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## Improving Mathematics Cognitive Learning Outcomes Through the Application of Bandicam Video to Class X Senior High School Students in Kampar Regency

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### ABSTRACT

This research was motivated by the learning outcomes of SMAN 5 Tapung students who were under the target (KKM). This research was to intend providing the solutions by applying Bandicam videos in the learning. The purpose of this study was to improve student learning outcomes on trigonometric comparison material in right triangles using Bandicam video media in class X Mia SMAN 5 Tapung. This study used a quantitative approach with interview observation steps, survey methods and blended learning methods. The research subjects were students of class X MIA SMAN 5 Tapung and the object of this study was the use of videos recorded with the Bandicam application to improve cognitive mathematics learning outcomes. Data collection techniques used tests, observations, and documentation, while data analysis techniques used qualitative descriptive data analysis methods. The average score obtained by students at the end of the first cycle was 67.6 with the number of students who reached the KKM as many as 32 students (43.7%), then at the end of the second cycle the average value of students increased to 77.4 and as many as 32 students scored reaching the KKM (87.5%). By increasing the KKM results obtained after learning using Bandicam video media, the cognitive learning outcomes of students are increased.

## 1. Introduction

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual-religious strength, self-control, personality, intelligence, noble character, and skills needed by themselves, society, nation and state.

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Efforts to develop the potential of students can be done through the process of learning mathematics, namely learning that prioritizes exact, correct and direct knowledge to the target so that it can form discipline in thinking, and train students to think simply, clearly, precisely and quickly. Therefore, mathematics subjects need to be given to all students at every level of education to equip students with the ability to think logically, analytically, systematically, critically and creatively as well as the ability to work together. In addition, mathematics subjects aim to make students have an attitude of appreciating the usefulness of mathematics in life, namely having curiosity, attention, and interest in learning mathematics, as well as a tenacious and confident attitude in problem solving.

The COVID-19 pandemic has forced teachers and students to carry out the online learning process. All parties, from schools, teachers, students, to parents must adapt and make changes. The practice of implementing online learning is not as easy as imagined, there are many obstacles and obstacles faced by teachers and students. The habit of teachers who can explain the material directly (during offline learning) affects the variety of teachers in using learning media. The role of parents is no less important in the online learning process. Because learning is done at home, parents must be able to become teachers' partners to assist the process. And this is strongly influenced by the educational background and awareness of the importance of education from each parent. Low levels of education and awareness will affect the activeness of students in participating in learning activities and also understanding of learning materials. Especially in mathematics. This situation needs to be considered by educators, especially teachers, so that they always try to create innovations in learning as a solution to increase the attractiveness of students in learning mathematics so that the learning outcomes of their students increase. Technological advances that give rise to various innovative applications must be utilized to develop appropriate learning media.

The above problems must be corrected immediately, the way teachers teach must be changed, teachers must be creative in developing online learning media that can help students and parents understand the material. Teachers must make learning implementation plans that are tailored to the Basic Competencies, then how teachers carry out learning according to the plans that have been prepared, use learning video media that are in accordance with learning objectives that can make students interested, and help students better understand the meaning of learning activity material mathematics.

Improving the quality of teachers is important for improving the transfer of knowledge to students (Gunawan et al., 2021), meaning that by making changes in using learning media, the knowledge conveyed to students will be conveyed effectively, especially in learning mathematics. In the process of learning mathematics, teachers are required to be able to create interesting learning media for students to easily understand mathematical symbols well and can be applied in their lives.

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During this pandemic, what parents / students complain about the most is the lack of information provided regarding the assignments given (Pardede et al., 2021). The use and application of a learning media that can facilitate students in understanding the material, doing assignments, increasing motivation and learning outcomes is expected to be able to be present as a bridge between students and teachers who cannot meet face to face in the middle of a pandemic.

With the hope that through the use of Bandicam video media, the enthusiasm for learning of students will increase again so that their learning outcomes will improve. To find out more about the influence of Bandicam video media, the researchers are interested in conducting classroom action research with the title: "Improving Mathematics Cognitive Learning Outcomes Through Bandicam Videos in Class X High School Students in Kampar District".

Learning outcomes are learning achievements achieved by students in the process of teaching and learning activities by bringing a change and formation of one's behavior (Masdafni, 2020). Meanwhile in other aspects, learning outcomes are certain competencies or abilities both cognitive, affective and psychomotor that are achieved or mastered by students after participating in the teaching and learning process (Kunandar, 2013). Learning outcomes are marked by changes in attitudes and behavior in students (Dwijayani, 2019).

Learning outcomes are a process of changing intellectual abilities (cognitive), interest or emotional abilities (affection) and fine and gross motor skills (psychomotor) in students (Afandi et al., 2013).

- a. Cognitive domain which includes knowledge, comprehension, application, analysis, synthesis, and evaluation
- b. Affective domain (affective domain), which includes acceptance (receiving), response (responding), assessment (valuing), organization (organization), characterization (characterization by a value or value - complex), and
- c. Psychomotor domain (psychomotor domain), which includes perception (perception), readiness to do a job (set), guided response (guided response), proficiency (complex overt response), adaptation (adaptation), and origin (origination).

In this study, the learning outcomes to be studied are in the cognitive aspect. Cognitive learning outcomes are behavioral changes that occur in the area of cognition. The learning process that involves cognition includes activities starting from the reception of external stimuli by sensory, deviations and processing in the brain into information when needed to solve problems.

Learning media is one component in the teaching and learning process that is indispensable in the learning process. So it can be said that the media are various types of components in the environment of students that can stimulate them to learn. Media is also a physical means used to send messages to students so as to stimulate them to learn. By using media the teacher is able to distribute subject

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matter from learning resources that are able to stimulate the thoughts, feelings, concerns, and interests and concerns of students in such a way that the learning process occurs. So it can be concluded that there are all forms of learning media tools or methods taken or carried out to streamline two-way communication and interaction between teachers and students in order to achieve learning objectives.

One of the media that should be developed by teachers is video learning. Learning video media can replace teachers when students want to repeat math material that has been learned in class, and can be a tool that stores every important thing that is conveyed by the teacher to students and can be repeated at any time by students. The use of learning media such as interactive videos can also stimulate the development of the cognitive, affective, and psychomotor domains of students where this media is very effective to use because it can be studied repeatedly and continuously by students (Firmansah & Firdaus, 2020). This media is expected to increase interest and student learning outcomes so that this activity can run effectively (Baharuddin, 2014).

Learning videos are learning media that contain sound, images, motion and text and are packaged in a concise, concise and clear manner (Purwanto & Rizki, 2015). The benefits of learning videos for students are to increase students' learning motivation; improve students' understanding; increase student involvement in the learning process; increasing students' independence in learning (Cahyono, 2021). In research on the analysis of students' perceptions of mathematics learning videos, students showed a positive attitude towards the application of learning videos in the process and improving learning outcomes (Rosiyanti et al., 2020).

Creating and compiling Learning Videos that can be used in learning there are many stages that must be done. The stages of designing a Learning Video are:

- a. Develop the structure of learning materials taken from the syllabus used in schools. The syllabus that is built is based on the content standard. The materials are arranged and sorted based on their basic competencies.
- b. Designing the structure of the Learning Learning Video.
- c. Collecting data related to teaching materials.
- d. Building a learning video display (Purwanto & Rizki, 2015).

To make a learning video, a recording device is needed to make a video. Bandicam is one of the tools/applications that can make videos easily and with quality. This application makes teachers able to be creative in delivering lesson materials through learning videos that they make independently (Jufri & Hasrizal, 2021). Teachers are not only monotonous in the learning process at school which usually uses power points.

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Bandicam is one of the many applications that are commonly used in recording activities, or rather screen recording. More simply, this application is used to record all activities carried out on the computer (Herayanti et al., 2019). Bandicam application is a screen recorder application that is very easy to use. This Bandicam application has several main features, such as: additional web camera overlay, this feature facilitates the use of a web camera while recording so that the video results show a teacher figure explaining; mix sound while video is being recorded; can add mouse click effect and animation while recording.

Video bandicam is a solution to overcome difficulties in the learning process where learning materials can be made in the form of learning videos and can be played by students at any time (Sidebang et al., 2021), thus students can repeat the explanation of the subject matter while at home, thus Bandicam media can also be used in other subjects such as mathematics. Moreover, the application of bandicam media in the learning process can improve student learning outcomes (Khotimah & Hasanah, 2021)

The research objective to be achieved in this classroom action research is to improve student learning outcomes in mathematics subjects with trigonometric comparisons of right triangles in online learning during the pandemic through the use of Bandicam video media in class X students of SMAN 5 Tapung Kab. Kampar year 2020/2021 lessons. Based on the theoretical study above, the following action hypothesis can be formulated: "By using Bandicam video media, there is an increase in students' cognitive learning outcomes in learning mathematics in class X students of SMAN 5 Tapung in the 2020/2021 academic year."

## **2. Methodology**

### ***Research procedure***

This research used a descriptive qualitative method. The type of research used is Classroom Action Research. Classroom Action Research in the Strategy of Classroom Action Research (PTK) During a Pandemic is a research that is used to develop new effective and efficient actions to overcome learning problems (Winarti, 2021). At the planning stage, activities were carried out in the preparation of learning tools such as RPP (Learning Implementation Plan); props in the form of PPT (Power Point) narrated recorded with the Bandicam application so that it becomes a video format; teaching materials containing a summary of the material in the form of a pdf file; LKPD (Student Worksheet) where in the first cycle, on the first meeting was making a concept map, while at second meeting, trigonometry comparison material was given in right triangles. In the second cycle, the first meeting, students were given examples of questions related to the material, while at the second meeting, students were given assignments in the form of LKPD; evaluation sheet, research instrument for two meetings (student and teacher activity observation sheet).

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The implementation of the action was carried out according to the scenario (planning) or refers to the lesson plans that have been prepared by the teacher and previous collaborators. The implementation of actions in improving students' learning outcomes in mathematics subjects through the use of Bandicam videos starts from preliminary activities, namely opening lessons by greeting, praying, conveying activities to be carried out followed by delivery of learning objectives, the teacher explains the material by giving PPT videos narrated with Bandicam, LKPD explanation, and evaluation.

The reflection was carried out as an effort to evaluate researchers with collaborators. The researcher and the teacher analyzed and managed the data from the observations and interpretations. These activities will then produce conclusions regarding the achievement of research objectives. If there are still obstacles so that the research objectives have not been achieved, corrective actions will be taken in the next cycle.

### ***Population and Research Sample***

The population of this study were all students who studied trigonometry, namely all X grade students of SMAN 5 Tapung, Kampar Regency for the 2020/2021 academic year which consisted of 2 MIA (Mathematics and Natural Sciences) classes and 3 IIS (Social Sciences) classes. Before determining the sample, the entire population was given a multiple-choice test consisting of 35 questions. Class X MIA 1, which consisted of 32 students with the lowest average test result of 3.5, was selected as the sample for further treatment.

### ***Data collection technique***

The data in this study were collected through tests, observations, and documentation. The test is used to collect data in the form of student learning outcomes. The test is given at the end of each meeting of each cycle carried out. The observation sheet used is an observation sheet about the activities of teachers and students when using Bandicam video media in learning mathematics. Meanwhile, documentation is used to document data in the form of test and non-test data. Test data in the form of test results documents that have been carried out by students and non-test data are photos of students participating in the mathematics learning process on the material of Trigonometry Comparison in right-angled triangles.

### ***Completeness Criteria***

This research is said to be successful if there is an increase in student learning outcomes in mathematics subjects which is marked by 75% of the number of students whose value is greater than or equal to the minimum KKM of 70.

### ***Data analysis technique***

This study uses descriptive qualitative data analysis method, which is a method that describes reality or facts in accordance with the data obtained with the aim of

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knowing to improve students' mathematics learning outcomes through the use of the Bandicam application for making video presentations.

### **3. Results and Discussion**

#### ***Results***

The implementation of mathematics learning using video media recorded with Bandicam was carried out in 2 cycles, each cycle consisting of two meetings. At the end of the meeting, an evaluation test was conducted to determine the extent to which learning outcomes were improved after the action was taken. Observations on teacher and student activities are carried out at every meeting aimed at observing the development of teacher and student activities in following the learning process.

#### ***Description of Cycle I***

Action Planning begins with determining the research time. The planned time for Cycle I action is March 14, 2021 for the first meeting and March 18, 2021 for the second meeting; Prepare learning materials on trigonometric ratios in right triangles; Prepare RPP; Prepare LKPD and instrument evaluation questions (covering a grid of questions, questions, answer keys, and scoring guidelines); Prepare observation sheets which contain observation sheets about teacher and student activities during the learning process using video media; Prepare media and learning resources that will be used in the learning process.

Learning activities are carried out face-to-face. The teacher starts the lesson with greetings, prayer together. The teacher conveys the purpose of studying trigonometry. Before entering the core material, the teacher did apperception by asking questions about the contents of the reading text regarding the previous trigonometry material. The teacher conveys the flow of activities that will be carried out in the learning. Then the teacher uses video learning media assisted by an infocus tool and is displayed in front of the class. The learning videos made by the teacher were made using the Bandicam application. After students pay attention to the explanation of the material from the video, the teacher asks questions with the aim of giving reinforcement to students. Then the teacher conveys the activities that must be completed by students in the LKPD, namely students summarize the material presented in the form of a mindmap (concept map) and tell how to determine trigonometric ratios in right triangles. The teacher asks students to submit their work, followed by drawing conclusions about the material that has been studied. Teachers and students carry out reflection activities by asking questions and answers related to the learning that has taken place. The activity was continued by working on evaluation questions. During the learning process the teacher observes all student activities and is recorded in the observation sheet.

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### *Description of Cycle II*

Cycle II was held on Thursday, March 18, 2021. Planning activities began with preparing learning materials on how to calculate the value of trigonometric ratios in right triangles; Prepare RPP; Prepare LKPD and instrument evaluation questions (covering a grid of questions, questions, answer keys, and scoring guidelines); Prepare observation sheets which contain observation sheets about teacher and student activities during the learning process using video media; Prepare media and learning resources that will be used in the learning process.

The teacher starts the lesson with greetings, prayer together. The teacher conveys the purpose of the lesson, which is to determine the value of trigonometric ratios in right triangles. Before entering the core material, the teacher did apperception by asking questions about finding the value of one of the unknown sides of a right triangle using the Pythagorean formula. The teacher conveys the flow of activities that will be carried out in the learning. Then the teacher gives an explanation through a Bandicam-based learning video in front of the class and the video is also distributed to students via a youtube video link or via whatsapp. After students pay attention to the explanation of the material from the video, the teacher asks questions with the aim of giving reinforcement to students. Then the teacher conveys the activities that students must complete in the LKPD. The teacher asks students to submit their work, followed by drawing conclusions about the material that has been studied. Teachers and students carry out reflection activities by asking questions and answers related to the learning that has taken place. The activity was continued by working on evaluation questions. During the learning process the teacher pays attention and observes student activities.

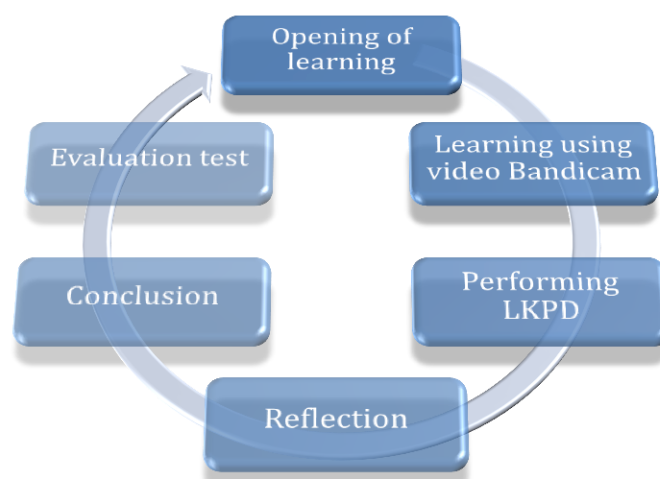


Figure 1. Flow of the Learning Process Using Video Bandicam

Cognitive learning outcomes of students in the first cycle based on the analysis obtained showed the level of student learning completeness of 53%. This shows that improvements are still needed in the next cycle because classical student



learning mastery has not yet reached 70%. In the second cycle, the level of student learning completeness increased to 87.5%. Improving student learning outcomes can be seen in table 1.

Table 1. Improving Learning Outcomes

Tindakan	Rata – rata hasil belajar	Persentase yang tuntas
Siklus I	68,9	53 %
Siklus II	77,4	87,5 %

From the learning activities in cycle I and cycle II, there was a change in the number of students who received grades in a significant direction, as shown in table 2.

Table.2 Interval and Predicate Value

Interval	Predikat	Jumlah Peserta Didik	
		Siklus I	Siklus II
90 - 100	Very good	-	4
80 - 89	Well	1	12
70 - 80	Enough	13	12
< 70	Not enough	18	4

The following is the flow scheme of a learning video using Bandicam videos:

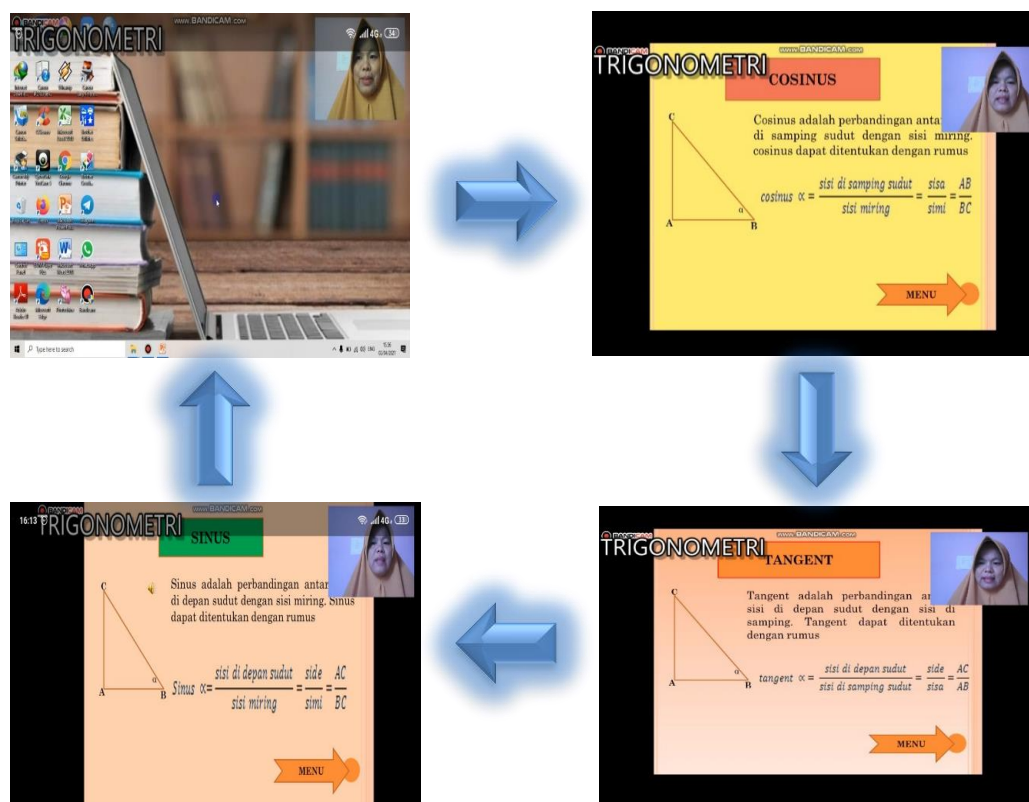


Figure 2. Bandicam Video Based Learning Flow

## ***Discussion***

In the implementation of classroom action research, researchers make observations during the learning process activities carried out in order to find out how to improve students' cognitive learning outcomes by using learning videos. This classroom action research can be said to be successful if there is an increase in learning outcomes and student activities. Based on the analysis of the student activity observation sheet, it showed an increase, starting from the first cycle of the first meeting to the second cycle of the second meeting. This can be seen in the learning process, where when students watch the video explanation of the material and then the teacher gives questions orally, they can be answered well. This shows that there is an increase in student stimulus to the material presented so that students become aware of the learning material presented by the teacher and students will find it easy to solve the questions given and in the end it will increase students' cognitive learning outcomes.

The results of the analysis carried out in each cycle showed an increase in student learning outcomes. Student learning outcomes in the first cycle obtained by 67.6 with learning completeness of 43.7%. And these results clearly cannot be said to be complete because they are still below the success indicator of 70%. Several factors were found that caused the learning outcomes in the first cycle to be incomplete, including: (a) there were some students who were still not thorough in understanding the material explanation videos, (b) changes in the number and form of questions (at the first meeting with multiple choice and multiple choice forms). the second meeting with the form of stuffing), (c) some students have a tendency to not want to work hard so they only answer casually.

Analysis of learning outcomes in cycle II, it was found that the average student cognitive learning outcomes classically was 77.4 with the percentage level of students who completed was 87.5%. And these results have shown the achievement of success indicators, namely 70% of the number of students whose scores are greater than or equal to the minimum KKM of 70. Improve cognitive learning outcomes from cycle I to cycle II by 43.8%. In the second cycle, it showed a significant improvement from the first cycle. This achievement was obtained because of the improvements made by the teacher from the first cycle, including:

- a. Produce new videos
  - b. Varying the form of student activity in LKPD (cycle 1 meeting 1 making mind maps, meeting 2 telling stories; cycle 2 for women 1 making trigonometric comparisons, meeting 2 determining the value of trigonometric comparisons of right triangles so that students are not saturated;
  - c. Vary the form of evaluation by using googleform or google classroom. Based on observations of student activities, the results obtained: (a) students were more thorough in understanding the explanation of the material in the video, (b) students were more enthusiastic and willing to work hard in completing
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each evaluation and activity in the LKPD, and (c) students had the courage to ask questions.

The advantages of this Bandicam application include (Indari, 2020):

- a. User friendly, where the Bandicam display is very easy to use even for beginners because there is no need to do many settings (just record and save) so that it makes teachers easily start recording
- b. It has quite complete features, such as a video screen recorder (making it easy for teachers to record a power point screen display); webcam overlay = add a webcam in the video being recorded so that the figure of the teacher who is presenting the material can be seen on the screen; voice recording; and the useful mouse effect adds mouse click effects and animations during recording.
- c. The resulting video format is directly in the form of MP4 with a file size that is small enough so it doesn't take long to convert
- d. Upload videos to Youtube without changing/reducing quality (720p/1080p). The quality of the images and sound in the video is good, making it easier for students to understand the material being explained.
- e. Videos can be played at any time if students want to repeat the learning material at home.

#### 4. Conclusion

Based on the results of the research conducted, it can be concluded that the combination of the application of Bandicam application and classroom action research on mathematics learning on trigonometric comparisons of right-angled triangles, can improve students' cognitive learning outcomes and become an alternative learning method during the pandemic. This is indicated by the increase in student learning outcomes at each meeting and the increase in the average and number of students who reach the KKM from cycle I to cycle II.

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