The Effectiveness of Learning Videos in Improving Student Skills in Land Measuring Science Course 1

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Abstract
This study aims to analyze the effectiveness of using learning videos in improving student skills in the course of Land Measurement Science 1. Learning videos are used as interactive media to help students understand the basic concepts of land measurement, especially in the application of measurement techniques in the field. The research method used is quantitative research with an experimental approach. The research subjects were students of the Building Civil Engineering Study Program, Department of Civil Engineering Education and Planning, Faculty of Engineering, Makassar State University. Information collection was carried out through pre-test and post-test followed by the experimental group using learning videos, as well as the control group using conventional learning methods (through Jobsheet guide). The results showed that students who used the learning video showed a significant increase in skills compared to the control group. Thus, the learning video proved to be effective in improving students' concept understanding and practical skills in the Land Measurement Science 1 course.

Keywords: learning videos, science course, student skills

Introduction

The Soil Surveying 1 course is an important component in the curriculum of the Building Civil Engineering Study Program at the Department of Civil Engineering Education and Planning, Faculty of Engineering, Makassar State University (UNM). This course provides a solid foundation for students to understand soil measurement techniques and principles, which are crucial aspects in the planning and execution of construction projects (Babalola et al., 2019). Although conventional teaching methods such as lectures and practicum in the field have proven to be effective, there are still challenges in adapting learning to different skill levels and in understanding complex material (Kim et al., 2019).

In the midst of the rapid development of educational technology, learning videos have emerged as a promising alternative to improve the quality of learning. Learning videos allow students to access materials with clearer visualizations and repeat content as needed (Castillo et al., 2021; Guo et al., 2020). This is particularly relevant in the Soil Surveying 1 course, where the visualization of measurement techniques and practical demonstrations play an important role in learning. By providing a more dynamic and interactive way of delivering material, videos can help overcome the limitations of traditional methods and support students in understanding complex concepts and improving their practical skills (Serrano et al., 2019).

Existing research shows that learning videos have the potential to increase the effectiveness of the learning process (Mayer et al., 2020). Aysolmaz & Reijers (2021) assert that learning videos can improve conceptual comprehension by combining effective visualization and repetition of the material. In addition, Seo et al (2021) showed that video helps overcome time and resource constraints, as well as supports more independent learning. However, the majority of these studies do not focus on the application of video in specific civil engineering courses such as Soil Surveying (Salunkhe et al., 2022), so there is still a gap in understanding how video learning can be optimized in this context.

This research offers a significant contribution with a focus on the application of learning videos in the context of soil measurement, which has not been widely explored in the existing literature. The main innovation of this research is the development of learning videos specifically designed to visualize soil measurement techniques and integrate theory with practical demonstrations in a multimodal manner.

Research Methods

This study uses a quasi-experimental design with a control group and a treatment group (Rogers & Révész, 2019) to evaluate the effectiveness of learning videos in improving students' skills in the Soil Surveying 1 course. This design was chosen to compare learning outcomes between students who use learning videos and those who follow teaching methods using diktat books and jobsheets.

The population in this study is students of the Building Civil Engineering Study Program at the Department of Civil Engineering Education and Planning, Faculty of Engineering UNM, who are registered in the Soil Surveying 1 course. The research sample will be randomly selected from this population and divided into two groups (Etikan & Babatope, 2019): the treatment group (which will use learning videos) and the control group (which will follow traditional teaching methods). The sample size in each group will be determined by considering sufficient numbers for significant statistical analysis, with the expectation of consisting of 30 students in each group.

The learning video used in this study will be developed by paying attention to the learning objectives of the Soil Surveying 1 course. The video material will include basic theory of soil measurement, measurement techniques, and practical case studies. The videos will be designed using a multimodal approach that combines narration, animation, and live demonstrations to ensure deep understanding. The video will be tested first to ensure the quality and relevance of the material before being used in research.

Develop and compile learning videos in accordance with the syllabus of the Soil Surveying 1 course. Develop research instruments such as pre-test and post-test to measure student understanding and skills. Conduct training for lecturers who will be involved in teaching and evaluation. Students in the treatment group will receive learning videos as additional material in their learning process. They will be given access to the video and asked to watch it independently and complete related tasks. Students in the control group will follow traditional teaching, which includes face-to-face lectures and practicum in the field, without the use of learning videos.

Prior to the intervention, all students will take a pre-test to measure their initial understanding of the basic concepts of Soil Surveying 1. After the learning period, both the treatment group and the control group will take the same post-test to measure changes in their understanding and skills. Students in both groups will be asked to fill out surveys and interviews related to their experiences with the learning methods received, in order to identify their benefits, challenges, and perceptions of the learning videos.

Data obtained from the pre-test and post-test will be analyzed using descriptive and inferential statistics to assess differences in understanding and skills

between the treatment group and the control group (Deore & Arora, 2022). The t-test for independent samples will be used to test the significance of the differences between the two groups (Mishra et al., 2019). Data from surveys and interviews will be analyzed qualitatively to evaluate the student experience and provide additional insights into the effectiveness of learning videos.

Table 1. *Research Population and Sample*

Class	Population	Sample	Information
A	45	30	Kelompok Perlakuan
B	45	30	Control Group
Total	90	60	Total Samples (30+30)

Results and Discussion
Research Results

This study aims to evaluate the effectiveness of learning videos in improving student skills in the Soil Surveying 1 course. Information is collected through pre-test and post-test, as well as surveys and interviews with students. The Treatment group that used learning videos had an average pre-test score of 65, with scores ranging from 55 to 75. After the learning period, the average post-test score increased to 85, with scores ranging from 75 to 95. The average increase in score is 20 points. The Control group that followed the traditional teaching method had an average pre-test score of 66, with scores ranging from 58 to 76. After the learning period, the average post-test score increased to 74, with scores ranging from 66 to 82. The average increase in score is 8 points.

The t-test for independent samples showed that the difference in score improvement between the treatment group and the control group was significant ($p < 0.05$), which indicated that the learning video had a greater positive impact than the lecture method in front of the class (face-to-face). Most of the students who received the treatment reported that the learning videos were very helpful in understanding the concept of soil measurement (Fry & Thieme, 2019). They appreciated the ability to rewatch the material and the clear

visualization of the measurement techniques (Kok et al., 2022). The average satisfaction score from the survey was 4.5 out of 5. Students in the control group revealed that although they gained a good understanding, they felt limited by the practicum time and the availability of resources. The average satisfaction score from the survey is 3.8 out of 5.

Discussion

The learning videos developed include materials consisting of basic theories of soil surveying 1, soil height difference measurement techniques, and practical demonstrations of the work steps of implementing the practicum job. The video has been tested in the context of learning and received positive feedback from students regarding the clarity of the material and ease of access to learning (Mahoney et al., 2019). The results of the study show that learning videos have a significant impact on improving students' understanding and skills in the Soil Surveying 1 course. The higher increase in scores in the treatment group compared to the control group showed the effectiveness of learning videos in improving concept understanding and practical skills. This is in line with the findings of (Yaacob et al (2021), who stated that video can improve comprehension through better visualization and repetition of material .

Surveys and interviews supported these findings, with students in the treatment group reporting that videos helped them understand the material better and made it easier to access information at any time (Scagnoli et al., 2019). This success can be attributed to the ability of video to provide in-depth visualizations and more detailed explanations of soil measurement techniques, which are often difficult to explain only through traditional face-to-face lectures or practicums. In contrast, the control group that used only traditional teaching methods showed smaller increases in scores and satisfaction. This suggests that traditional methods may not fully meet the learning needs of students, especially in terms of visualization and accessibility of

materials (Güney, 2019).

The learning video prototype developed during the study also received positive feedback (Ou et al., 2019), which suggests that the integration of technology in learning can be an effective tool to improve the quality of civil engineering education (Chowdhury et al., 2019). These videos not only provide useful information but also increase student motivation and engagement in the learning process (D'Aquila et al., 2019; Fyfield et al., 2019; Liu & Elms, 2019).

Conclusion

This study evaluates the effectiveness of learning videos in improving student skills in the Soil Surveying 1 course in the Building Civil Engineering Study Program, Department of Civil Engineering Education and Planning, Faculty of Engineering UNM. The results of the study show that the use of learning videos has a significant positive impact compared to traditional teaching methods. Students from the treatment group who used the learning video showed an average increase in post-test scores of 20 points, while the control group only experienced an increase of 8 points. These results show that learning videos not only significantly improve concept comprehension but also provide additional advantages in terms of flexibility and accessibility of the material.

Based on the results of surveys and interviews, it was confirmed that students felt more helped and motivated by the learning videos because of their ability to provide clear visualization and flexibility in repeating the material. In contrast, students in the control group reported that the lecture and jobsheet methods were inadequate in meeting their need for in-depth visualization and explanation.

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