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Development of a Web-Based E-Module for Food and Beverage Preparation Course for Vocational Students in Upper Secondary (PVMA)

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Abstract

Designing and creating an online e-module for the Food and Beverage Preparation Course (FBPC) specifically for Upper Secondary Vocational Students (PVMA) is the objective of this study. To improve theoretical knowledge and practical skills, the e-module integrates interactive multimedia, simulations, and assessments. Learning material developers provided an online e-module for the Food and Beverage Preparation course. Designing and developing the e-module and testing its usability and functionality are the study's objectives. The ADDIE Model provides the foundation for the design and development process. A clear and understanding teaching flow could be developed with the aid of storyboards, flow charts, and hierarchical charts. This e-module was developed using the Google Site platform. Canva was employed by the study to generate graphic and multimedia content for the e-module. Wordwall is frequently used in educational activities. To assess the product's functionality, 14 experts were given the checklist form. Results for interaction design are 100% agreeable, while interface design is 92.9% agreeable, and content design is 92.9% agreeable. After that, 38 students performed the pretest and posttest. With a value of t = -3.118 and sig = 0.004 ($p < 0.05$) between the pre-test and the post-test, there is a significant difference in the use of the e-module before and after. In summary, the PVMA teaching and learning process can make use of this e-module

1. Introduction

21st-century learning focuses on the fluency of information, media, and technology. Therefore, students should learn to use technology in innovative ways to prepare them to face a dynamic and ever-changing world. According to Premalatha and Subadevi (2024) and Saleh et. al (2017), implementing 21st-century learning makes educators more creative in creating an effective learning process. Technology plays an important role in facilitating 21st-century learning. Through technology, students can explore various learning resources, such as e-modules, e-books, audio and video materials, and other interactive materials (Emma, 2024; Abed, 2019).

One of the e-learning tools is the E-module, a digital learning tool that can be utilized either online or offline, depending on the needs of the students (Trilestari & Almunawaroh, 2020). Text, pictures, videos, animations, and interactive components like tests and simulations can all be used in e-module content to make learning more engaging and interesting. Similar to a stand-alone course, an e-module is accessible and usable from any location at any time. Komikesari et al. (2020) describe an e-module as a type of self-directed instructional

resource that is given in an electronic format, logically arranged, and written understandably. The e-module includes videos, audio, and animations that increase user engagement and give them more control over their education. Mobile learning can be used for e-modules (Ayawan, 2022). Ahmad Hanis et.al, (2022) states that an e-module is an electronic version of the module that can be accessed by electronic devices such as mobile phones, computers, and tablets. Aziz et.al (2019) stated the web-based learning process as a medium to enhance student learning and launch the learning and learning process. This is because the learning process of students is independent. If there is an e-module, students can implement the learning process flexibly.

It was determined that the absence of digital resources from the school causes some issues. Haslin and Hamzah (2023) supported this, claiming that one limitation of education is the absence of digital resources. This is because the absence of these digital resources hinders the learning process for both teachers and pupils.. when teachers' and students' learning is hampered by a lack of digital tools. Researchers must develop this kind of e-module for PVMA students enrolled in the Food and Beverage Preparation Course. Another challenge is the WIM provided by the Skills Development Department in English. This is because students gain very little understanding when English is used during lessons. This becomes a constraint for students. Mamat (2016) stated that students do not understand teaching and learning that uses English as the medium of instruction because they cannot master it. This has made it necessary for researchers to create web-based e-modules in dual languages to maximize student comprehension. Additionally, because the learning module is methodically developed based on the curriculum and presented utilizing electronic media like computers or smartphones, students can use it whenever it is most convenient for them and are not restricted by time or location.

There are several research objectives to be achieved in this study, among them are:

i. Designing a web-based e-module of a Food and Beverage Preparation Course
ii. Developing a web-based e-module of a Food and Beverage Preparation Course
iii. Evaluating the functionality of a web-based e-module of a Food and Beverage Preparation Course
iv. Evaluating the level of usability of a web-based e-module of a Food and Beverage Preparation Course

The Written Teaching Materials (WIM) published by the Skills Development Department served as the basis for the scope of this study which is used in the development of the Food and Beverage Preparation Course E-module. Furthermore, only PVMA students enrolled in the course code participated in this study.

2. Methodology

The research methodology is a systematic design of how this research is carried out to achieve the goals, objectives, and research questions that have been stated. Therefore, the methods used in this study can make the research process more systematic and organized.

2.1 Research Design

The research design for this study includes two main phases, namely the product development phase and the evaluation phase to test the functionality and usability of the module. Data collection was done using quantitative methods. Primary data was gathered quantitatively using checklist forms, questionnaires, and alpha and beta testing of the instruments. The ADDIE Model was also used as a research design in this study

2.2 ADDIE Model

The ADDIE model is a framework for instructional design which is widely used in Education. This model has been used by educators and instructional designers since 1970. This model is used in the development of teaching materials, products, and the development of subjects. Dewadi et.al (2021) stated that the ADDIE Model consists of five stages, which are analysis, design, development, implementation, and evaluation. The first stage begins with the first phase which is the analysis phase where the researcher analyses the problems related to the product and makes solutions to the problems that arise. Followed by the second phase is to design the teaching methods used in the product of this study. Next is the third phase which is the development phase, this phase details the development and design of the study product. Phase four is the implementation phase of the development and design of the research product according to the specifications set by the researcher. Lastly is the evaluation phase which is to measure to get feedback from experts about the product developed as well as the usability of the product on users. Table 1 shows the approach used based on **the** ADDIE Model.

Table 1: ADDIE Model

No	*Model ADDIE*	*Explanation*
1	Analysis Phase	- Analysis of topics and content - Focus on topics that are less mastered by students.
2	Design Phase	The design process is divided into three: - Content (based on Gagne's Model). - Interface (Use of storyboards for the whole process). - Interaction (Developing interaction between e-module and students).
3	Development Phase	- The Google Site platform is used for web development. - Development of notes using the Canva platform, PowerPoint. - Video development using the Canva platform. - Development of learning activities using the Wordwall platform.
4	Implementation Phase	- The content of the e-module is tested by the researcher if there is a problem, improvements are made.
5	Evaluation Phase	- The e-module is checked by experts for the functionality of the e-module. - Pre-Test and Post-Test are conducted for students for one group to see the usability of the e-module.

2.3 Research Instrument

The development of this e-module uses a checklist as a research instrument for expert verification. The instrument developed was adapted from previous studies and has been validated by instrument experts. In addition, to answer the fourth research question, the researcher used 2 sets of quiz questions that were used for the pre-test and post-test to test the usability of the e-module for users. The instrument was developed and adapted from previous studies by Abd Hamid (2019), Ariffin (2020), Abdul Rani (2023) and Rahmat (2023). The questionnaire developed has been validated by instrument experts.

3. Result and Discussion

An expert verification form in the form of a checklist was given to 14 experts. Two experts from the Public University in Batu Pahat. Five experts from Secondary Schools in Johor. Finally, seven experts from 3 Vocational Colleges in Johor, Selangor, and Sabah. The use of this research instrument has been selected based on the objectives set by the researcher. The research instrument was chosen based on the objectives set by the researcher. Table 2 provides a list of expert panels involved in evaluating the e-module.

Table 2: Expert Panel List

Name	Position	Expertise
2 experts (Validity of Product Functionality)	Lecturer the Faculty of Technical and Vocational Education	Instructional Design & Technology
5 experts (Validity of Product Functionality)	High School Teacher	- Instructional Design & Technology - Food and Beverage - Catering & Hospitality
2 experts (Validity of Product Functionality)	Vocational College Teacher	- Catering & Hospitality - Food and Beverage

3.1 Evaluation of Functionality by Experts

The checklist form is divided into five sections: demographic data, interface design, interaction design, content design, and comments and ideas for product improvements. Following the development of the E-module, experts were given this checklist form. Furthermore, percentages are used to assess the outcomes.

The analysis of interaction design demonstrates (100 percent) agreement, according to the overall analysis of the product functionality evaluation that was conducted. Comparatively, 92.1 percent of interface and content design analyses concur. According to the overall analysis, this e-module can operate effectively. The outcome of expert functionality is displayed in Table 3.

Table 3: the result of functionality among experts.

Analysis	*Result*
Interaction Design Analysis	100%
Interface Design Analysis	92.1%
Content Design Analysis	92.1%

3.2 Evaluation of Usability by Students

A set of quiz questions is used for the Pre-Test and Post-Test to assess the level of usability of the e-module. Two identical sets of questions were given to respondents. This set of quiz questions has 20 objective questions. The duration for the pre- and post-test is 8 weeks. The evaluation of the pre and post-test was analysed using a paired sample t-test to see the usability of the e-module for users. 38 respondents have been analysed consisting of PVMA form 4 and 5 students. Table 4 shows the Paired Sample T-Test.

Table 4: Paired Sample t-test

Paired Samples Statistics							
		Mean	N	Standard Deviation	*t* value	*df*	*Sig. (2-tailed)*
Pair 1	Pre-test (student scores)	48.82	38	15.701	-3.118	38	.004
	Post-test (student scores)	56.32	38	16.913			

Paired Sample t-test was performed to assess whether there was a difference between before and after the use of e-module for students in form 4 and form 5 of PVMA. The mean value (M= 56.32) for after the use of the e-module, Standard deviation (SD=16.913) is significantly higher than before the use of the e-module mean value (M=48.82 Standard deviation (SD=15.701), t ([df 38]) = [t-value -3.118], p = [0.004]. Therefore, due to the

significant alpha value, the null hypothesis is rejected because there is a difference between before and after the use of the Food and Beverage Preparation Course E-module.

There is an increase in the value of student scores after using the Food Preparation and Preparation Course e-module in the learning and learning session. Vianis (2022) the use of an e-module has a good effect on learning. E-module developed using the Google Site platform. Dewi (2023) stated that learning media using the Google Sites platform can provide new experiences to students and support digital learning. Following Dewi's (2023) assertion, the findings of this study have highlighted the importance of prospective e-learners comprehending the distinctions between e-learning classrooms and traditional classrooms that use dual language education. This is because e-learning has both benefits and drawbacks in both settings, which may have an impact on students' overall performance (Al-Rawashdeh et al., 2021;Trilestari et al 2020). Because it can be accessed at any time via a device, the designed e-module is simple for students to use. This finding also supports the claim made by Astuti et al. (2022) that web-based learning is an online learning resource that can be accessed from any location at any time with an internet connection. Students benefit from the module's variety of learning resources, including audio and video. This is because it can enhance learning comprehension. This is consistent with Mohamad's (2017 assertion that interactive variety can raise the quality of more effective learning and enhance the learning content that is presented. The researcher's e-module is user-friendly and includes visual aids for students to view, such as learning slides, infographics, and posters.

4. Conclusion

The e-module that has been developed by the researcher can help students in the learning process. PVMA student's learning outcomes would be impacted by this e-module. It can enhance students' understanding. Additionally, students can readily access e-modules from anywhere at any time. Because it contains digital material, the e-module is compatible with 21st-century learning standards (PAK21). Because it can be accessed at any time via a device, the designed e-module is simple for students to use. This e-module was developed using the Google Site platform. Researchers use this platform because it is user-friendly and simple to use, in addition to having the ability to enhance students' digital proficiency.

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