The innovation of learning plan designer based mobile web to improve quality of learning media in vocational technology for education 4.0

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Abstract. The era of education 4.0 is an era of digitalization and transformation. Learning media must also follow technological developments for the learning process. The problem that often arises is the relatively weak learning media in the form of supporting programs for arranging learning plan. This study aims to: 1) mapping the components of learning media in the education 4.0 era; 2) testing the level of attractiveness of the Learning Plan Designer Based Mobile Web; and 3) testing the effectiveness level of the Learning Plan Designer Based Mobile Web. This study uses research and development (R&D) methods. In the mapping process, data collection techniques are through questionnaires and documentation. The focus of research is in vocational colleges in East Java. The results of this study include: 1) the components of learning media in the education 4.0 era consisting of easily accessible, ongoing information, easy to use, technology-based, intelligence systems, and educational interactions; 2) Learning Plan Designer Based Mobile Web products developed are feasible and attractive (mean score of 93.5%) based on the validation results of learning software experts and vocational and science education material experts; and 3) the results of the development of the Learning Plan Designer Based Mobile Web product are proven to be effective and can be used as a reference and alternative media for further research.

1. Introduction

In the era of education 4.0, the world of education is required to adapt learning media to developing technology. The impact, resulting in the need for learning media to change in a transformative direction that adapts to the prevalence of student needs. The effect of this is very broad across all levels of education, especially vocational education [1–3]. Vocational education has a role in preparing superior human resources to build the nation. This is because the quality of superior vocational education is the main measure in assessing the progress of a country in terms of the quality of its industrial sector [4,5]. Another fact is that there are still many gaps in the vocational world. One of the gaps is that the needs for learning media in the era of Education 4.0 are not properly fulfilled in line with technological developments. The need for learning media should be synchronized with developing technology. Several researchers explained that the level of learning media fulfillment was still low [6–8]. This raises the root of the problem that actually occurs, namely the unavailability of innovative learning media. The learning media in the vocational field on campus should prioritize the level of media innovation that is
tailored to the needs of students. Based on this, lecturers are required to develop learning media that can stimulate students to think creatively. This can be done by introducing vocational students to renewable learning media innovations [9,10].

One form of learning media that is trending is the learning plan designer based on the mobile web. A learning plan designer based on the mobile web is a system and learning media designed based on the mobile web. Until now, the mobile web has become an effective learning medium to improve the quality of learning media, especially in the vocational field. On the mobile web, there are tools that provide a study plan design every week in the form of teaching materials, quizzes, and exams for each competency being studied. [4,5].

Mobile web-based learning planning design is basically a manifestation of conventional learning planning that is integrated with technology. In the designer based mobile web learning plan, the need for quality learning media that is attractive can be met. In addition, students can access learning media according to their needs. This is certainly very effective in increasing student interaction with lecturers and improving the quality of learning media, which will improve students' abilities as learners.

2. Methods

The method used is research and development (R&D). The development stage starts with needs analysis, literature study, product design, product validation, product testing, product revision, and product effectiveness testing. The validation test was carried out by two teams of experts. In the testing process, the team consists of a team of instructional media experts and a team of vocational material experts. The product revision process is carried out if there is input from the expert team. The method implemented is presented in Figure 1.

![Figure 1. Research methods](image)

3. Results

In this study, we found the findings of need. The process for identifying this component is carried out by distributing questionnaires and interviews. These components include easily accessible, ongoing information, use to use, technology-based, intelligence systems, and educational interactions. The percentage levels of each component are shown in Figure 2.

![Figure 2. Learning Media Components in the Education 4.0 Era](image)
In Figure 2 shown that there are six components of the need for learning media in the education era 4.0. The percentage of each of these components is easily accessible (86.5%), ongoing information (79.7%), easy to use (82%), technology-based (92.4%), intelligence systems (88.2%), and educational interactions (91.2%). Furthermore, the validation results from vocational and science education material experts are shown in Table 1.

**Table 1.** The results of expert validation on vocational and science education materials.

| No | Indicator Items                        | Score | %   |
|----|---------------------------------------|-------|-----|
| 1  | Linkage with target competencies       | 4.00  | 100.00 |
| 2  | Presentation material relief           | 3.80  | 95.00 |
| 3  | The question component encourages active thinking | 4.00  | 100.00 |
| 4  | The relationship of each material to the content | 3.50  | 87.50 |
| 5  | The strength of the material stimulates the user | 4.00  | 100.00 |

Table 1 explain five main indicator items used by material expert validators to analyze the products being developed. Table 2 shows the results of the media expert validation.

**Table 2.** The results of expert validation of learning software.

| No | Indicator Items                        | Score | %   |
|----|---------------------------------------|-------|-----|
| 1  | Application layout and design          | 4.00  | 100.00 |
| 2  | Application updates                    | 3.50  | 87.50 |
| 3  | Presentation of presentation information | 3.33  | 83.33 |
| 4  | Ease of operation by the user          | 3.50  | 87.50 |
| 5  | Content and content attractiveness     | 4.00  | 100.00 |

Based on Table 2, it can be interpreted that there are five main components of expert validation of learning software experts. If examined more deeply, of the five indicators tested, there are two indicators that get a maximum score of 4.00 (100%). The results of the analysis of student's initial abilities are shown in Table 3.

**Table 3.** Results of Data Processing Initial Ability Test Results.

| T  | Df | Sig. | Mean Difference | Std. Error Difference |
|----|----|------|-----------------|-----------------------|
| -1.11 | 55 | .24 | -1.84 | 1.66 |
| -1.11 | 54.4 | .24 | -1.84 | 1.66 |

Based on Table 3 shows the results of the initial ability test of the two classes before using the mobile web-based designer learning plan. The summary of these results indicates a significance value of 0.24. This indicates that the initial ability of the two classes is not a significant difference. The final ability test results are shown in Table 4.

**Table 4.** Final Ability Results Data Processing.

| T  | Df | Sig. | Mean Difference | Std. Error Difference |
|----|----|------|-----------------|-----------------------|
| 7.63 | 55 | .002 | 11.77 | 1.58 |
| 7.60 | 53.17 | .002 | 11.77 | 1.58 |

Based on Table 4 shows the results of the final ability test for both classes. The summary of these results shows that the significance value is 0.002. This indicates that there is a significant difference between the control class and the experimental class. In the experimental class, learning uses the product developed.
4. Discussion

This research resulted in three significant findings. These findings include: (1) the components of learning media in the education 4.0 era; (2) the level of attractiveness of the developed mobile web-based designer learning plan product; and (3) the effectiveness level of the mobile web-based designer learning plan product.

4.1 Components of Learning Media Needs in the Education Era 4.0

The main indicator for the learning media needs of the Education 4.0 era is Easily Accessible. In this component, lecturers in the vocational field should be in charge of making learning media that are easily accessible to students. Experts explain that the quality of learning media in the vocational field at least makes it easy for students in the learning process so that students' insight in the field of vocational education can increase. Student motivation to learn using mobile web-based learning media is determined by the perceived ease of use [11,12]. Learning media in the field of vocational education is a means of realizing students into creative and productive humans to play a central role in industrial development. In this concept, it can be said that the learning media in this era should have different characteristics from the learning media in the previous era. In the era of education 4.0, it is a response to the needs of industry 4.0, where humans and technology are aligned [13,14].

Understanding the quality of learning in the field of vocational education is in line with the availability of learning media that suits your needs. This is important to prepare students for the industrial revolution 4.0 era with the education 4.0 era. The development of learning in the education era 4.0 in the vocational field must be balanced with the application of innovative learning media in accordance with the design of the learning implementation plan. Experts explain that the learning process in the vocational field will be efficient if the learning environment is made similar to field conditions. The field conditions referred to are the replica conditions of the industrial environment in which they will work. Students currently compete in the world of technology so that educational technology must be continuously updated [12,15].

Fulfilling the quality of learning media in the vocational field should fulfill the principle of delivering continuous information (ongoing information). The availability of continuous access to information is an important indicator of the need for learning media in the education era 4.0 in the vocational field. Learning media innovation focuses on the ease of use (easy to use) by students. This will have an impact on the ability of students to understand the material in relation to the competencies learned. The achievement of the desired competencies will be effective if the availability of learning media is in line with students' understanding abilities with competency demands [12,16]. The principle that must be considered in using visual media in learning is to emphasize aspects of simplicity, clarity, and ease of reading.

4.2 The attractiveness of Learning Plan Designer Based Mobile Web

The product developed is a learning media in the form of a mobile web-based learning plan designer. The material content and media content of this product are designed in accordance with the mapping of the components of the learning media needs in the education era 4.0. Based on the results of the validation of the vocational and science education material experts, the mean score of the material developed has high validity. This shows that the material innovation in the Learning Plan Designer Based Mobile Web product is quite good. In testing by learning software experts, the average score of the product being developed has a high level of attractiveness.

Testing the attractiveness of the developed mobile web-based learning plan designer products have fulfilled the role and function of mobile web development demands as a quality learning medium. Learning Plan Designer Based Mobile Web can be translated as an innovative way of learning interaction using technology that makes it easier for learning and learners. Mobile web learning is a learning strategy using mobile technology to introduce and enable learning. The use of mobile web
supports learning objectives in various fields without exception in the vocational field because it fulfills an effective and communicative learning system between learners and learners \[17,18\].

Testing by material experts, the overall score is above 75%. This is in accordance with the principle of developing learning media that the quality of the material being developed is the main benchmark for developing the quality of the learning media being developed. The quality of the material in e-learning has a central role in improving student understanding. The material that has been developed is practically used in learning. The mobile web-based designer learning plan is the most innovative learning media in accordance with the education 4.0 era. These components are more easily synchronized with the learning media. Learning plan designer based on mobile web is actually the form of technology-integrated learning media \[3,19\].

4.2 Effectiveness of Learning Plan Designer Based Mobile Web

Improving the quality of learning media can be proven by an increase in student learning outcomes so that the increase in the quality of learning becomes real with the function of learning media. The function of technology-based learning media can be mapped into six roles, namely a tool to create effective teaching and learning conditions to support student-learner interaction, an integral part of the learning conditions carried out, laying a concrete foundation of abstract concepts so that student's misconceptions can be minimized, improve motivation to learn students, and improve the quality of learning. In principle, the design of a learning plan using a mobile web can essentially provide opportunities for learners to prepare the learning process to be carried out. Not only that, learners are also encouraged to become creative managers who realize better learning management \[5,20\].

So it can be said that the achievement of learning objectives will not be effective if the learning media used are not technology-based. Mobile web-based learning can be used effectively to reduce the gap between theory and practice so that the learning objectives can be fulfilled completely. This is because learning media is central to learning itself. Problems that arise when delivering information on the subject matter can be overcome by using innovative mobile web-based learning media \[21,22\].

5. Conclusion

In this study, the conclusions are divided into several components. First, the components of the learning media need of the Education 4.0 era include easily accessible, ongoing information, easy to use, technology-based, intelligence systems, and educational interactions. Second, learning plan designer based mobile web technology has a high level of attractiveness and completeness of vocational materials. Third, the technology developed is proven to be able to improve vocational student learning outcomes in the education era 4.0.

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