

Students' Needs Analysis for Video-Based Learning in Python Programming at Madrasah Aliyah

Dini Oktarika^{1*}, Winna Dharmayanti², Muhamad Arpan³

^{1,2,3}Information Technology Education, Faculty of Mathematics, Natural Sciences, and Technology, Universitas PGRI Pontianak, Jalan Ampera, Kota Pontianak, Kalimantan Barat, Indonesia

*Corresponding author: dinioktarika96@gmail.com

Abstract. This study aims to analyze students' needs for video-based learning in Python programming at Madrasah Aliyah. The research employed a quantitative descriptive approach using a survey method. The participants were students who had learned or were currently learning Python programming. Data were collected through a Likert-scale questionnaire covering indicators such as the need for learning media, preferences for video-based learning, difficulties in understanding the material, and learning style compatibility. The data were analyzed using descriptive statistics, including percentages and mean scores. The results indicate that all indicators fall into the high category, with percentages above 80%. This finding suggests that students have a strong need for video-based learning to support their understanding of Python programming. Learning videos are perceived as effective in helping students comprehend abstract concepts, enhancing learning motivation, and facilitating independent learning. This study concludes that the development of multimedia-based learning videos is essential to improve the effectiveness of Python learning in Madrasah Aliyah. Therefore, designing learning media that align with students' needs and characteristics is crucial to support the quality of education in the digital era.

Keywords: Needs analysis, Learning video, Python programming, Multimedia, Madrasah Aliyah

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1. Introduction

The rapid development of information and communication technology has brought significant changes in the field of education, including the learning process at the Madrasah Aliyah level. The integration of technology in learning has become a necessity to improve the quality of education and to meet the demands of the digital era (Bond et al., 2020). One area that has experienced considerable development is programming education, particularly Python, which is known as a relatively easy-to-learn programming language and is widely used in various fields such as data science, artificial intelligence, and application development (Van Rossum & Drake, 2009). Ideally, the teaching of Python programming in Madrasah Aliyah should be conducted effectively and interactively, and should enhance students' understanding and skills through the use of innovative learning media.

However, in reality, the teaching of Informatics, particularly Python programming, in Madrasah Aliyah still faces various challenges. The learning process is often conventional, teacher-centered, and lacks the use of engaging instructional media. This condition leads to difficulties for students in understanding abstract programming concepts (Robins et al., 2003). In addition, limited instructional time and insufficient learning resources also contribute to students' low interest and understanding of Python material (Lahtinen et al., 2005).

Theoretically, the use of multimedia-based learning media, such as instructional videos, can improve learning effectiveness by integrating visual and auditory elements that help clarify the delivery of content. Multimedia learning theory suggests that presenting information through a combination of text, images, and audio can support deeper understanding (Mayer, 2009; Mayer, 2021). Furthermore, previous studies have shown that learning videos can enhance students' motivation, independence, and learning outcomes (Kay, 2012; Zhang et al., 2006).

On the other hand, the use of video-based learning also supports flexible learning models such as online and blended learning, allowing students to learn independently at their own pace (Hrastinski, 2019). However, the development of effective learning videos must be based on a needs analysis to ensure alignment with students' characteristics, abilities, and learning preferences (Branch, 2009). Without such analysis, the developed media may not optimally support the learning process.

Therefore, an in-depth study is needed to analyze students' needs for Python programming learning videos in Madrasah Aliyah. This research is expected to provide a solid foundation for developing more effective, engaging, and need-based learning media.

2. Method

This study employed a quantitative descriptive approach using a survey method to analyze students' needs for video-based learning in Python programming at Madrasah Aliyah. This approach aims to obtain a systematic description of students' needs, preferences, and learning characteristics in the use of video-based learning media. The research design used was a cross-sectional survey, in which data were collected at a single point in time to describe the actual condition of the respondents (Creswell, 2014).

The participants of this study were a group of students from Madrasah Aliyah Negeri 1 Pontianak who were learning Python programming, specifically 189 tenth-grade students. The sampling technique used was purposive sampling, considering students' involvement in programming learning (Sugiyono, 2019). The selection of participants was also based on recommendations from the subject teacher.

The data collection instrument used in this study was a questionnaire developed based on learning needs indicators, including (a) the need for learning media, (b) preferences for video-based learning, (c) difficulties in understanding Python material, and (d) students' learning style characteristics. The questionnaire employed a five-point Likert scale to measure the level of agreement for each statement. The Likert scale is a widely used psychometric instrument to measure attitudes, perceptions, and opinions quantitatively through a graded range of responses from strongly disagree to strongly agree (Jebb et al., 2021; Koo & Yang, 2025).

Data collection was conducted by distributing the questionnaire to respondents both directly and through online platforms. Prior to its use, the instrument was tested for validity and reliability to ensure that it measured accurately and consistently (Arikunto, 2013). The collected data were then processed and analyzed further.

Data analysis was carried out using descriptive statistical techniques to present the data in the form of percentages and mean scores. Percentages were used to determine the level of students' needs for video-based learning, while mean scores were used to identify the tendency of respondents' answers. The percentage was calculated using the following formula:

$$P = \frac{f}{N} \times 100\% \quad (1)$$

where:

P : represents the percentage

f : represents the frequency of responses

N : represents the total number of respondents.

In addition, the mean score was calculated using the following formula:

$$\bar{X} = \frac{\sum X}{N}$$

where:

$\bar{X}$: represents the mean score

$\sum X$: represents the total score

N : represents the number of respondents.

The results of the analysis were then interpreted into categories of students' needs as a basis for developing appropriate video-based learning media.

3. Results and Discussion

The results of this study present data on students' needs for video-based learning in Python programming at Madrasah Aliyah. The data were obtained through the distribution of questionnaires to students and were analyzed using descriptive statistics in the form of percentages and mean scores. Based on the results of data processing, an overview of students' needs for the use of learning videos was obtained, as presented in Table 1.

Table 1. Student Needs for Python Learning Videos.

Indicator	Mean Score	Percentage (%)	Category
Need for learning media	4.35	87.0	High
Preference for video format	4.28	85.6	High
Difficulty in understanding material	4.10	82.0	High
Learning style compatibility	4.22	84.4	High

Based on Table 1, all indicators fall into the high category, indicating that students have a significant need for the use of video-based learning in studying Python programming. The indicator related to the need for learning media obtained the highest score, which reflects a gap between the ideal condition of technology-based learning and the current conventional teaching practices. This finding is in line with Bond et al. (2020), who stated that the integration of technology in education is still not optimal in many institutions.

Students' high preference for video-based learning indicates that audiovisual media are more favored compared to traditional teaching methods. This can be explained by multimedia learning theory, which suggests that the combination of visual and auditory elements can enhance information processing in both working memory and long-term memory (Mayer, 2021). In addition, videos enable the representation of abstract concepts in a more concrete form, thereby facilitating students' understanding.

The level of difficulty experienced by students in understanding Python material is also categorized as high. This indicates that learning programming remains a challenge for students, particularly in understanding logical structures and syntax. This finding is consistent with previous studies by Robins et al. (2003) and Lahtinen et al. (2005), which state that programming is one of the most difficult subjects for beginners. Therefore, the use of instructional videos that provide step-by-step explanations can serve as an effective solution to reduce students' cognitive load.

Furthermore, the compatibility of video-based learning with students' learning styles also shows a high score. This suggests that instructional videos can accommodate various learning styles, particularly visual and auditory learners. In this context, video-based learning offers flexibility, allowing students to learn independently and repeatedly according to their needs. This is consistent with the concept of flexible learning in blended learning environments, which enables students to control the time, place, and pace of their learning (Hrastinski, 2019).

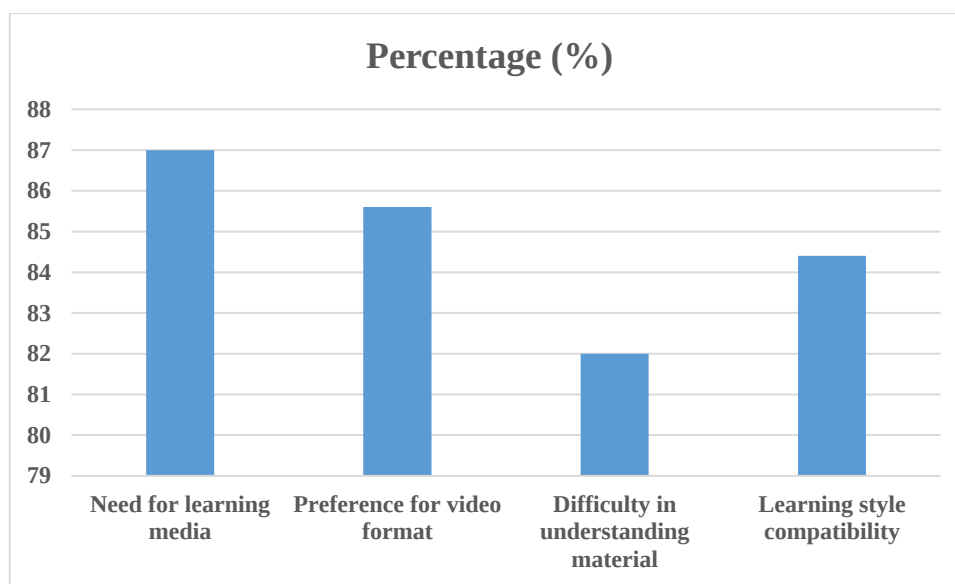


Figure 1. Percentage of Student Needs for Python Learning Videos

Based on Figure 1, it can be observed that all indicators have percentages above 80%, indicating a very high level of need. This suggests that the development of video-based learning is not merely complementary, but has become a primary necessity in supporting Python learning at Madrasah Aliyah.

Furthermore, these findings are consistent with previous studies by Kay (2012) and Zhang et al. (2006), which demonstrate that the use of video in learning can enhance students' motivation, engagement, and learning outcomes. Instructional videos provide a more engaging learning experience and enable deeper cognitive interaction compared to conventional teaching methods.

Thus, the results of this study confirm that there is a strong need for the development of Python programming learning videos that are systematically designed and based on students' needs. The implication of these findings is the necessity to develop learning media that are not only visually appealing but also pedagogically sound, including well-structured content, clarity of explanation, and interactivity, in order to optimally improve learning effectiveness.

4. Conclusion

Based on the results of the study, it can be concluded that students at Madrasah Aliyah have a high need for the use of video-based learning in studying Python programming. All research indicators fall into the high category, including the need for learning media, preferences for video formats, difficulties in understanding the material, and compatibility with students' learning styles.

The high level of need indicates a gap between the current learning conditions, which tend to be conventional, and students' needs for more interactive, visual, and flexible learning media. Instructional videos are considered effective in helping students understand abstract programming concepts through more systematic and easily comprehensible content delivery. In addition, videos support self-directed learning, allowing students to access the material anytime according to their individual learning pace.

The implications of this study suggest that the development of multimedia-based learning videos should become a priority in educational innovation at Madrasah Aliyah, particularly in Python programming instruction. Teachers and instructional media developers are expected to design videos that are not only visually engaging but also pedagogically sound, including clear explanations, well-structured content, and the integration of practical examples. Furthermore, the findings of this study can serve as a reference for educational institutions in formulating technology-based learning policies to improve the quality of education.

The recommendations of this study emphasize the need to develop interactive, student-centered learning videos and to conduct further trials to measure their effectiveness in improving learning outcomes. Future research is recommended to examine the impact of video-based learning on cognitive, affective, and programming skill aspects in greater depth. Additionally, further studies may involve larger sample sizes or integrate specific instructional models such as blended learning or flipped classroom to obtain more comprehensive results.

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