




## Elementary School Teachers' Perceptions on Video-Based Mathematics Learning in Flipped Classroom Model Towards Learning Quality

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### Abstract

Teachers' perceptions of video-assisted mathematics instruction in measurement topics within flipped classroom learning models vary. This study explores teachers' perceptions of using video-assisted mathematics instruction in measurement topics in elementary schools. A case study was conducted with 30 elementary school teachers teaching in various regions in Tasikmalaya. Data collection was carried out through questionnaire dissemination and interviews as research instruments. The data analysis technique employed in this study was Interactive Analysis, which involved data reduction, data presentation, and conclusion. The research findings indicate that teachers' perceptions of video-assisted mathematics instruction encompassed cognitive aspects with an average score of 87.50%, affective aspects with an average score of 88.50% and psychomotor aspects with an average score of 89.50%. The results show that most teachers positively perceive using video-assisted mathematics instruction in measurement topics. Teachers state that video-assisted instruction helps students understand measurement concepts and makes learning more engaging and enjoyable for elementary school students.

## INTRODUCTION

Mathematics education is essential in shaping a person's character and thinking. In mathematics education, students with difficulty understanding the material teachers present in class are often encountered. This is related to teaching methods that are less effective and do not attract students' interest in learning mathematics. To overcome this problem, various innovations in teaching methods have been developed, one of which is using learning videos as a teaching aid [1]. Learning videos in mathematics teaching can help students understand mathematical concepts more efficiently and enjoyably. Learning videos have become increasingly popular among teachers and students worldwide in recent years. A critical aspect of using learning videos is teachers' perception of the quality of learning videos used in mathematics teaching [2].

Video learning can be a crucial component in implementing the flipped classroom model. In the flipped classroom, students are provided access to learning materials through instructional videos before the class session, while the class time is utilized for interactive activities such as discussions, explorations, and application of the concepts learned through the videos. Using instructional videos in this model allows students to control their learning pace, time, and

methods while providing teachers opportunities for more resounding individual support during class sessions.

One theory that supports the use of instructional videos in the flipped classroom model is the Multimedia Learning Theory. According to this theory, humans have limited information processing capacity, and using media that combines text, images, audio, and animation can enhance understanding and retention of information. With the advantage of incorporating various media elements, instructional videos can assist students in comprehending and internalizing the taught mathematical concepts.

Previous research findings also support the effectiveness of using instructional videos in the flipped classroom model. Using instructional videos in the flipped classroom model can improve students' academic achievement in economics [3]. Using instructional videos in the flipped classroom model can enhance students' interest and motivation in mathematics [4]. Teachers' perceptions of learning media are an essential factor that can influence the effectiveness of using learning media. This is because teachers' perceptions can affect the use of learning media in the classroom and its impact on student learning outcomes [5]. Therefore, it is important to understand teachers' perceptions of learning videos in mathematics in the context of teaching at elementary schools.

Previous studies have also investigated teachers' perceptions of learning media, showing that teachers' perceptions of learning videos are very positive and impact students' performance in learning mathematics [6]. In addition, learning videos can improve students' motivation and ability to understand mathematical concepts [7]. However, some studies show teachers' perceptions of learning videos are not always positive. Some studies show that teachers' perceptions of learning videos are still not good enough, and they experience difficulty selecting the appropriate learning videos for classroom teaching [8].

Learning videos can help students understand abstract mathematical concepts more easily and enjoyably in mathematics teaching. However, learning videos cannot be considered the sole solution to mathematical learning problems. As a teaching aid, learning videos must be well-designed and suitable for the characteristics of students and teaching needs.

Several previous studies have discussed using learning videos in mathematics teaching in elementary schools. For example, a study showed that learning videos could improve students' learning outcomes in geometry [9]. However, the study did not discuss teachers' perceptions of using learning videos. In addition, using learning videos in mathematics teaching in elementary schools also showed positive results in improving students' learning outcomes. However, the study did not discuss teachers' views on using learning videos [10]. Several other studies also show that using learning videos in mathematics teaching can improve students' learning outcomes [11]. However, few studies still discuss teachers' perceptions of using learning videos in mathematics teaching.

Learning videos are a relatively new learning medium that requires continuous evaluation and development. Therefore, research on teachers' perceptions of using learning videos in mathematics teaching is crucial to evaluate and to develop more effective learning media suitable for elementary schools' teaching needs.

## METHOD

This study used a case study method to explore teachers' perceptions of using learning videos to teach elementary school measurement material. The case study method was chosen because it allows the researcher to obtain in-depth and detailed data on teachers' views on using learning videos in mathematics education [12].

Data was collected through the distribution of questionnaires and interviews on the use of learning videos in teaching measurement material to thirty teachers from 30 different elementary schools in the City and Regency of Tasikmalaya, which were distributed via a Google Form link. The data obtained were then analyzed using interactive analysis techniques, which included data reduction, data presentation, and conclusion. The results of the data analysis showed that teachers' perceptions of learning videos on measurement material included cognitive, affective, and psychomotor aspects.

**Table 1.** Questions in the Teacher Questionnaire

No	Question
1	How good is the quality of the mathematics measurement learning video?
2	How complete and comprehensive is the material presented in the learning video?
3	To what extent can the learning video stand alone without needing additional explanations?
4	How adaptive is the learning video in adjusting to students' abilities and needs?
5	How easy is it for students to access and use the learning video?
6	To what extent is the user interface of the learning video easy to understand and operate for students?
7	How independently can students use the learning video without assistance from a teacher or others?
8	How complete and precise is the information conveyed in the learning video?
9	To what extent does the learning video provide real-life examples and applications of measurement in everyday life?
10	How well does the duration of the learning video align with the presented material?

**Table 2.** Respondent Data

Respondent	Gender	Percentage
Gender	Male	25
	Female	75
Education	Bachelor	30
	Magister	70

The score is obtained through the following equation :

$$\text{Percentage} = \frac{\text{Positive responses}}{\text{Question items}} \times 100\%$$

Furthermore, the percentage score of the teacher's question is referred to the criteria as follows:

**Table 3.** Criteria for Level of Success [13]

Criteria	Level
>90	Very High
80-89	High
70-79	Medium
60-69	Low
<60	Very low

## RESULTS AND DISCUSSION

This study explores teachers' perceptions of using instructional videos in teaching the topic of mathematical measurement in primary schools. Through in-depth interviews with several teachers, the study obtained results that provide an overview of their views on the effectiveness of using instructional videos in the context of teaching measurement of areas in mathematics.

The positive perceptions of teachers towards video-assisted mathematics instruction align with the potential benefits associated with the flipped classroom learning model. Providing instructional videos as pre-learning resources allows students to access and engage with the content at their own pace and convenience. This approach allows for more interactive and collaborative activities during in-class sessions, fostering more profound understanding and knowledge application.

Integrating video-assisted instruction in teaching measurement topics provides visual and auditory stimuli, facilitating multisensory learning experiences. Such experiences enhance students' cognitive engagement and facilitate conceptual understanding. Additionally, the affective aspect of learning is addressed through videos, as they can spark students' interest, motivation, and enjoyment, leading to increased participation and active learning.

Teachers also stated that instructional videos make presenting complex and abstract material more engagingly and interactively easier. Instructional videos also enrich students' learning experiences by providing real-life examples and applications of measuring areas in everyday life.

However, some teachers mentioned several challenges related to the use of instructional videos. Some teachers felt the need to adapt existing instructional videos to suit the needs of their classes and ensure that the presented material was relevant to the applicable curriculum. Additionally, technical constraints such as adequate facilities and infrastructure availability were identified as factors that need to be considered. Learning videos are becoming increasingly popular as a learning media in education. Learning videos can make it easier for students to understand complex material through images or text. Learning videos can also increase student engagement in the teaching and learning process and provide a more enjoyable and interactive learning experience.

Based on the results of several studies, the following conclusions were obtained the use of learning videos can improve student learning outcomes in science subjects in elementary school.

The use of video learning in teaching measurement material in elementary school is perceived positively by teachers. Video learning can improve student learning outcomes and increase their engagement in the learning process [14]. In addition, other research showed that learning videos can help students improve their speaking skills in English. Video learning can also provide a more enjoyable and interactive learning experience. Video learning effectively improves students' speaking and listening skills in English [15]. The learning videos can also attract students' enthusiasm for learning [16]. Here is a mathematics learning video on measurement shared on YouTube, link <https://youtu.be/bpj9hYv5oag>.

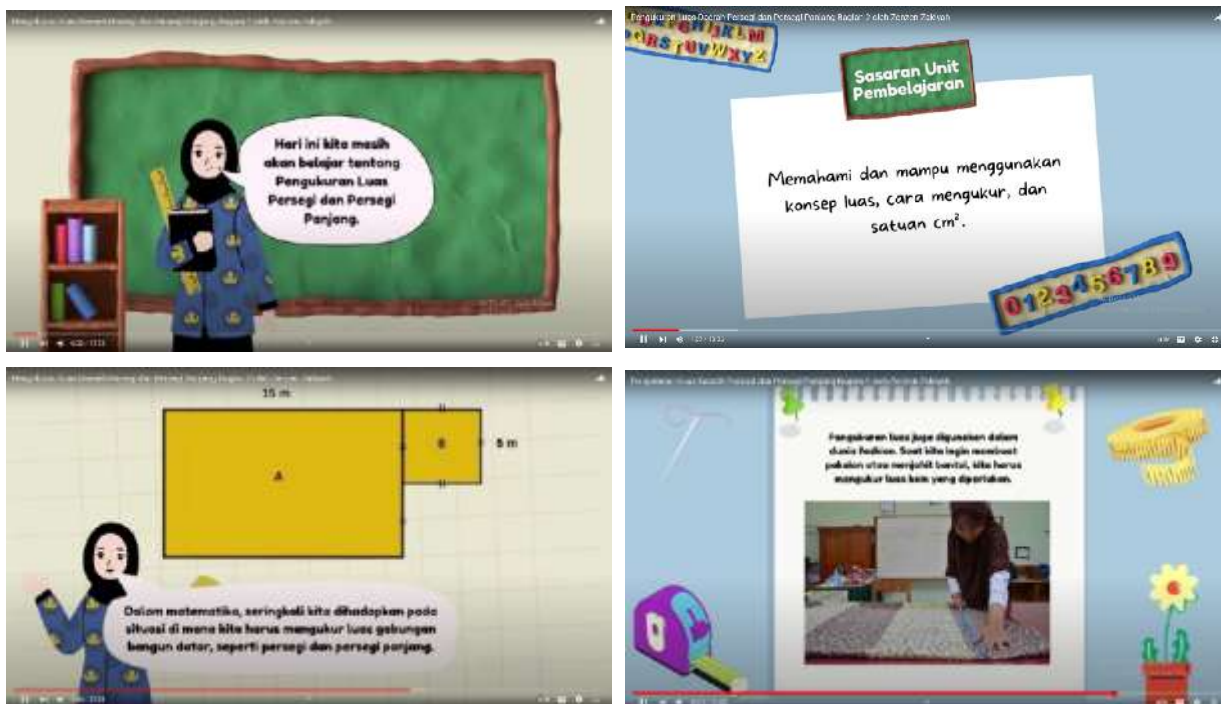


Figure 1. Learning Videos

This study generated result on elementary school teachers' perceptions of video learning for measurement material, with a focus on cognitive, affective, and psychomotor aspects, while considering indicators for creating effective video learning to ensure that learning material can be presented well and effectively to students (a) Self-Instruction: The material in the video must be explained independently and easily understood by students without assistance from teachers or others, (b) Self-Contained: The video must present the material entirely and comprehensively without requiring additional explanations from other sources, (c) Stand Alone: The video must be able to stand on its own and not depend on material or information from other sources, (d) Adaptive: The video must be able to adapt to students' abilities and needs, as well as be accessible to students with different levels of skills or backgrounds, (e) User Friendly: The video should be easy to access and use by students, and designed with an interface that is easy to understand and operate [17].

These concepts can be applied as a guideline in creating video learning for measurement material in elementary schools. First, the self-instruction principle emphasizes the importance of explaining the material independently and efficiently understood by students without assistance

from the teacher or others. This can be achieved by using simple language and avoiding complicated technical terms for students to understand.

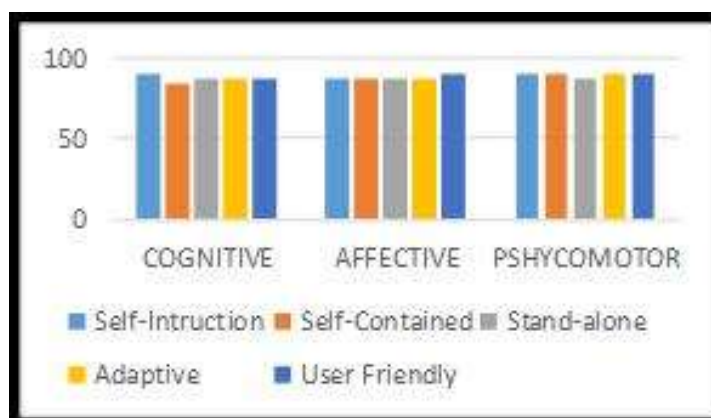
Second, the self-contained principle emphasizes the importance of the video being able to present the material comprehensively without requiring additional explanations from other sources. This can be achieved by presenting the material systematically and sequentially and providing sufficient and detailed explanations for each part of the material.

Third, the stand-alone principle emphasizes the importance of the video being able to stand alone and not depend on material or information from other sources. This can be achieved by presenting the material comprehensively and providing sufficient explanations for each part without referring to other sources.

Fourth, the adaptive principle emphasizes the importance of the video being able to adapt to the abilities and needs of students and be accessible to students with different skill levels or backgrounds. This can be achieved by presenting the material in several levels of difficulty and providing options to adjust the playback speed of the video.

Fifth, the user-friendly principle emphasizes the importance of the video being easy to access and use by students and designed with an interface that is easy to understand and operate. This can be achieved by presenting the material in a format suitable for the device used by students and providing easy navigation and controls for students to understand.

Applying these concepts, video learning for measuring topics in elementary school is expected to be presented well and effectively to students. Below is a summary of the survey data on video learning:



**Figure 1.** Recapitulation of Video Learning Questionnaire

Based on the chart above, the analysis results show that teachers' perceptions of the learning video materials have covered all three aspects with an average score of 87.50% for cognitive, 88.5% for affective, and 89.50% for psychomotor aspects. Precisely, in the cognitive domain, the learning video for measurement materials has fulfilled the self-instruction (90%), self-contained (87.50%), stand-alone (85%), adaptive (87.50%), and user-friendly (87.50%) indicators. This indicates that the learning video has provided ease in understanding measurement concepts for students and can be a source of independent learning for students.

In the affective domain, the learning video also fulfils the self-instruction (87.50%), self-contained (87.50%), stand-alone (87.50%), adaptive (87.50%), and user-friendly (92.50%) indicators. This shows that the learning video can motivate students and provide a fun learning experience. In the psychomotor domain, the learning video fulfils the self-instruction (90%), self-contained (90%), stand-alone (87.50%), adaptive (90%), and user-friendly (90%) indicators. This indicates that the learning video can also develop students' motor skills and practical abilities in conducting measurements. In general, the results of this study indicate that learning video for measurement materials in elementary school has excellent potential to improve the quality of learning. The cognitive aspect includes understanding concepts and problem-solving skills, while the affective aspect includes student motivation and interest in learning. The psychomotor aspect involves the ability of students to apply the learned concepts in laboratory activities or daily life.

Based on the analysis of the data obtained, it can be concluded that, In terms of the cognitive aspect, the teachers have a positive perception towards the use of learning videos in developing students' understanding of concepts and problem-solving skills. One teacher expressed, Learning videos make it easier for students to understand complex concepts. On the affective aspect, the teachers stated that learning videos can enhance students' motivation and interest in learning. One teacher said students become more enthusiastic about learning after watching learning videos. On the psychomotor aspect, the teachers stated that using learning videos could assist students in applying the learned concepts in daily life. One teacher revealed that students find it easier to apply measurement concepts in practical activities after watching learning videos.

Regarding the cognitive aspect, the teachers assessed that learning videos had fulfilled essential indicators such as information quality, content clarity and accuracy, and relevance to learning objectives. This is consistent with previous research indicating that using videos in teaching can improve students' understanding of the subject matter [18].

On the affective aspect, the teachers evaluated that learning videos can stimulate students' interest and motivation to learn and provide an enjoyable learning experience. This is also consistent with previous research showing that using videos in teaching can enhance students' interest and motivation to learn [19].

Regarding the psychomotor aspect, the teachers assessed that learning videos could help students develop practical skills related to measurement, such as using measuring tools and accurately performing measurements. This aligns with previous research indicating that using videos in teaching can improve students' practical skills [20].

The results of this study indicate that learning videos on measurement in elementary schools can be an effective tool in enhancing students' cognitive, affective, and psychomotor competencies. The role of teachers in selecting and developing appropriate learning videos is crucial in achieving optimal learning objectives. However, there are also some challenges in using learning videos. One of the challenges revealed is the limited accessibility to the internet in certain areas, which causes difficulties in accessing instruction.

## CONCLUSION

This study explored how elementary school teachers perceive video-assisted mathematics instruction in the context of measurement topics within flipped classroom learning models. The findings reveal that teachers have a positive outlook on integrating video resources into their

teaching practices, as it positively impacts students' cognitive, affective, and psychomotor aspects of learning. Teachers found that the videos provided clear and systematic explanations of measurement concepts, enhancing students' comprehension in the cognitive aspect. In terms of affective aspects, teachers observed that the videos captured students' interest and attention, making learning measurement topics more engaging. Furthermore, in the psychomotor aspect, teachers believed that the videos assisted students in understanding and applying measurement concepts to real-life situations. The study emphasizes the significance of incorporating video-assisted instruction in the flipped classroom learning approach, particularly in mathematics education. By leveraging videos as a teaching tool, educators can enhance student engagement, promote conceptual understanding, and foster a more interactive, student-centred learning environment.

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