



Using the E-Module in the Firefighting Course to Increase Cadets' Motivation

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Abstract: The Firemanship course is one of the mandatory courses taught to pilot cadets. As part of one of the capabilities of Airport Rescue and Fire Fighting (ARFF), the firemanship course provides pilot cadets with the ability to handle fire incidents at airports. The application of technology in learning firemanship courses has not been widely practiced by aviation education institutions. Using e-modules can increase aviation cadets' abilities, including learning motivation. In this research, the e-module for the firemanship course was created using the ADDIE method. The result is an increase in understanding scores and the ability to increase the learning motivation of pilot cadets. The increase can be seen from the minimum score of the pre-test, which is 1.6, increasing to 3.2 in the post-test. The maximum score in the pre-test of 2.2 increases to 3.7 in the post-test. The overall average score also increases in the pre-test from 1.96 to 3.53 in the post-test. This research also shows that there are differences in the understanding scores of Palembang Aviation Polytechnic cadets in firemanship courses. Learning using e-modules also provides a difference in value even though it is not significant. This adds to the literature on the application of ADDIE in making e-modules which are also effectively used in firemanship courses in particular.

Keywords: firemanship, e-module, motivation

Recommended citation: Sutiyo., Masito, F., Nugraha, W., Komalasari, Y., & Brown, C. (2024). Increase Cadet Motivation in Firefighting Course Using E-Module. *Journal of Innovation in Educational and Cultural Research*, 5(1), 29-34.

INTRODUCTION

Education plays a vital role in advancing a nation's civilization, so a nation must have a sound education system to become a great nation. Educational success can be achieved through an effective learning process (Abdullah et al., 2021; Puspitasari, 2019). Therefore, a quality learning process is needed to improve the quality of education (Rismayanti et al., 2022). The development of the paradigm that teachers are the primary source of knowledge in a learning process is no longer relevant. This is because a huge amount of data and knowledge has been provided using technology (Suherman, 2023). This is because technology has made enormous amounts of data and knowledge available (Wulandari et al., 2021). This led to several studies on utilizing technology as a new media in learning. These include the development of media, teaching materials, and other components that support learning activities that must be integrated with technology (Logan, 2021; Sani, 2021). Teaching materials must be used as creatively as possible to carry out an effective teaching and learning process. The learning process combined with technology is one of today's most popular learning approaches. The teaching materials often used today are in electronic form, such as electronic modules or e-modules. E-modules have one advantage: they can be accessed and used via electronic devices such as computers, laptops, tablets, or even smartphones. E-modules are equipped with audiovisuals, videos, and animations without reducing the content structure of conventional modules, providing students with enriched material and learning experiences (Alfieri, 2012; Astuti, 2023; Sofyan, 2019). Using E-Modules can produce a creative, productive, progressive, and interesting learning atmosphere. Learning using e-modules is also considered practical (Komikesari, 2020). Teaching materials that apply technology, such as e-modules, have the potential to increase students' desire to learn. The use of e-modules is also considered capable of mobilizing all the psychic driving forces in students. This is called student learning motivation. To achieve optimal learning outcomes, educators must do something new to increase students' learning motivation (Ilmi, 2021; Matsun, 2019).

According to Hermans (Nurrawi et al., 2023), motivated people have the following characteristics: 1) a tendency to work on tasks that are challenging but not above their abilities; 2) a strong desire to try and work alone and find their own solutions; 3) a strong desire to progress and achieve a higher level of success than the previous level of success; and 4) focus on the future. Motivation is vital in teaching and learning. Teachers must continue to motivate their students by offering interesting and creative lesson materials (Leny, 2021; Rusmansyah, 2021). The Firemanship course is one of the mandatory courses taught to pilot cadets at the Palembang Aviation Polytechnic. This course teaches knowledge and skills in dealing with unexpected events, including fire. Some of the material taught includes fire triangle theory, fire extinguishing techniques with or without tools, and implementing the victim evacuation process. Firemanship material is one of the capabilities

of Airport Rescue and Fire Fighting (ARFF). According to ICAO Doc 9137 Part 1 Chapter 1, ARFF services must always be available at every airport. This takes into account the possibility of a fire occurring: 1) when the aircraft lands, takes off, parks, etc.; 2) immediately after an aircraft incident or accident; or 3) at any time during the rescue operation (De Luca & Dell'Acqua, 2014; Suharev et al., 2020).

The purpose of this research is to add to the literature review on making e-modules, especially at aviation polytechnic institutions, especially in firefighting or firemanship courses. The results of this research can also improve the ability of cadets to handle fires, especially in the airport area, and can motivate cadets to learn firemanship. The e-module created is also expected to be one of the learning platforms for all aviation polytechnics in Indonesia in carrying out firemanship lectures..

METHODS

This research aims to develop and produce e-modules as flipbooks for the firemanship course. This research applied a modification of the ADDIE model to develop the e-module form. The ADDIE model was chosen because it is reliable in producing many other technology-based learning support tools. The ADDIE model comprised five elements: analysis, design, development, implementation, and evaluation (Crompton et al., 2023; Suratnu, 2023; Zou et al., 2023). Adjustments were made by carrying out several additional stages of the ADDIE model. This research will also measure the effectiveness of e-modules in increasing the learning motivation and curiosity of Palembang Aviation Polytechnic pilot cadets. Assessment in measuring the effectiveness of e-modules used pre-test and post-test assessment methods. The assessment indicators used to measure the increase in learning motivation of pilot cadets are based on Hermans. Testing of the effect of the e-module was carried out in two classes with a total of 45 aviation cadets.

In the data collection process, a questionnaire was used. Questionnaires were distributed to two classes that were given different learning techniques. The instrument used consisted of ten pre-test and post-test questions related to the application of e-modules during lectures. In addition, to measure the success of the application of e-modules, the final semester scores of Palembang Aviation Polytechnic cadets were also used. The final score of this semester is taken based on three aspects of assessment during lectures, namely the score of daily assignments, the score of the Mid-Semester Examination (UTS), and the score of the Final Semester Examination (UAS). The three indicators were then summed up and divided by three to find the average score of each cadet.

RESULT AND DISCUSSION

The ADDIE model is a model based on behaviorism theory. A theory which is the result of developing ideas by Dick and Carry to develop a learning system (Suratnu, 2023; Asmianto et al., 2024). ADDIE is an abbreviation for Analysis, Design, Development, Implementation, and Evaluation. The ADDIE model applies five interrelated levels or elements that encourage the practice of developing teaching programs or teaching modules. Each of these elements or levels does not follow a progressive pattern. Instead, elements or levels mutually inform each other in a design system. The ADDIE model can describe a comprehensive learning design activity process. This capability is one of the advantages of the ADDIE model compared to other models. This capability is one of the advantages of the ADDIE model compared to other models (Liu & Fan, 2023; He, 2024). The results of applying ADDIE in this research will be described below.

This analysis stage provides an overview of the e-module that will be developed. In this research, the analysis process began by taking data from pilot cadets at the Palembang Aviation Polytechnic. The pilot cadets were given a questionnaire form regarding the need for e-modules as part of the learning support for the firemanship course. Calculations use a modified Likert scale to obtain percentages. In measuring variables, the Likert scale creates variable indicators. Next, these indicators are used to make statements or questions. Table 1 shows the quantitative values assigned to the instrument items. Figure 1 is the result of the questionnaire taken.

Table 1. Likert Scale Calculation

Evaluation	Scale Value
Strongly Agree	4
Agree	3
Disagree	2
Strongly Disagree	1

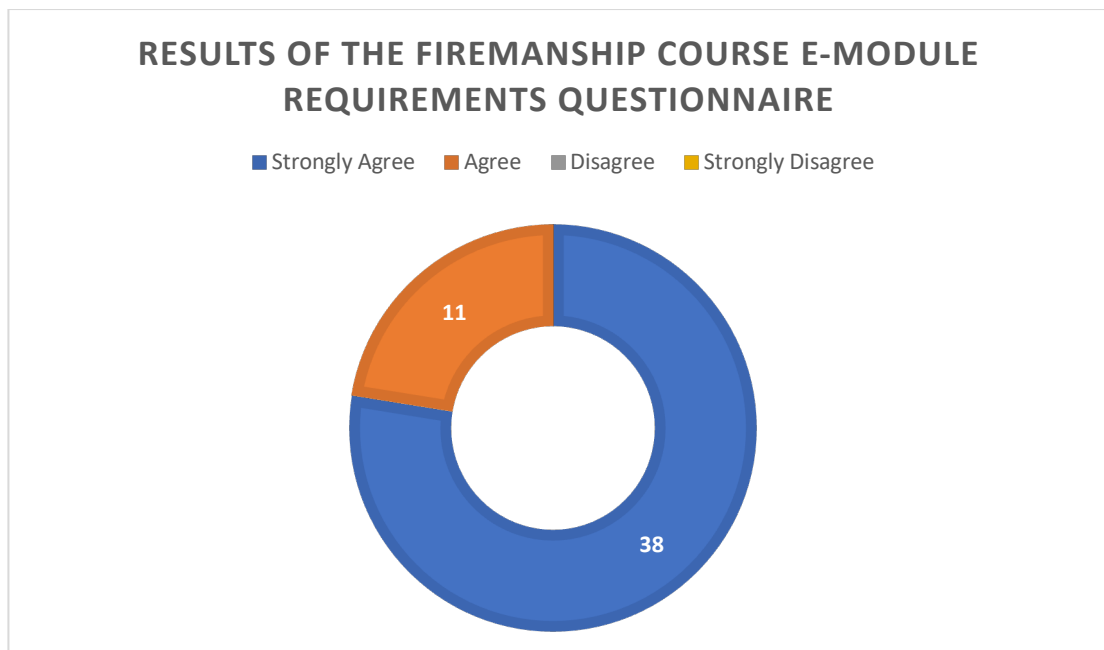


Figure 2. Results of taking a questionnaire regarding e-module requirements for pilot cadets

From the figure above, it can be seen that 38 of the 49 respondents stated that they strongly agreed with the development of e-modules for firemanship courses. Meanwhile, 11 other respondents stated that they agreed to develop e-modules. E-module-based teaching materials are needed for cadets because they are self-instructional. This means that the instructions in the e-module are apparent, making it easy to use and have clear learning objectives. Teaching materials in electronic form are also known as self-contained. This means that the lesson material presented is complete so that pilot cadets can study the material thoroughly. The e-module being developed also stands alone, which means the subject matter is not included in other teaching materials. The results of this questionnaire will then be used as a reference for implementing the next stage. The planning stage begins with determining and collecting the resources needed to develop the e-module product for this firemanship course (Aydin et al., 2023; Kartika et al., 2022; Zheng, 2024). The material sources used in the e-module are based on needs analysis. Three types of sources are needed to develop this media: media, material, and complementary. Media sources relate to the elements used in the media by producing them or with help from various reference sources relevant to the course (Alzoebi et al., 2023; Huda & Erlangga, 2023). At this stage, the sequence or structure of the e-module to be created is also carried out.

After the design stage is complete, the next stage is the development stage in the ADDIE model, namely product realization (Huang, 2023; Faghihi et al., 2024). These materials are obtained from sources that comply with the National Fire Protection Association (NFPA) curriculum and guidelines. Learning materials come from books, teaching materials that follow the curriculum, and applicable Core Competencies (KI) and Basic Competencies (KD), which include collecting materials and creating e-module teaching material media. Supporting images are sourced from downloads on the internet, and some are developed using design support applications. Then, the implementation stage was carried out to determine the effect of the e-module created by the firemanship course on increasing the learning motivation of pilot cadets at the Palembang Aviation Polytechnic. Before implementing the e-module that had been created, the pilot cadets involved in this research were given a pre-test. The questions at this pre-test stage consist of 10 questions related to using learning media such as physical modules and presentation files before implementing e-modules. Aligned questions will be given during the post-test to measure changes related to pilot cadets' learning motivation during learning using e-modules. The pre-test and post-test use assessments using the Likert scale are in Table 1.

Table 2. Descriptive Data of the Pretest Class

	N	Minimum	Maximum	Mean	Std. Deviation
Class	45	1,6	2,2	1,96444	0,11767

Table 3. Descriptive Data of the Posttest Class

	N	Minimum	Maximum	Mean	Std. Deviation
Class	45	3,2	3,7	3,52889	0,12583

Based on Table 2 and Table 3, there has been an increase in the cadets' minimum and maximum scores and the average class scores. The increase from the minimum score in the pre-test, which was 1.6, increased to 3.2 in the post-test. The maximum score in the pre-test, with a score of 2.2, increased to 3.7 in the post-test. The overall average score also increased from 1.96444 in the pre-test to 3.52889 in the post-test. This shows an increase in the understanding and learning motivation of the pilot cadets in the firemanship course. The final score results also show differences in the average scores in the control and experimental classes. The control class got an average final semester score of 87.73, while the final score for the experimental class was 88.08. The comparison table can be seen in Table 4.

Table 4. Comparison of Final Scores between Control and Experimental Classes

	N	Minimum	Maximum	Mean
Control class	22	87,0	89,0	87,73
Experimental class	23	87,0	89,0	88,08

The Firemanship learning module has 50 pages and three main pillars: attitude, responsibility, and leadership discipline. A trained attitude that is responsive and alert to safety becomes a strong foundation, teaching individuals to be proactive and ready to face fire situations. A well-understood responsibility involves protecting the public from fire dangers and using the correct equipment to fight fires. Leadership disciplines form a solid structure, enabling individuals to work effectively in teams, lead safely, and maintain efficiency when handling emergencies.



Figure 2. The E-module Preview

By combining these three aspects, the Firemanship module prepares individuals with the skills, knowledge, and attitudes necessary to face the challenges of fire. It is not just about technical understanding but also mental readiness, profound responsibility, and the ability to act as a responsible leader. With a solid foundation in attitude, responsibility, and leadership discipline, students are prepared to respond appropriately and efficiently when faced with a fire emergency, making them an integral part of maintaining the safety of the community and the environment. This is in line with the needs of aviation cadets for teaching materials that can increase learning motivation and the desire to learn, which continues to serve and be alert during emergencies during fires in the Firemanship course. Especially in firemanship courses, cadets also need electronic teaching materials such as e-modules to increase their understanding of the concepts in the Firemanship course, help them improve their ability to apply firemanship concepts, improve their ability to analyze and conclude concepts, and improve the ability to abstract material in the firemanship course. The evaluation stage evaluates the obstacles encountered in this research so that they can be refined in further research. Several obstacles in implementing the Firemanship learning e-module include 1) Lack of direct interaction; Fire learning requires practical training and direct interaction. E-modules cannot wholly replace the hands-on experience required to master firefighting skills; 2) Difficulty maintaining engagement; Lack of social interaction and direct monitoring can lead to a lack of engagement and motivation in learning important fire material; 3) Difficulty in supervision

and assessment; Monitoring progress and participation in e-modules can be difficult. Evaluation of practical skills in fire situations is also complex via e-learning platforms. Overcoming these barriers requires a holistic approach that combines technology with practical training, accessibility support, careful supervision, and the provision of engaging content. The results of this study indicate that the use of the E-module designed with the application of the ADDIE method has succeeded in increasing the learning motivation of cadets in the firemanship course. Learning by using e-modules also provides a difference in value even though it is not significant. This adds to the repertoire of literature reviews in the application of ADDIE in making e-modules which are also effectively used in firemanship courses in particular. In general, the application of the ADDIE method in making e-modules according to the author can also be used more extensively in learning for aviation cadets.

CONCLUSION

Based on previous research and discussions, applying the ADDIE model in creating e-modules for firemanship courses can increase pilot cadets' understanding and learning motivation. This can be seen from the increase in the pre-test and post-test results. This e-module, which uses a flipbook, effectively increases the learning motivation value of pilot cadets in the firemanship course. This teaching material can be further developed for dissemination purposes. This teaching material aims to achieve the targeted competencies for pilot cadets and teachers in the firemanship course. This study also shows the use of the e-module designed with the ADDIE method can improve the understanding of cadets in firemanship courses. This also reinforces that the use of the e-module designed with the ADDIE method can also be used more widely, especially in practical courses.

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