                        | Image elements that have accurate descriptions   | 3 | 0 | 100        | 0        |
| <b>Resolution</b>          |  |   |   |            |          |
| B26                        | Using a resolution that can be used by all types of devices.                                       | 3 | 0 | 100        | 0        |
| <b>Loading Web</b>         |  |   |   |            |          |
| B27                        | Use a file size that is not too large so as not to interfere with the loading process.             | 3 | 0 | 100        | 0        |
| B28                        | Use the type of website that can be accessed by all types of devices.                              | 3 | 0 | 100        | 0        |
| <b>Applicability</b>       |  |   |   |            |          |
| B30                        | All learning activities encourage active engagement and feedback.                                  | 3 | 0 | 100        | 0        |
| B31                        | This e-learning web can motivate students to carry out independent learning outside the classroom. | 3 | 0 | 100        | 0        |
| B32                        | The use of e-learning web can contribute to effective learning.                                    | 3 | 0 | 100        | 0        |
| B33                        | All aspects of the e-learning web can be used as a good reference source for success in learning.  | 3 | 0 | 100        | 0        |
| <b>TOTAL</b>               |  |   |   | <b>100</b> | <b>0</b> |

Besides that, 62% of lecturers and 67% of students choose the e-learning web as a suitable reference material for students to use in teaching and learning. Most lecturers and students think that the appropriate application/software to use for e-learning web development is through Google Sites. The average respondent chose Arial font size 12 and black for this e-learning web. The graphic features needed on an e-learning website involve using diagrams, infographics and videos to convey information more clearly. In contrast, as many as 94% of lecturers and 97% of students agree that the content of the information presented in the table can help the delivery of learning clearly.

While most respondents agree that the content structure required on an e-learning website must contain headers and footers that facilitate the search for other pages, consistent text layout, appropriate subtopics and sentence structure in the e-learning website must be easy to understand. In addition, most lecturers and students think that this e-learning web can improve students' understanding and achievement, can be used as a reference

material that can be used regardless of place and time and help students review lessons even in the absence of a lecturer

In addition, they also agreed that the e-learning web can help students practice the theoretical learning in the course learned in the practical process. Lecturers and students also agree that this e-learning web is a reference material that contains explanations, diagrams, graphics, videos and multimedia elements to give students a clear picture. In addition, the help of activities and exercises in the module can improve student understanding.

**Table 2** Lecturers and students' view on required elements in web development

| Item   | Frequency (f) |         | Percentage (%) |         |
|--|---------------|---------|----------------|---------|
|  | Lecturer      | Student | Lecturer       | Student |
| B1 A suitable form of reference material to be used by students in teaching and learning.            |               |         |                |         |
| a) Printed module  | 3             | 8       | 19             | 27      |
| b) E-Module  | 1             | 2       | 6              | 6       |
| c) E-learning web  | 10            | 20      | 62             | 67      |
| d) Presentation slide  | 0             | 0       | 0              | 0       |
| e) Application   | 0             | 0       | 0              | 0       |
| f) Others  | 2             | 0       | 13             | 0       |
| B2 Application/software that is suitable to be used for e-learning web development                   |               |         |                |         |
| a) Google Sites  | 12            | 30      | 75             | 100     |
| b) Flipbook  | 0             | 0       | 0              | 0       |
| c) Wix   | 4             | 0       | 25             | 0       |
| d) WordPress   | 0             | 0       | 0              | 0       |
| B3 Choose the type of font that is suitable to use   |               |         |                |         |
| a) Arial   | 16            | 25      | 100            | 83      |
| b) Calibri   | 0             | 2       | 0              | 7       |
| c) Century Gothic  | 0             | 3       | 0              | 10      |
| d) Times New Roman   | 0             | 0       | 0              | 0       |
| B4 Choose the appropriate font color to use  |               |         |                |         |
| Black  | 16            | 30      | 100            | 100     |
| Blue   | 0             | 0       | 0              | 0       |
| B5 Choose the appropriate font size to use   |               |         |                |         |
| a) 10  | 0             | 1       | 0              | 3       |
| b) 11  | 5             | 11      | 31             | 37      |
| c) 12  | 11            | 18      | 69             | 60      |
| B6 Graphical features required on an e-learning website  |               |         |                |         |
| a) Diagrams that can convey and explain the text clearly   | 16            | 30      | 100            | 100     |
| b) Pictures in the form of infographics  | 16            | 30      | 100            | 100     |
| c) The content of the information/info presented in the table is clear                               | 15            | 29      | 94             | 97      |
| d) Videos of work procedures can be shown clearly  | 16            | 30      | 100            | 100     |
| B7 The arrangement of content required on an e-learning website                                      |               |         |                |         |
| a) Header that can describe the entire content   | 15            | 29      | 94             | 97      |
| b) Header that facilitates the search of other pages   | 16            | 30      | 100            | 100     |
| c) Footer that facilitates the main page   | 16            | 30      | 100            | 100     |
| d) The layout of the text in the e-module is consistent  | 16            | 30      | 100            | 100     |
| e) The order of subtopics is appropriate   | 15            | 30      | 94             | 100     |
| f) Sentence structure in the e-learning web is easy to understand                                    | 16            | 30      | 100            | 100     |
| B8 E-learning web can:   |               |         |                |         |
| a) Improve student understanding and achievement   | 15            | 30      | 94             | 100     |
| b) Made a reference material that can be used regardless of place and time                           | 16            | 30      | 100            | 100     |
| c) Helping students review lessons regardless of place and time despite the absence of the lecturer. | 16            | 30      | 100            | 100     |
| d) Practise the theoretical learning in the course learned into the practical process well.          | 15            | 30      | 94             | 100     |

| Item  | Frequency (f) |         | Percentage (%) |         |
|---|---------------|---------|----------------|---------|
|   | Lecturer      | Student | Lecturer       | Student |
| e) Reference materials containing explanations, diagrams, graphics and videos | 16            | 30      | 100            | 100     |
| f) There are multimedia elements to give students a clear picture.            | 16            | 30      | 100            | 100     |
| g) Activities and exercises in the module can improve student understanding.  | 16            | 30      | 100            | 100     |

### 3.1 The Appropriateness of The Web Design

The average percentage of lecturers (L) and students (S) agree with web design. All lecturers and most students agree that the front page of the web with the course title is relevant. This is because, on the website's front page, a picture of a brick is used to show that this e-learning website is related to the brickwork course. According to Jundillah, Suseno and Surarso (2019), the website produced must have an attractive appearance and be designed according to the type of website.

Lecturers and students also agree that the colours used on the web are attractive, and the visual graphics displayed on the web are clear. Referring to the developed e-learning web, the colour tone in the web is bright so as not to disturb and provide comfort to the user while reading. Every colour combination can improve the quality of information delivery. In addition, the graphic visuals involved consider the ease of delivering learning content information (Nordin, Singh & Mansor, 2021). For example, diagrams are used for each process to show the work steps more clearly. The screen display on this web is suitable for learning and can be displayed on all devices. An interesting and non-boring display is important during learning (Mohd Rodzi et al., 2022). Learning on the e-learning web will help students understand and give a clearer visualization of the information presented.

The layout of the e-learning web page is simple and clear, and the menu in the e-learning web facilitates information access. Each page also comes with a menu button or the main page, the previous page, and the next page to make it easier for users to access the page they want. Navigation buttons, menus, and button movement (forward and backward) are important for students using e-learning. (Alshehri et al., 2019). Lecturers and students agree that the text used in the web e-learning brickwork course is appropriate and easy to read. The researcher uses a simple and compact text to make it easier for students to understand the content of the information without confusing them with a long text. In addition, important content in the text will be blackened with red to give students instructions on how to note and remember important information.

**Table 3** Feedback of lecturers and students on the appropriateness of the web design

| Item   | Frequency (f) |   |            |            | Percentage (%) |            |            |            |
|--|---------------|---|------------|------------|----------------|------------|------------|------------|
|  | Disagree      |   | Agree      |            | Disagree       |            | Agree      |            |
|  | L             | S | L          | S          | L              | S          | L          | S          |
| B1 The colors are interesting.                     | 0             | 0 | 10         | 30         | 0              | 0          | 100        | 100        |
| B2 The screen displays are suitable.               | 0             | 0 | 10         | 30         | 0              | 0          | 100        | 100        |
| B3 The front page corresponds to the module title. | 0             | 0 | 10         | 30         | 0              | 0          | 100        | 100        |
| B4 Simple and clear page layout.                   | 0             | 0 | 10         | 30         | 0              | 0          | 100        | 100        |
| B5 The text used is suitable and easy to read.     | 0             | 0 | 10         | 30         | 0              | 0          | 100        | 100        |
| B6 The menu facilitates access to information.     | 0             | 0 | 10         | 30         | 0              | 0          | 100        | 100        |
| B7 Graphic visuals are clear.                      | 0             | 0 | 10         | 30         | 0              | 0          | 100        | 100        |
|  | <b>TOTAL</b>  |   | <b>100</b> | <b>100</b> | <b>100</b>     | <b>100</b> | <b>100</b> | <b>100</b> |

### 3.2 The Appropriateness of the Web Format

Lecturers and students agree with the web format. The researcher refers to the learning syllabus to ensure that the content on the web is relevant and within the learning scope of the brickwork course. The organization of the content developed must match the content of the syllabus to meet the scope of the lesson (Becher & Maclure, 2024). The size and colour of the font used in the e-learning web and the font type can be improved. According to, the use of text is an important step in the reading system (Wang et al., 2010). The layout of units and text layout in the e-learning web is consistent, the order of subtopics is appropriate, and the sentence structure in the e-learning web is easy to understand. This is because the researcher uses words that are easy to understand. A word order technique that is easy to understand in forming sentences so that the information conveyed is clear and does not confuse them (Simanjuntak et al., 2021). In addition, each unit has the same balanced layout and uses a uniform type of text.

Most lecturers and students agreed that the arrangement of the content was easy to understand. This is because students are used to being exposed to technology from lecturers. Therefore, students can more easily understand and identify the order of web content. Referring to the developed e-learning web, each topic in the brickwork course is attached with a list of content covered in that topic. Apart from this content list attached to the front of each topic, it is also displayed on the horizontal sidebar and navigation sidebar. With this, users can access the desired topic easily and quickly.

**Table 4** Feedback of lecturers and students on the appropriateness of the web format

| Item         | Frequency (f)                      |   |       |    | Percentage (%) |   |       |            |            |
|--------------|------------------------------------|---|-------|----|----------------|---|-------|------------|------------|
|              | Disagree                           |   | Agree |    | Disagree       |   | Agree |            |            |
|              | L                                  | S | L     | S  | L              | S | L     | S          |            |
| Content      |                                    |   |       |    |                |   |       |            |            |
| B1           | Web content is related material.   | 0 | 0     | 10 | 30             | 0 | 0     | 100        | 100        |
| B2           | The content is easy to understand. | 0 | 0     | 10 | 30             | 0 | 0     | 100        | 100        |
| Typography   |                                    |   |       |    |                |   |       |            |            |
| B3           | Appropriate font type. (Arial)     | 0 | 0     | 10 | 30             | 0 | 0     | 100        | 100        |
| B4           | Appropriate font size. (12)        | 0 | 0     | 10 | 30             | 0 | 0     | 100        | 100        |
| B5           | Appropriate font color. (Black)    | 0 | 0     | 10 | 30             | 0 | 0     | 100        | 100        |
| Layout       |                                    |   |       |    |                |   |       |            |            |
| B6           | Layout is consistent               | 0 | 0     | 10 | 30             | 0 | 0     | 100        | 100        |
| B7           | Text layout is consistent.         | 0 | 0     | 10 | 30             | 0 | 0     | 100        | 100        |
| B8           | Subtopics is appropriate.          | 0 | 0     | 10 | 30             | 0 | 0     | 100        | 100        |
| B9           | Sentence is easy to understand.    | 0 | 0     | 10 | 30             | 0 | 0     | 100        | 100        |
| <b>TOTAL</b> |                                    |   |       |    |                |   |       | <b>100</b> | <b>100</b> |

### 3.4 The Appropriateness of The Web Content

Table 4 shows the feedback of lecturers (L) on the appropriateness of the web content. All lecturers agree that the learning content in the e-learning web for the brickwork course is easy to understand. The researcher has listed and displayed a list of content covering each topic's learning. With this, users can understand all the learning content in each topic. Therefore, users are more willing to continue learning from one sub-topic to the next. Then, lecturers also agreed that the content for the brickwork course was appropriate to the learning topic. Content delivery must be simple and interesting (Ali & Khan, 2018).

The lecturer also agrees that this e-learning website has links to appropriate websites. This is because the researcher focused on the results of the data collected during the previous needs research. As a result of the need for research feedback, it was found that most users are more comfortable using Google Sites as a site to develop reference materials. The lecturer agrees that students can easily get the reference materials provided. This is because the main page of the web includes a link and QR Code, which makes it easier for students to get materials by copying the link or scanning the QR code using their respective devices. QR scanners are fast and easy (Emmanuel et al., 2020).

In addition, respondents agree that the content of the e-learning web for the brickwork course is flexible and can be referred to repeatedly. Since this e-learning web is developed online, users can access it with an internet connection on their respective devices. In addition, notes in Portable Document Format (PDF) provided by researchers can make it easier for them to save notes for reference while offline, without using an internet connection. Respondents also agreed that the video posted on the web was related to the brickwork course. The researcher has selected relevant videos and placed them on the same page as the description to avoid confusing users.

**Table 4** Feedback of lecturers on the appropriateness of the web content

| Item         | Frequency (f)                               |       | Percentage (%) |            |            |
|--------------|---|-------|----------------|------------|------------|
|              | Disagree                                    | Agree | Disagree       | Agree      |            |
| C1           | Easy to understand.                         | 0     | 10             | 0          | 100        |
| C2           | Appropriate to the learning topic.          | 0     | 10             | 0          | 100        |
| C3           | Flexible and can be referred to repeatedly. | 0     | 10             | 0          | 100        |
| C4           | Video links correspond to content.          | 0     | 10             | 0          | 100        |
| C5           | Links to relevant websites.                 | 0     | 10             | 0          | 100        |
| C6           | Easily get the provided learning resource.  | 0     | 10             | 0          | 100        |
| <b>TOTAL</b> |   |       |                | <b>100</b> | <b>100</b> |

### 3.5 The Usability of the E-Learning Web for The Brickwork Course

Table 5 shows that almost all respondents agreed that the e-learning web is easy to access. The type of website used is Google Sites, and previous needs studies have shown that users are more interested in using the website. The menu link provided in the e-learning web through Google Site can be easily clicked according to the user's need. Menu links are displayed on the horizontal sidebar and navigation sidebar. The navigation menu and collapsible group must be presentable (Larkin et al., 2021). Meanwhile, all lecturers and students can easily download the materials provided. Respondents also think that the organization of materials in the e-learning web is structured, where each material is organized according to content that begins with the introduction of the web and then units 1, 2, 3, and 4, as well as learning notes. Sub-topics in each unit are also presented on different pages according to their relevance and relevance.

**Table 5** Feedback of lecturers and students on the usability of the e-learning web for the brickwork course

| Item                                  | Frequency (f)  |   |       |   | Percentage (%) |   |       |   |  |
|---------------------------------------|--|---|-------|---|----------------|---|-------|---|--|
|                                       | Disagree   |   | Agree |   | Disagree       |   | Agree |   |  |
|                                       | L  | S | L     | S | L              | S | L     | S |  |
| <b>Easy To Access</b>                 |  |   |       |   |                |   |       |   |  |
| D1                                    | I easily access the e-learning web for the brickwork course.   |   |       |   |                |   |       |   |  |
| D2                                    | I can easily access the brickwork course through the Google Site on the e-learning web for the brickwork course.                               |   |       |   |                |   |       |   |  |
| D3                                    | The e-learning web menu link for the brickwork course works well.  |   |       |   |                |   |       |   |  |
| D4                                    | The organization of materials in the brickwork course e-learning web is structured.  |   |       |   |                |   |       |   |  |
| D5                                    | I easily download learning materials from the e-learning web for the brickwork course.   |   |       |   |                |   |       |   |  |
| <b>Learning By Independent Access</b> |  |   |       |   |                |   |       |   |  |
| D6                                    | The use of the e-learning web can increase access to independent student learning.   |   |       |   |                |   |       |   |  |
| D7                                    | Students are interested in exploring more information about what they are learning.  |   |       |   |                |   |       |   |  |
| D8                                    | Students can follow the progress of learning at any time.  |   |       |   |                |   |       |   |  |
| D9                                    | Students can easily learn according to their time.   |   |       |   |                |   |       |   |  |
| D10                                   | Students easily learn personally (self-learning)   |   |       |   |                |   |       |   |  |
| D11                                   | The use of the e-learning web can increase learning control by self-regulation.  |   |       |   |                |   |       |   |  |
| D12                                   | The use of the e-learning web can increase access to independent student learning.   |   |       |   |                |   |       |   |  |
| <b>Learning Outcomes</b>              |  |   |       |   |                |   |       |   |  |
| D13                                   | After using this web, students will gain more knowledge about brickwork skills using the e-learning web.                                       |   |       |   |                |   |       |   |  |
| D14                                   | After using this web, students will acquire brickwork skills using e-learning web  |   |       |   |                |   |       |   |  |
| D15                                   | After using this web, students will master the types of brickwork through the videos displayed in the e-learning web for the brickwork course. |   |       |   |                |   |       |   |  |
| D16                                   | After using this website, students will master cutting bricks as needed.   |   |       |   |                |   |       |   |  |
| <b>Meaningful Learning (Active)</b>   |  |   |       |   |                |   |       |   |  |
| D17                                   | Students will get an active learning process.  |   |       |   |                |   |       |   |  |
| D18                                   | Web e-learning that contains diagrams, graphics, tables, and videos can convey information.  |   |       |   |                |   |       |   |  |
| D19                                   | Activities and exercises on the e-learning web improve student understanding.  |   |       |   |                |   |       |   |  |
| D20                                   | Students will monitor their learning.  |   |       |   |                |   |       |   |  |

| Item   | Frequency (f) |   |       |    | Percentage (%) |   |            |              |
|--|---------------|---|-------|----|----------------|---|------------|--------------|
|  | Disagree      |   | Agree |    | Disagree       |   | Agree      |              |
|  | L             | S | L     | S  | L              | S | L          | S            |
| D21 Students have a dynamic role in learning activities. | 0             | 0 | 10    | 30 | 0              | 0 | 100        | 100          |
| <b>TOTAL</b>   |               |   |       |    |                |   | <b>100</b> | <b>99.83</b> |

Besides, respondents agree that recommend learning by independent access. The results show that all the lecturers agree that using this e-learning web can increase access to independent learning. This is because students can use reference materials anytime and anywhere despite the absence of the lecturer. Respondents agreed that students can follow their learning progress anytime, according to their comfort. This e-learning web can always be used through a link or QR code the lecturer shares with the students. All the lecturers strongly agree that this e-learning web can facilitate personal learning (self-learning). A user-friendly web design with self-assessment features facilitates personalized learning (Schneider & Council, 2021). Anyhow, it was found that as many as 3% represented by a student did not agree with “students easily learn personally (self-learning)”. This is because not all students can focus fully due to laziness and cannot control their learning without external distractions. Almost all students agree that the e-learning web can improve self-regulation of learning. This is because the exercises on the web can help users control their learning, where answers are displayed automatically after answering each question. Students become more independent during checking and training because of the use of technology materials, which can increase their motivation (Odinokaya et al., 2019).

In addition, 100% of respondents agree that learning outcomes match the course. Providing additional materials, such as videos and related diagrams, can help students understand more and provide a clearer picture related to learning. Students can build knowledge by associating it (pictures/tables/diagrams/videos/audio) with previous or current knowledge. This helps students build deeper knowledge about learning (Hamdan et al., 2017). Almost all respondents agreed that through this e-learning web, students will gain more knowledge and skills about brickwork skills because there is content on the web that exposes students to selection methods, handling methods, work quality care measures, and so on. Lecturers and students agree on mastering students in brick-cutting techniques as needed after using this e-learning web. Diagrams provided on the web can make it easier for students to understand and apply brick-cutting techniques during practical work.

Respondents agree that web e-learning produces meaningful (active) learning. The findings can prove that all respondents, including lecturers and students, agree that students will actively learn by using this web as reference material. The use of multimedia graphics in learning is interactive and significantly impacts learning achievement (Mulyadi, Atmazaki, & Syahrul, 2019). Almost all lecturers agree that with the use of this e-learning web, students will monitor their learning. Furthermore, e-learning is an influential tool because it can provide a unique learning style and improve students' academic performance (Al Rawashdeh et al., 2021). All respondents also think that e-learning websites containing diagrams, graphics, tables, and videos can help convey information. This gives an advantage to this e-learning web because it allows students to imagine the phenomenon in the real world (Alzahrani, 2020). Most lecturers and students agree that activities and exercises on the e-learning web can improve students' understanding and that students have a dynamic role in learning activities. According to Alzahrani (2020), learning activities are an interactive learning system that allows students to understand and memorize content.

Since the developed e-learning web is appropriate from the elements, design, content, format and usability of this web is expected to create effective learning. However, the researcher hopes that in the future more reforms and improvements in the development of this e-learning web will continue to improve student understanding in any course and field.

#### 4. Conclusion

The e-learning web has been verified by experts, including two experts in the field of creative multimedia and three experts in building construction programs. Next, based on the feedback that was distributed to 10 lecturers and 30 construction technology students shows that this product can meet the needs and requirements as a reference material in learning brickwork courses. In conclusion, all respondents will accept the design, format, content, and usability of the e-learning web. However, to improve the quality of e-learning web development, the researcher hopes that further studies will continue. Based on the study's results, the researcher hopes that the views expressed can help further studies in expanding the use of web e-learning for all courses. Among the recommendations that can be implemented are to increase activities related to learning and develop reinforcement exercises that lecturers can monitor.

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## Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

## Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Yee Mei Heong, Murni Farahin Binti Mahmud, Mimi Mohaffyza Binti Mohamad; **data collection:** Murni Farahin Binti Mahmud; **analysis and interpretation of results:** Yee Mei Heong, Murni Farahin Binti Mahmud; **draft manuscript preparation:** Murni Farahin Binti Mahmud, Nurulwahida Azid, Andika Bagus Nur Rahma Putra. All authors reviewed the results and approved the final version of the manuscript.

## References

- Abdul Rahman, M., Zakaria, M. S., & Din, R. (2021). Design Learning Module Fundamental of Computer Science: Evaluation of Content Validity. *International Journal of Research in Education and Science*, 7(4), 1104-1116.
- Ag. Damit, M.A. & Omar, M.K. (2019) Meneroka impak dan cabaran pensyarah terhadap pelaksanaan e-pembelajaran di Kolej Vokasional Zon Tengah, Malaysia [exploring impact towards elearning in vocational colleges]. In: 5th International Conference on Educational Research and Practice (ICERP) 2019, 22-23 Oct. 2019, Palm Garden Hotel, Putrajaya, Malaysia. (pp. 148-157).
- Al Rawashdeh, A.Z., et al. (2021). Advantages and Disadvantages of Using e-Learning in University Education: Analyzing Students' Perspectives.
- Ali, D.F. & Abdul Kadir, N. (2021) M-Pembelajaran Aplikasi Android bagi Kursus Binaan Bangunan [android in learning brickwork], *Innovative Teaching and Learning Journal*, 2(2).
- Alias, M.H. (2020). Persepsi Pembelajaran Dewasa Melalui Teknologi Blog Web 2.0 [perception of adult learning when using technology], *Journal of Personalized Learning* 3(1).
- Almaiah, M.A. & Alyoussef, I.Y. (2019). Analysis of the Effect of Course Design, Course Content Support, Course Assessment and Instructor Characteristics on the Actual Use of E-Learning System. *IEEE Xplore*, 7.
- Alshehri, A., Rutter, M., & Smith, S. (2019). Assessing the Relative Importance of an E-Learning System's Usability Design Characteristics Based on Students' Preferences. *European Journal of Educational Research*, 8(3), 839-855.
- Alzahrani, N.M. (2020). Augmented Reality: A Systematic Review of Its Benefits and Challenges in E-learning Contexts. *Journal of Applied Sciences*, 10(16).
- Becher, T. & Maclure, S. (2024). The Politics of Curriculum Change. United Kingdom: Routledge Revivals.
- Boyman, S. N., Jamal, M. B., Razali, N. A. & Abdul Aziz, M. S. (2020). ADDIE Model Design Process For 21st Century Teaching and Facilitation Activities (Pdpc) In Nationhood Studies Module. *International Journal of Psychosocial Rehabilitation*, 24(9), 2115-2124.
- Chua, Y.P. (2020) Introduction to Quantitative Research Approaches in Education Week 7 from [https://www.researchgate.net/publication/355473671\\_Introduction\\_to\\_Quantitative\\_Research\\_Approaches\\_in\\_Education\\_WEEK\\_1\\_PROF\\_DR\\_CHUA\\_YAN\\_PIAW](https://www.researchgate.net/publication/355473671_Introduction_to_Quantitative_Research_Approaches_in_Education_WEEK_1_PROF_DR_CHUA_YAN_PIAW)
- D'Souza M. (2018). Ten essentials for action-oriented and second order energy transitions, transformations, and climate change research. *Energy Research & Social Science*, 40, 54-70.
- Emmanuel, A. A., Adedoyin, A. E., Mukaila, O., & Roseline, O. O. (2020). Application of smartphone qrcode scanner as a means of authenticating student identity card. *International Journal of Engineering Research and Technology*, 13(1), 48-5
- Hamdan, N. A., Mohamad, M., & Shaharuddin, S. (2017). Hypermedia reading materials: Undergraduate perceptions and features affecting their reading comprehension. *Electronic Journal of E-learning*, 15(2), 116-125.
- Hossain Khan, M. L., Setiawan, A., & Kustiawan, I. (2019). Design and Development of A Single Page and Web-based Responsive E-learning System for Higher Education Institutions. *INVOTEC*, 15(2), 85-93.
- Jundillah, M. L., Suseno, J. E., & Surarso, B. (2019). Evaluation of e-learning websites using the Webqual method and importance performance analysis. In *E3S Web of Conferences* (Vol. 125, p. 24001). EDP Sciences.
- Khan, N. & Ali, S. (2018). Impact of salicylic acid and PGPR on the drought tolerance and phytoremediation potential of *Helianthus annuus*. *Frontiers in microbiology*, 9, 2507
- Liang, L., & Acuna, D. (2020). Don't judge a journal by its cover: Appearance of a Journal's website as predictor of blacklisted Open-Access status. *Proceedings of the Association for Information Science and Technology*, 57(1), e306.

- Mahmud, M.F., Yee, M.H., Mohamad, M.M., Azid, N. & Nur Rahma Putra, A.B. (2023). Analisis Keperluan Pembangunan Web E-Pembelajaran Bagi Kurus Kerja Bata Di Kolej Vokasional [Needs Analysis for the Development of E-Learning Websites for Bricklaying Courses at Vocational Colleges]. Kurikulum & Instruksi Siri 14. Batu Pahat, Johor: Penerbit UTHM. 114-124. ISBN:9786297566634.
- Mulyadi, M., Atmazaki, A., & Syahrul, R. (2019). The Development of Interactive Multimedia E-Module on Indonesia Language Course. In 1st International Conference on Innovation in Education (ICoIE 2018) (pp. 291-295).
- Nordin, H., Singh, D., & Mansor, Z. (2021). Interface Design for E-Learning: Investigating Design Characteristics of Colour and Graphic Elements for Generation Z. *KSII Transactions on Internet & Information Systems*, 15(9).
- Odinokaya, M., Krepkaia, T., Karpovich, I., & Ivanova, T. (2019). Self-regulation as a basic element of the professional culture of engineers. *Education sciences*, 9(3), 200.
- Rodzi, N. S. M., Jailani, N. M. O., Saupi, M. A. M., & Jofri, M. H. (2022). ARCuria: Perkembangan Realiti Augmented (AR) untuk Memudahkan Kanak-kanak Diskalkulia Mempelajari Konsep Matematik dan Pengiraan [The Development of Augmented Reality (AR) to Facilitate Children with Dyscalculia in Learning Mathematical Concepts and Calculations]. *Multidisciplinary Applied Research And Innovation*, 3(2).
- Sadeghi, M. (2019). A shift from classroom to distance learning: Advantages and limitations. *International Journal of Research in English Education*, 4(1), 80-88.
- Schneider, S. L., & Council, M. L. (2021). Distance learning in the era of COVID-19. *Archives of dermatological research*, 313(5), 389-390.
- Simanjuntak, R. A. (2021). I An Analysis of Teachers' Challenges In Teaching Writing Skill During The Covid-19 Pandemic At SMP Negeri 3 Pangkalan Kerinci (Doctoral dissertation, Universitas Islam Riau).
- Wang, W., et al. (2019). Efficient and accurate arbitrary-shaped text detection with pixel aggregation network. In *Proceedings of the IEEE/CVF international conference on computer vision* (pp. 8440-8449).
- Yusof, M. H. M., et al. (2020). Issue and Challenge for Vocational Teaching Quality in the Vocational College Lecturers: A Systematic Review. *Sains Humanika* 12(2).
- Yusoff, A. F. M., Hamat, W. N. W., & Basir, N. K. (2019). Penggunaan aplikasi web 2.0 dalam proses pengajaran dan pembelajaran kursus mata pelajaran umum (MPU) di politeknik [Web 2.0 application in teaching and learning in general course in polytechnic], *e-BANGI*, 16(5), 1-13.