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Analysis and Exploration of Mobile Microlearning for Vocational High School Students

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Abstract. This study aims to analyse the learning needs of Vocational High School students in improving their competence towards software engineering. Therefore, this research was conducted on second grade students of vocational school in Bekasi. Qualitative research method was used to identify students' needs in software engineering learning process. Data collection was conducted by literature review, observation, and in-depth interviews. This research was conducted in collaboration with 28 students who have participated in creative product and entrepreneurship learning and three teachers. The results of this study indicate that students need teaching materials that are concise, interesting and easy to understand. Mobile microlearning is an alternative teaching material needed by students to understand the material of creative products and entrepreneurship in the competence of software engineering expertise. In addition, the use of mobile microlearning teaching materials can be developed with collaborative assignments for students. Thus, this research has implications for student learning innovation in vocational school. Given that the goal of vocational education leads to graduates who are ready to work and entrepreneurship, teaching materials developed based on collaboration can train students to adapt to the work environment and develop themselves independently.

Keywords: learning media; mobile learning; microlearning; vocational high school

1 Introduction

Vocational education is a part of the education system that prepares students to be better able to work in one occupational group or one field of work than in other fields of work. According to Bartosh et al. [1] students in vocational schools must consider their social environment. In addition, they must also be able to adapt to technological advances. Technological advances encourage students to be able to obtain information related to learning materials[2]. However, the use of technology must also be supported by good digital literacy skills. Teachers in vocational schools must also have competence in vocational knowledge, vocational skills and pedagogical abilities [3]. This pedagogical ability challenges vocational school teachers to integrate technology into learning[4].

In addition, demand for the competencies of Vocational High School graduates continues to increase along with the demands of global workforce competencies and the rapid advancement of technology[5]. The Indonesian government has attempted to

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implement policies to meet these demands. According to Suharno et al [6], it is stated that to achieve the objectives of vocational school education in accordance with the development of the world of work and the business world, it is necessary to increase student competence. This includes strengthening basic competencies and developing 21st century characters, such as critical thinking, creativity, communication, and collaboration, as well as instilling work ethic values and increasing students' abilities in the world of work[7][8].

The selection of appropriate curriculum implementation strategies greatly affects the achievement of these competency demands. According to Dick et al. [9] states that learning elements include context, content, learning methods, and instruction. Therefore, the synergy between teachers, students, learning materials, learning activities, teaching material delivery systems, and learning environments must be effectively designed as a strategy to achieve the desired learning objectives. According to Gagne in Anglin and Dick [10] there are three main components of learning, namely: external conditions, internal, and also learning outcomes, where learning outcomes are indicators of effective learning, good learning outcomes are indicators that effective learning has occurred.

In Indonesia, public vocational school called SMKN. Based on pre-research at SMKN 5 Bekasi, it was found that, in the subject of Creative Products and Entrepreneurship, the average achievement of the minimum completeness criteria of 108 students, in 6 materials, did not exceed 50%. According to Ministry Education[11], the final achievement of the Creative Product and Entrepreneurship subject in phase F is that students are able to actualise the competence of the concentration of expertise by producing products, both goods and services, which are innovative, have economic value, and are in accordance with customer needs. In addition, learners are also expected to be able to build sustainable businesses by utilising existing opportunities, both in their vocational field of expertise and other businesses that are more in line with market developments. Therefore, student achievement in this subject needs to be improved through appropriate solutions, given the importance of Creative Product and Entrepreneurship subjects in achieving vocational education goals.

In the context of learning materials, study of Astuti [12] concluded that vocational students should continuously access the latest information about the development of industry and business to gain insights that can improve their competence. According to Kim et al. [13], the role of teachers in this information age is to selectively choose relevant and useful information, and deliver it through methods and activities that are interesting and appropriate to the characteristics of learners.

In the learning process at school, sorting and delivering information is packaged in the form of teaching materials[14]. Research by Yao et al. [15] and Haleem et al. [16] concluded that teaching materials serve as a means for students to gain knowledge as well as a tool for teachers to instil skills and develop student abilities. Similarly, Fanani et al. [17] states that teaching materials are a medium in the process of delivering knowledge and skills from teachers to students. This emphasises the importance of designing subject matter in accordance with the principles of developing teaching materials to make it easier for students to learn and interact[18]. This study conducted a needs analysis to determine the teaching materials to be developed the character and

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needs of students[19]. Needs analysis is defined as a method to determine the existence of a gap between actual conditions and desired conditions, or to assess the feasibility of a situation[20]. By applying certain methods, it is hoped that this needs analysis process will become the basis for learning activities that focus on student needs, so that they can support the achievement of the competencies of vocational school graduates.

2 Method

This research was conducted using a qualitative approach to analyse and explore learning needs[21]. Thus, the researcher can identify solutions from the results of the analysis. This research was conducted at SMKN 5 Bekasi. SMKN 5 Bekasi is one of the state-owned vocational schools located in Bekasi, West Java. This research was conducted from October 2023 to July 2024. The researcher collaborated with three teachers of creative product and entrepreneurship subjects and 28 students in class 2 of SMK. Data collection was conducted through in-depth interviews, observation and documentation. Researchers observed the learning process of creative products and entrepreneurship for 4 meetings. Participatory observation was carried out by researchers to analyse the learning process carried out by teachers and see the enthusiasm of students in learning. After observation, researchers conducted semi-structured mandala interviews using the following interview guidelines.

Table 1. Interview Guidelines Indicators.

No	Aspects	Indicators
1	Material context	Facilities or support from the school, infrastructure or physical facilities, available resources in the form of character, ability, motivation of students & teachers
2	Organisational/policy context	Which organisations need to play a role. Also policies relevant to the problem
3	Educational context	Current situation (content, learning model, assessment).
4	*Viability*	What are the strengths, weaknesses, opportunities and barriers that might hinder the implementation of the development product?

The in-depth interview process was conducted at the school after students and teachers had conducted learning activities. The interviews were conducted twice with a span of two months. Each participant conducted an interview for 120 minutes. The researcher used a smartphone to record each interview with students and teachers. Documentation was conducted by analysing literature review related to the implementation of micro-learning. Of the 50 articles that had been analysed, the researcher identified seven articles that were in accordance with the research objectives. This research analysis technique uses the Miles and Huberman [22]method through three stages as follows: reduction, data presentation and conclusion drawing.

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3 Results and Discussions

3.1 Results

Microlearning is one of the learning methods that focus on delivering material and information in a short and focused manner. This condition is in line with the characteristics of students in vocational schools.

Table 2. Material Context Interview Results.

No	Questions	Answers
1	The lessons are concise and easy to understand	'In the process of learning creative products and entrepreneurship, it is interesting to be deepened because it can be my skill after graduating from school' (Ano, May 2024) 'I like learning creative products and entrepreneurship because it can be my provision in the future' (Palupi, May 2024)
2	Search for Information on the Internet	'I am used to looking for additional information on learning materials through the internet independently such as on Google' (Anton, May 2024) 'When looking for information, I usually use the GPT chat if asked by the teacher. If not asked, I do not look for additional information.' (Ane, May 2024)
3	Group Assignment	'Actually, group assignments train us on cooperation skills. I am happy when I get group assignments in the form of projects that produce products. So that it can train creativity and entrepreneurship well' (Maria, May 2024) 'A fun group assignment is to make a product. Because by making products we are required to think creatively' (Rendi, May 2024)
4	Learning Materials	'Learning materials would actually be easier if they were internet-based and could be accessed through our smartphones.' (Ano, May 2024) 'The learning materials are still too complicated and numerous, making it difficult to understand.' (Maria, May 2024)

Table 2 shows that they like learning creative products and entrepreneurship. It is just that in finding additional information students are not used to doing it independently. In addition, they are more interested in doing project-based group assignments by producing products. The expected learning materials are also smartphone-

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based. In preparing the learning curriculum at SMKN 5 Bekasi, there is a head of the expertise competency curriculum and collaborates with creative product and entrepreneurship subject teachers. However, the learning materials provided by the teacher are many and complicated. Thus, students experience problems. Moreover, in the context of education, the media and teaching materials are still not varied. Therefore, innovation is needed in creative product and entrepreneurship learning activities. According to Yuniarsih et al. [23] Learning media that can make students do independent learning is the application of microlearning. This is because microlearning is effectively used to encourage students' interest in learning [24]. Considering the needs of students in the learning process require materials that are easy to understand in a concise and mobile-based manner, microlearning can be an alternative innovation. Microlearning aims to provide convenience for students to access materials anytime and anywhere. The intensity of smartphone use by students can encourage the development of microlearning in online learning. Thus, students can utilise digital media such as smartphones to provide an effective and interesting learning experience for students.

3.2 Discussions

The results of this study show that students' needs in learning are important to be analysed as a measure to improve learning outcomes. Therefore, this research illustrates that Microlearning, including mobile devices can be a solution on how to bridge the world's need for quantity and quality of learning due to difficult and complicated materials [25]. The results of this study are in line with the concept of Romero-Rodríguez et al. [26] It can be concluded that there is a gap between the needs of students and ongoing learning practices. Students have difficulty with too much Creative Product and Entrepreneurship subject material, and need material that is presented concisely and can be accessed via mobile devices. The teaching media and teaching materials currently used by teachers of Creative Product and Entrepreneurship subjects at SMKN 5 Bekasi tend to be less varied, making them less able to motivate students. Nevertheless, students have realised the importance of this subject in supporting their competencies. A similar problem was concluded on Utami and Atmojo [27] that teaching materials that are only physical have various weaknesses, such as being easily damaged, less varied, and require a lot of space, making them less attractive to students. Students' visual learning styles tend to be influenced by what they see during learning, while the arrangement of the school environment in question includes the provision of learning facilities that can stimulate student readiness, processes, and learning outcomes, including the development of teaching materials that are in accordance with student needs. Meanwhile the learning style preferences of vocational students, especially in computer and network engineering majors, have diverse characteristics, with a dominant tendency to kinesthetic learning styles, so e-learning was developed that contained assignments. So it is necessary to develop teaching materials that suit the needs & characteristics of the latest students in order to improve the competence of vocational school students.

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Based on the results of the literature review stage, it can be concluded that teaching materials that present material concisely are known as microlearning. Microlearning originated from the needs of the world of work aimed at allowing workers or students to multitask or not use a lot of time to search for additional knowledge[28]. This microlearning method has been applied in several studies at the vocational school and senior high school levels and has proven effective in achieving learning objectives. In addition, the application of microlearning in research for creative product and entrepreneurship subjects showed a significant increase in learner competence. Research on the characteristics of vocational school students, the characteristics of creative product and entrepreneurship subjects, and the characteristics of teaching materials have been conducted and become a reference in the preparation of teaching materials that are in accordance with the characteristics of students. Supporting documents, such as assessment guides and lesson plans, can also be used as guidelines in learning activities.

Teaching materials based on the technology used into four main categories: printed teaching materials, audio teaching materials, audio-visual teaching materials, interactive multimedia teaching materials, and web-based teaching materials[29]. Based on feedback and discussions with practitioners and other experts, it was concluded that the teaching materials to be developed as intervention solutions are teaching materials that use microlearning methods, can be accessed via mobile devices, and include group or collaborative assignments.

4 Conclusions

This research concludes that students in vocational schools need learning media that can help them understand the learning materials. Not all learning materials at vocational schools are concise and easy to understand. Creative product and entrepreneurship learning materials have shortcomings in the learning process. Students have problems when understanding the material because it is too much. In addition, the learning media used still does not encourage students to learn independently. Thus, innovation in learning is needed. This research also shows that there is a need for teaching materials that are prepared according to the characteristics and needs of students, especially for complex materials and based on student work products. In terms of material, a simple, short and fast presentation through varied media is needed. In terms of project work, student work products need to be done collaboratively. In addition, there is a need for teaching materials to be accessible through mobile devices. As a solution to these needs, the development of mobile microlearning teaching materials with a collaborative approach was chosen, especially for creative product and entrepreneurship subjects. The results of this study have implications for future learning activities. Academics can develop microlearning-based learning media in vocational schools and conduct trials with students. In addition, this research also has implications for student learning innovation in vocational schools. Considering that the goal of vocational education leads to graduates who are ready to work and entrepreneurship, teaching materials developed based on co-

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laboration can train students to adapt to the work environment and develop themselves independently.

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