Employing the Addie Instructional Model to Design a Teaching Module for TVET Teacher in Automobile: A Systematic Literature Review

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ABSTRACT

The importance of an appropriate model for the effective design of teaching modules for TVET teachers cannot be overemphasized as functional modules facilitate adequate learning outcomes. This study examined the effectiveness of the teaching module for the TVET teacher in automobile technology for the TVET program in Nigeria. The ADDIE model consisting of five phases: Analysis, Design, Development, Implementation and Evaluation was adopted for the study. The goal of this study is to systematically review the teaching module specifically designed for TVET teachers in automobile technology for the TVET programme in Nigeria. The review process included developing inclusion and exclusion criteria as well as methods for identifying, examining, and determining eligibility. Google Scholar and Scopus platform were the journal databases utilized for the survey approach applied in this study. These findings are based on previous studies, which showed that the ADDIE instructional design model effectively addresses instructional needs, provides feedback, and integrates best practices in online information literacy courses. Also, the Product-Based Learning Approach was used to develop an entrepreneurship module, suggesting that lecturers can use this model to support teaching and learning processes.

Keyword: TVET, Teaching Module, ADDIE Model, Automobile

INTRODUCTION

Automotive technology is one of the courses taught in some Technical and Vocational Education and Training (TVET) institutions. Technology has become a significant catalyst for innovation in education and training, altering how knowledge is shared, received, and deployed (Abuhassna et al., 2024). To achieve educational objectives, it is crucial to meticulously select and utilize a suitable methodology, since a teaching and learning approach serves as a crucial tool or path to reaching learning goals (Jalil et al., 2020). To improve the knowledge and abilities of TVET instructors in the automotive industry, it is essential to use the ADDIE model for creating teaching modules. The Addie model consists of a series of steps, the outcome of one phase drives the subsequent step. However, there is no need for a sequential, linear approach to the phases in this sequence (Spatioti & Kazanidis, 2022). The model is a pedagogical framework extensively employed by educational designers and training programmers to create education and training programs. (Spatioti & Kazanidis, 2022). The name of this model is an acronym that represents the five fundamental processes for designing and developing the learning experience. These steps are as follows: Analyzing, designing, developing, implementing, and evaluating. It offers a systematic way to build successful training

programs (Abuhassna et al., 2024). Technical and vocational education and training (TVET) is a planned education and training that intends to give knowledge and skills for productive work (Ogbuanya & David, 2020). The automotive industry needs a robust teaching module that enhances the effectiveness of the TVET teachers for teaching automobile courses. This will ensure the acquisition of adequate automobile knowledge and skills.

Automobile maintenance personnel, commonly known as motor vehicle mechanics, must be equipped with the relevant knowledge, skills, and attitudes. These are critical for the effective maintenance of modern automobiles, owing to the influx of automobiles into Nigeria and the challenges of sustaining them. Today's motor vehicle mechanics are expected to diagnose problems, service, and repair an automobile (Ogbuanya & David, 2020). Thus, there is a need for qualified TVET teachers. The automotive business is a fast-growing industry that requires highly qualified and educated TVET teachers to equip learners with the needed skills to thrive (Hiim, 2020 ; Ogbuanya & David, 2020).

A teacher plays an important role in controlling the teaching and learning process. A teacher provides enablers responsible for trainees' development and achievement. (Jalil et al., 2020). In learning activities, a teacher and students must prepare well concerning media and models as support for teaching and learning activities to achieve the desired goals (Abuhassna et al., 2024). Establishing learning objectives and modifying the learning experience to suit students' interests and skills is crucial for achieving learning objectives (Matsum et al., 2022). A set of educational resources, and instructional materials consists of content, procedures, guidelines, and tests that are intended to be interesting, well-structured, and in line with classroom skills to achieve specific goals (Hasanah Dewi Lestari, 2023). In modern classrooms, the ADDIE model is applied to content module development, with an emphasis on creating educational materials that integrate digital resources and technology. For the creation and evaluation of instructional courses, training programs, and curricula across a range of domains, educators, researchers, and instructional designers have extensively employed the ADDIE instructional model (Lim & Burton, 2021).

This systematic literature analysis intends to explore the present state of applying the ADDIE model in producing modules for TVET instructors in the automotive sector. Specifically, it will investigate the available literature to determine the best practices, obstacles, and consequences of implementing the ADDIE model in this setting.

This review explored the current literature to determine the major components of the ADDIE model that are most relevant to the creation of modules for TVET instructors in the automotive sector. It also evaluated the efficacy of the ADDIE approach in increasing the skills and knowledge of TVET instructors and the influence on student results. This study sought to give insights and suggestions for TVET institutions and policymakers on how to successfully apply the ADDIE model in building modules for TVET instructors in the automotive sector. The development research uses the ADDIE model as its development model. The rationale for employing the ADDIE model in this study lies in its sequential steps and user-friendly nature. This study aims to conduct a thorough review of the automotive technology teaching module created especially for TVET instructors in Nigeria's TVET program.

METHODOLOGY

This study was done by conducting a comprehensive systematic review process, including establishing eligibility and exclusion criteria and procedures for identification, examination, and eligibility determination. This was followed by data collection and analysis. The survey method utilized Google Scholar and Scopus databases to source for articles. The systematic review process encompasses multiple stages. Drawing from prior research and thesauruses, pertinent and comparable keywords associated with teaching modules were selected. For this study, the chosen keywords utilized in a Google Scholar search

were: module development OR "teaching" AND Automobile**.** and the **Keywords used in a Scopus search were:** module development OR "teaching" OR "ADDIE model" AND Automobile**.**

In the initial phase, 89,500 articles were retrieved from the search database (Figure 1). The term used was sufficiently expansive to capture relevant articles while effectively filtering out less pertinent ones. Subsequently, a set of eligibility and exclusion criteria were established to capture articles published between 2019 and 2023 and articles written in English language. The remaining articles were evaluated and analysed by identifying studies that closely align with the research objectives. Data extraction involved reviewing the abstracts first, and then thoroughly examining the entire article. Finally, an exclusion process was used to narrow the selection, ensuring that only the most relevant articles were included in the review. Specifically, the papers whose content were not in line with the ADDIE model and TVET teachers in automobile were excluded after examining the entire articles. Finally, fifteen articles were selected for the study.
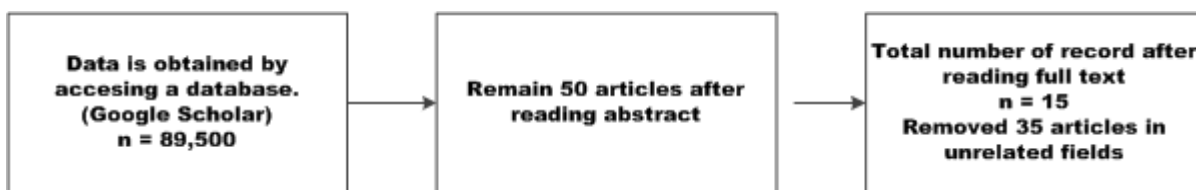

Figure 1: Studies Selection Procedure for Review and Synthesis

FINDINGS

The trend in publications over the past five years indicates a significant prevalence of articles emphasizing the significance of module development in educational instruction teaching and learning. The total number of articles that were found was 89,500, and a total of 15 research articles were reviewed in this module development.

To enhance the comprehensive search for this research, prior studies concerning module development were reviewed. The results of previous research included in this systematic literature review indicated that the effectiveness of teaching module development in enhancing student achievement is not consistently addressed. However, researchers emphasized the importance of active and creative teaching approaches by educators to attain teaching goals, Numerous research studies provide details on how to create modules for teaching and learning in a variety of fields. The results obtained revealed that the ADDIE instructional design model is a useful tool for addressing instructional needs, providing feedback, and integrating best practices in teaching and learning into online information literacy courses. The study by Tian & Xie (2023), investigates how the ADDIE model and the fundamentals of the political and ideological classroom teaching model are coupled in China. Addie model and quantitative method were used to analyse the data. The result showed that the five ADDIE model modules and the five fundamental components of the ideological and political classroom teaching model are closely related. According to the study, students' enthusiasm can be effectively mobilized by analyzing the ADDIE model in the context of ideology. Moreover, the goal of Haowharn & Ruangsuwa (2022), is to manage life skills instruction by bridging the communication and information technology gaps in Thailand. The study reported high scores for both the process and product of the virtual learning environment model, with a combined score of 89.66%/90.90% and the efficiency index was noted as 0.8063, indicating a high level of effectiveness in achieving the model's objectives. To increase the effectiveness and efficiency of the virtual learning environment model for strengthening teenagers' life skills learning in Thai more research should be done on its problems, elements, processes, and techniques. Furthermore, Song & Sabran (2023) using visual aids using a mixed-method approach. presented a revised ADDIE-based college teaching approach in Malaysia. The results obtained showed that

the ADDIE model-based imaging instruction was deemed superior to conventional classroom methods by both teachers and students. This was evidenced by the increase in teacher satisfaction. However, subsequent studies may examine the implementation of the suggested pedagogical approach in various fields and learning environments.

Hengki et al. (2022) investigated the value and difficulties associated with teaching modules at different educational levels, ranging from elementary to high school in Indonesia. Using a qualitative approach ADDIE model was used to create the teaching module, The findings show that many teachers, particularly those instructing independent learning curricula, lack a fundamental comprehension of putting together and constructing instructional modules. It was suggested that developing teaching modules could present difficulties, especially when considering autonomous learning curricula. Furthermore, Shahat et al. (2023) study adopted the ADDIE model to create a conventional program in Saudi Arabia. The results showed that along with helping participants develop their plans and instructional strategies, the ADDIE model (AM) program helped them discover and develop their creative talents in raw materials synthesis. The study found a direct correlation between AM training and creativity.

Additionally, the study of Rizal et al. (2021b) demonstrated how a smartphone app supports a problem-based learning management system (PBLMS3)—using the ADDIE model and quantitative method for the study. PBLMS3 is an application that helps students become more digitally literate. The study suggested that more research should be done to find out what other factors might improve digital literacy. The study by Martatiyana et al. (2023), ascertains the role of the ADDIE model in the production of online learning materials. The results showed that high-quality digital teaching resources could be created and assembled using the ADDIE model. Its five phases offer a methodical framework that guarantees the caliber and potency of instructional resources to assist with the learning process. However, the study acknowledges that not all educational environments could benefit equally from its findings.

In the study by Alwi et al. (2019), the objective was to create teaching modules aimed at fostering green skills within design and technology courses in primary schools. A qualitative approach was used for the study. The results revealed that the ADDIE model is suitable for developing green skills. The model's five phases Analysis, Design, Development, Implementation, and Evaluation were instrumental in ensuring a comprehensive and organized approach to module creation. Hendriyani et al. (2021) described how a valid, widely used, and efficient approach to learning the Product-Based Learning Approach was used to develop an entrepreneurship module using the ADDIE model. It was found that lecturers may use entrepreneurship modules using the Product-Based Learning—approach as a medium to support the teaching and learning process. The study by Stapa & Mohammad (2019) creates a Vocational Learning (Voc-Learning) e-learning prototype for Malaysian vocational education in Malaysia. It was found that the Malaysian vocational education system underutilises e-learning strategies according to the ADDIE model. However, the unique requirements of the Malaysian vocational education system may impact the efficacy of the developed prototype. The study aimed to increase elementary school student's interest in mathematics by developing a learning media that made a clock in Indonesia. The ADDIE model was utilised to create mathematical software while utilizing quantitative approach. Based on previous studies, using Hawgent dynamic mathematics software improved students' comprehension of clock reading in primary school (Pereira et al., 2021). The study by Shahat et al. (2023) developed a training program based on the ADDIE model to assist graduate students in art education in acquiring creative skills relevant to Indonesian raw material synthesis. According to the study's findings, creativity and AM training are strongly correlated, allowing students to go back to earlier phases when they notice a difference between what they believe to be true and what they see. Zahari et al. (2021) explored the syntax of problem-based learning (PBL) integrated into the learning management system. Using ADDIE for the study, it was found that physics education students had low digital literacy. The Moodle in LMS was unable to achieve optimal outcomes in terms of usability and reliability.

However, Suratnu (2023) examined the process of designing an instructional module using the ADDIE

model. This research investigated the application of the ADDIE model in crafting an instructional module tailored for remedial-level instruction in the Malay language. Leveraging the ADDIE model in crafting the instructional module has proven effective in addressing teaching and learning objectives, as it employs a systematic approach tailored to students' needs. This module is expected to enhance students' proficiency in fundamental reading and writing skills. Additional studies could explore the development of Malay language resources that complement the TaLM. Also, similar investigations could be carried out on a broader scale to enhance the comprehension of its effectiveness.

DISCUSSION

Abdul Rahman et al. (2021), define a module as a teaching and learning unit that systematically and gradually covers a specific subject to make it easier for the target audience to learn on their own. While Syam (2019) found that the term "module" in education refers to a tutorial chapter associated with a particular topic. Nowadays, there is a growing prevalence of research focused on creating modules for teaching and learning, suggesting that researchers recognize the significance of this topic for the future. The study by Muhammad & Kabir (2016) stated that many researchers employ the ADDIE model, one of the instructional design models, while creating software or applications for the field of education. The research study focuses on the usefulness of the module developed and its effectiveness in teaching TVET students about refrigeration and air conditioning in automobile technology. An examination of prior research indicates that employing a module-based learning approach in classrooms promotes a smoother teaching and learning experience, enhancing student success.

Additionally, the instruction and educational methods utilized in this module enhance engagement and effectiveness as they contribute to the advancement of students and their performance. Previous research outcomes presented a vivid picture regarding the influence of module development, as indicated by this comprehensive review of relevant literature. To align with the rapid progress of modern technology in this new era of norms, it is imperative to bolster the development of modules within the education system to ensure that the teaching and learning processes remain in sync with the latest advancements. The development of modules in education affects student results and greatly influences the approaches adopted by educators. The delivery methods and strategies teachers employ play a crucial role in moulding the educational experience for students. This aims to ensure the ongoing progress of education in Malaysia, thereby impacting the broader societal development within the country. As a result, the module's development could be implemented in Nigerian higher education institutions to teach refrigeration and air conditioning as part of the Technical and Vocational Education and Training (TVET) program. The emphasis on active learning put into the construction of the modules was guided by an extensive examination of the best ways for students to learn. Higher-level thinking, problem-solving, and knowledge retention have all been proven to be supported by writing across the curriculum and guided discovery-based learning. According to Kpabep & Festus (2019), while also catering to the interests and needs of various students using module packages for learning, the learner assumes ownership of the learning process, shifting it away from the teacher.

Similarly, Teaching modules are essentially learning materials that have been comprehensively and methodically organised by the learning principles applied by teachers to teach students (Kadek, 2022b). Modules are an alternative tutorial technique for the learners' education and satisfaction. The teacher's job is to direct and oversee the student's progress as they complete their tasks independently. Utilising the modules, students engage in a variety of engaging tasks that are tough enough to maintain concentration and attention (Syam, 2019). A good module should offer variation in skills and pedagogy and be accurate. The module's development should focus on several features, including self-instructional, self-contained, stand-alone, adaptive, and user-friendly (Rahdiyanta et al., 2023).

CONCLUSION

This study reviewed the use of the ADDIE instructional model to propose a design teaching module for TVET teachers in automobiles. Its study found that most research focused on the development of the ADDIE model but not on its effectiveness. Thus, there is a need for more studies on the effectiveness of the ADDIE model. The effectiveness of teaching modules is pivotal in the educational context, serving as a highly organized and structured learning resource designed to facilitate student learning and teacher instruction. It can be concluded from the findings of previous studies that the ADDIE instructional design model is a valuable tool for addressing instructional needs, providing feedback, and integrating best practices in teaching and learning into online information literacy courses. It can also be concluded that, based on the results of the previous study, the product-based learning approach was used to develop an entrepreneurship module using the ADDIE model. However, future studies on its effectiveness are recommended which can aid TVET teachers to gather feedback from students especially based on their understanding of the model.

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