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The Influence of Innovation Management on the Effectiveness of Digital Learning Media Development

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ABSTRACT

The development of digital technology has encouraged educational institutions to innovate in developing more interactive and adaptive learning media. This study aims to analyze the effect of innovation management on the effectiveness of digital learning media development. The research method used is a quantitative approach with a survey technique. Data were collected by distributing questionnaires to 75 respondents consisting of educators and learning media developers in higher education. Data analysis was performed using multiple linear regression to determine the relationship between innovation management variables (innovation planning, implementation, and evaluation) and the effectiveness of digital learning media development. The results show that innovation management has a significant effect on the effectiveness of digital learning media development, with the greatest contribution coming from the aspect of innovation implementation. These findings confirm that the success of learning media development is not only determined by technological capabilities, but also by the institution's ability to manage the innovation process systematically and sustainably. The implications of this study highlight the importance of implementing innovation management as a key strategy in improving the quality and effectiveness of digital learning media in the era of educational transformation.

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1. INTRODUCTION

The rapid development of information and communication technology (ICT) has brought fundamental changes to the world of education. The learning process, which was previously conventional, has now transformed into digital learning that emphasizes interactivity, flexibility, and high accessibility. Digital learning media is one of the tangible results of this transformation, playing an important role in improving the effectiveness of the teaching and learning process at various levels of education. However, the development of digital learning media not only requires technical skills, but also requires planned, measurable, and sustainable innovation management. In this context, innovation management has a strategic role to ensure that the digital media development process can run effectively, efficiently, and in accordance with user needs [1].

Innovation management is essentially a series of activities that include planning, organizing, implementing, and evaluating the innovation process carried out within an organization. In the educational environment, the application of innovation management is becoming increasingly important in line with the demand to create learning that is relevant to the times. Innovation that is not managed properly often results in

learning media products that are ineffective, difficult to implement, or unsuitable for the characteristics of the learners [2]. Conversely, the systematic application of innovation management can help educational institutions produce digital learning media that is adaptive, engaging, and adds value to learning outcomes [3].

Previous studies have shown that good innovation management contributes positively to the quality and sustainability of technology-based educational products [4]. In addition, the effectiveness of digital learning media development is greatly influenced by the organization's ability to integrate innovative ideas into the production process, as well as the readiness of human resources to adapt to technological changes [5]. However, in practice, many educational institutions still face challenges in implementing innovation management optimally [6]. Some common problems that arise include the limited digital competence of educators, minimal coordination between development teams, and the absence of a sustainable innovation evaluation system [7].

Based on this phenomenon, this study was conducted to analyze the effect of innovation management on the effectiveness of digital learning media development. The research focuses on the extent to which the components of innovation management, including innovation planning, innovation implementation, and innovation evaluation, impact the effectiveness of the process and results of digital learning media development in an educational environment [8]. By understanding this relationship, it is hoped that the results of this study can provide theoretical and practical contributions to media developers, educators, and policy makers in designing more effective digital learning development strategies [9].

2. METHOD

This study uses a quantitative approach with an explanatory research method that aims to explain the causal relationship between innovation management variables (independent variables) and the effectiveness of digital learning media development (dependent variables) [10]. A quantitative approach was chosen because this study focuses on testing hypotheses that are objective, measurable, and use numerical data processed through statistical analysis [11].

The population in this study consisted of all educators, educational staff, and digital learning media developers in higher and secondary education institutions that have implemented technology in the learning process. The exact number of the population is unknown, so sampling was conducted using non-probability sampling with the purposive sampling method [12].

Sample selection was based on specific criteria, namely: (1) respondents were directly involved in the development of digital learning media; (2) had at least one year of experience in technology-based educational innovation processes; and (3) understood the innovation management process in their respective educational institutions [13]. Based on these criteria, 75 respondents were obtained who were considered representative of the research population [14].

Primary data was collected through a closed questionnaire based on research variable indicators. The questionnaire was first tested on 20 respondents to ensure the validity and reliability of the instrument. In addition, secondary data was obtained through a literature study of scientific journals, books, and research reports relevant to innovation management and digital learning media development [15]. To maintain data accuracy, data collection was conducted online using digital forms to reach respondents spread across various educational institutions [16].

The research began with a preliminary study to identify problems in the field related to the effectiveness of digital media development. Next, research instruments were developed based on a review of innovation management theory and the effectiveness of digital learning [17]. Once the instruments were declared valid and reliable, questionnaires were distributed to respondents who met the criteria. The collected data was then processed, analyzed, and interpreted to obtain conclusions that describe the relationship between variables [18]. The following is the Validity Test Formula (Pearson Product Moment Correlation):

$$r_{xy} = \frac{N(\sum XY) - (\sum X)(\sum Y)}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}}$$

Description:
$r_{xy=}$ correlation coefficient between item scores (X) and total scores (Y)
$N =$ number of respondents
$\Sigma\, xy =$ the product of the item score and the total score
$\Sigma\, x =$ item score
$\Sigma\, y =$ total score
Σ X^2 and Y^2 = sum of the squares of each score

3. RESULTS AND DISCUSSION

This study was conducted on 75 respondents consisting of educators and developers of digital learning media in various educational institutions [19]. The research instrument was a questionnaire with a five-point Likert scale that measured two main variables, namely Innovation Management (X) and the Effectiveness of Digital Learning Media Development (Y) [20].

The recapitulation results show that the majority of respondents gave high ratings to the implementation of innovation management in their respective institutions [21]. The average score for the innovation management variable was 4.18, which is categorized as good, while the average score for the effectiveness of digital learning media development was 4.25, which is categorized as very good [22].

3.1. Validity and Reliability Test

Based on the validity test results using Pearson Product Moment, all items in both variables have a value of $r\ count > r\ tabel(0{,}230)$ at a significance level of 5%. This indicates that all items in the questionnaire are valid and suitable for use in further analysis.

Meanwhile, the reliability test results using Cronbach's Alpha showed a value of 0.884 for the innovation management variable and 0.902 for the digital learning media development effectiveness variable. Since both values are > 0.70, the research instrument is declared reliable with a very high level of internal consistency.

3.2. Classical Assumption Test

Before performing regression analysis, classical assumption tests were conducted to ensure the validity of the model. The results of the normality test using the Kolmogorov-Smirnov test showed a significance value of 0.200 > 0.05, indicating that the data was normally distributed. The results of the multicollinearity test showed a Tolerance value of 0.875 > 0.10 and a VIF value of 1.142 < 10, indicating that there were no signs of multicollinearity. The heteroscedasticity test using the Glejser method produced a significance value above 0.05, indicating that the regression model was free from heteroscedasticity.

3.3. Multiple Linear Regression Analysis Results

The analysis was conducted to determine the effect of innovation management variables (X) on the effectiveness of digital learning media development (Y). The linear regression equation obtained is:

$$Y=12{,}314+0{,}657X$$

These results indicate that each one-unit increase in the application of innovation management will increase the effectiveness of digital learning media development by 0.657 units, assuming other variables remain constant. The coefficient of determination (R^2) value is 0.652, which means that 65.2% of the variation in the effectiveness of digital learning media development can be explained by innovation management, while the remaining 34.8% is influenced by other factors outside this study, such as technological support, educator competence, and educational organization policies.

3.4. Significance Test (t-test and F-test)

The t-test results show the value $t_{count} = 9{,}276$ with significance $p = 0{,}000 < 0{,}5$ This means that innovation management variables have a significant partial effect on the effectiveness of digital learning media development. Meanwhile, the F test results show a value of $F_{count} = 86{,}03$ with significance $p = 0{,}000 < 0{,}05$. Therefore, simultaneously, innovation management has a significant influence on the effectiveness of digital learning media development.

The results of the study indicate that innovation management has a positive and significant effect on the effectiveness of digital learning media development. This means that the better the application of innovation management principles in the educational environment, the more effective the process of developing digital learning media will be.

This finding reinforces the theory proposed that innovation management is a systematic process involving the identification of opportunities, management of creative ideas, and implementation of innovations to produce value-added products or services. In the context of education, the application of innovation management enables developers and educators to synergistically integrate new ideas, creative methods, and digital technology to improve the quality of learning.

More specifically, the implementation aspect of innovation has the most dominant contribution to the effectiveness of learning media development. This shows that the stages of innovation implementation, such as the application of interactive learning technology, collaboration between development teams, and adaptation to the needs of learners, are key factors for success in digital media development. In addition, the planning aspect of innovation also plays an important role in determining the direction and sustainability of media

development. Educational institutions that have an innovative vision and strong managerial support tend to be more capable of producing learning media that is relevant to the needs of the times.

Meanwhile, innovation evaluation serves to ensure that the results of digital media development meet the expected quality standards. Continuous evaluation allows educational institutions to make iterative improvements to the media developed, so that learning effectiveness can be continuously improved.

These findings are in line with the results research, which states that the success of digital education innovation is highly dependent on an organization's ability to comprehensively manage the innovation process, from idea to implementation. Similarly, research shows that effective innovation management contributes significantly to improving the quality of technology-based learning in higher education.

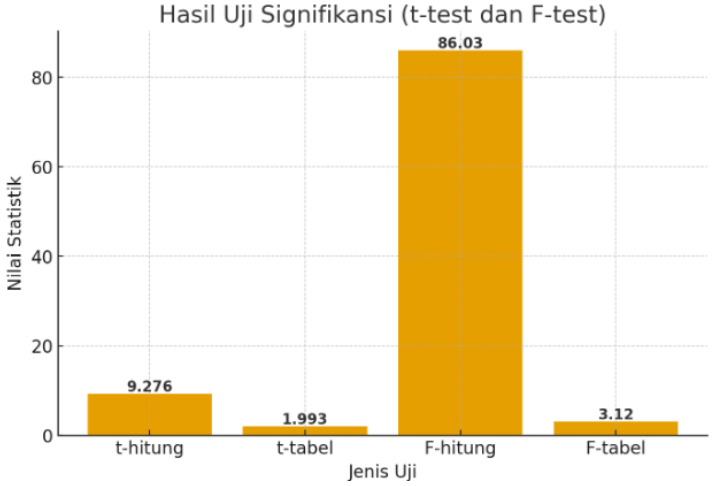

Figure 1. Significance test results diagram

Based on the significance test results shown in the diagram above, a t-value of 9.276 was obtained with a t-table value of 1.993 at a significance level of 0.05 (α = 5%). The t-value, which is much greater than the t-table value, indicates that the innovation management variable has a partial and significant effect on the effectiveness of digital learning media development. Thus, the hypothesis stating that innovation management has a positive effect on the effectiveness of digital learning media development is accepted.

Meanwhile, the simultaneous test (F-test) results show that the F-count value of 86.03 is greater than the F-table value of 3.12 at a significance level of 0.05. This result indicates that simultaneously, all dimensions of innovation management which include innovation planning, innovation implementation, and innovation evaluation have a significant effect on the effectiveness of digital learning media development.

Descriptively, the diagram shows a striking difference between the calculated values and the table, both in the partial and simultaneous tests. This reinforces that the application of effective innovation management in educational institutions can improve the quality, efficiency, and effectiveness of the digital learning media developed. In other words, the better innovation management is applied, the higher the effectiveness in developing digital learning media.

These results are in line with innovation management theory, which emphasizes the importance of systematic management of ideas, processes, and evaluations so that innovation can have a real impact on improving organizational performance, including in the context of education. Empirically, this study proves that innovative strategies in learning technology management contribute significantly to the effectiveness of digital media development.

4. CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that innovation management has a significant effect on the effectiveness of digital learning media development. The results of the partial test (t-test) show that each dimension of innovation management, including innovation planning, innovation implementation, and innovation evaluation, contributes significantly to improving the effectiveness of the developed learning media. The t-count value (9.276), which is greater than the t-table (1.993), shows that the innovation management variable individually has a positive and significant effect on the effectiveness of digital learning media development.

Simultaneously, the F-test results show that all components of innovation management collectively influence the effectiveness of digital learning media development, with an F-value (86.03) greater than the F-table (3.12). These findings confirm that success in developing digital learning media does not only depend on

technical capabilities or the use of technology alone, but also on how innovation is managed systematically, planned, and sustained in an educational environment.

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