

# M-Keris: Science Learning Multimedia Based on Local Wisdom of Keris to Improve Students' Conceptual Understanding

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## ABSTRAK

Kurangnya pemahaman konsep siswa terhadap materi IPA. Penelitian ini bertujuan untuk meningkatkan pemahaman konsep siswa menggunakan multimedia berbasis kearifan lokal keris. Jenis penelitian ini adalah quasi experimental design dengan menggunakan teknik nonequivalent control group design. Populasi dalam penelitian ini adalah siswa kelas VII, yang dibagi menjadi kelas eksperimen dan kelas kontrol. Instrumen pengumpulan data berupa soal tes pemahaman konsep. Teknik analisis data menggunakan analisis independent sample t-test. Hasil penelitian menunjukkan bahwa terdapat perbedaan efektivitas antara M-Keris dan Multimedia konvensional terhadap pemahaman konsep siswa kelas VII. Berdasarkan hasil analisis yang menunjukkan besar nilai Sig. (2-tailed) pada uji independent sample t test adalah  $0,018 < 0,05$ . Peran unsur-unsur multimedia yang terdapat dalam M-Keris merupakan faktor penting untuk membangun minat belajar serta pemahaman siswa terhadap konsep-konsep yang disajikan. Oleh karena itu pembelajaran dengan M-Keris lebih efektif serta memudahkan siswa memahami konsep yang diberikan dibandingkan dengan multimedia konvensional lainnya. Selain itu dengan M-Keris fungsi guru akan sepenuhnya menjadi fasilitator yang mengarahkan serta membantu siswa menerangkan hal-hal yang belum dipahami. Implikasi penelitian ini diharapkan guru dapat menggunakan M-keris dalam proses pembelajaran. sehingga dapat meningkatkan hasil belajar siswa.

## ABSTRACT

Lack of understanding of students' concepts of science material. This study aims to improve students' conceptual understanding using multimedia based on local wisdom of the keris. This type of research is a quasi-experimental design using a nonequivalent control group design technique. The population in this study were class VII students, which were divided into experimental class and control class. The data collection instrument was in the form of a concept understanding test. The data analysis technique used independent sample t-test analysis. The results showed that there were differences in the effectiveness between M-Keris and conventional Multimedia on understanding the concepts of class VII students. Based on the results of the analysis which shows the value of Sig. (2-tailed) in the independent sample t test was  $0.018 < 0.05$ . The role of multimedia elements contained in M-Keris is an important factor to build interest in learning and students' understanding of the concepts presented. Therefore, learning with M-Keris is more effective and makes it easier for students to understand the concepts given compared to other conventional multimedia. In addition, with M-Keris, the teacher's function will be fully as a facilitator who directs and helps students explain things that have not been understood. The implication of this research is that teachers are expected to be able to use M-keris in the learning process. So as to improve student learning outcomes.

## 1. INTRODUCTION

Science lesson is a learning process that is not just memorizing definitions and formulas (Alexander et al., 2018; Ichsan et al., 2018; W.B. Putra & Wulandari, 2021). Natural Sciences (IPA) is related to how to systematically find out about nature, so that mastery of a collection of knowledge in the form of facts, concepts, or principles alone needs to be balanced with a process of discovery (Nurmalita et al., 2020).

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Currently, Science has been developed into *integrated sciences and integrated social studies* that are oriented towards technological developments without eliminating cultural elements (Guswita et al., 2018; Savitri & Meilana, 2022). The cultural element in question is a form of local wisdom that exists around students. There needs to be a balance between knowledge with scientific attitudes and the value of local wisdom. This is intended so that students are able to use science in accordance with ethical values and social norms contained in the local wisdom. The integration of local wisdom into science learning provides students with an understanding of the relationship between science and everyday life. In addition to having the benefits of knowledge of local wisdom, students will more easily understand the concepts given. The tendency of students in terms of understanding is caused by the concepts given according to what they see and find in everyday life (Lukman et al., 2019; P. Putra, 2017).

However, there are still many schools that have not been able to meet the recommended criteria, especially in remote areas or areas that fall into the 3T category (Lagged behind, Foremost, and Outermost). In the 3T area, the use of learning media as the main alternative to overcome the problem of lack of facilities and infrastructure to support learning activities is still minimal. However, the downloaded PowerPoint and multimedia media still have many weaknesses and the level of validity has not been ascertained (Irfan et al., 2019; Jayusman et al., 2017; Juhaeni et al., 2021). The tendency of teachers to use PowerPoint and multimedia media that are static and not interactive or only in the form of text will cause boredom and lack of student understanding of the concepts explained. (Iga Raspati & Maria Zulfiati, 2020; Jayusman et al., 2017). The use of such PowerPoint and multimedia media should be avoided and replaced with interactive media that can stimulate student involvement during learning activities (Irfan et al., 2019; Salmiah et al., 2016). Based on observations made at Pangudi Luhur Moyudan Junior High School, it was found that students' understanding of concepts was still minimal, students' abilities were limited to memorization aspects. This is caused by the lack of availability of laboratory equipment that supports the implementation of learning. Understanding of a concept is a person's ability to translate something, re-explain and re-apply the concept based on his experience (Dharmayanti, 2019). Concept understanding arises through the process of abstraction of factual knowledge. Concept understanding occurs when students get or feel that learning is more meaningful, thus students can relate new information to previously known concepts. If these problems are left unchecked, it will have a negative impact on student understanding.

One way to overcome this problem is to use effective learning media. The media in question is media that contains science concepts in the form of videos, animations, simulations that link science concepts with the surrounding environment in the form of local wisdom. The use of media like this will have an impact on students' interest in learning and level of understanding (Anisa et al., 2021; Tut Wuri Handayani, 2018). With this media, the teacher is able to create a more pleasant learning atmosphere and environment, which will change the teacher's role which was originally monotonous to become more open and provide space for students to interact. PowerPoint and multimedia media that are widely spread on the internet are generally the main choice for every teacher (Gaikwad & Tankhiwale, 2014; Irfan et al., 2019). This is because PowerPoint and multimedia are more practical and easier to obtain. The use of media such as multimedia and PowerPoint can assist teachers in explaining the concepts of the material to be taught (Astuti et al., 2021; Suartawan et al., 2021). One way to attract students' attention is to use media such as power point when inserted with pictures, videos or animations. Learning media has a variety of types, such as media images, videos, animations, simulations and others (Ahmet et al., 2018; Takacs et al., 2015). The combination of several media, which are packaged in one form of multimedia, is very effective in clarifying the delivery of the content or meaning of the given concept. The role of multimedia is able to provoke students' interest and understanding of the concepts described (Amelia et al., 2021; Meyer et al., 2019; Mustaqim, 2016). The ability of the media if applied in learning activities effectively can function as a channel for messages from teachers to students (Handayani & Koeswanti, 2021; Yuniarni et al., 2019).

Previous findings have developed many PowerPoint learning media. The research that has been done has resulted that the interactive PowerPoint-based learning media that has been developed is declared valid so that it is suitable for use in learning and the developed learning media is declared practical to use. (Baker et al., 2018; Suartawan et al., 2021). The use of interactive PowerPoint-based learning media can also have a positive influence in the learning process, learning will be effective, efficient and can create a conducive learning atmosphere (Anisa et al., 2021; Jayusman et al., 2017). PowerPoint-based interactive media that has been developed and declared suitable for use in learning Indonesian can provide assistance to students in understanding the material and relating it to the environment around students. This research develops multimedia based on local wisdom of the keris. This is a novelty and a difference between this study and previous research. So, the purpose of this research is to improve students' understanding of concepts using multimedia based on local wisdom of the keris to the science material of junior high school.

## 2. METHOD

This research is an R&D research with data analysis techniques using quasi-experimental design technique in the form of a nonequivalent control group design, i.e., the samples used for the experimental class and as the control class were not chosen randomly. The research design of nonequivalent control group design can be seen in [Table 1](#).

**Table 1.** Nonequivalent Control Group Design

Sample	Beginning	Treatment	End
A	O1	X1	O2
B	O3	X2	O4

This research held at Pangudi Luhur Moyudan Middle School with the research population being class VII students consisting of 3 classes. The sample was selected by purposive sampling technique, namely the technique of determining the sample with certain considerations. Class VII A is the experimental class and class VIII C is the control class. The research instruments are lesson plans, Multimedia IPA based on local wisdom Keris (M-Keris) and concept understanding test questions. The data taken in the form of data from the concept understanding test. The data from the concept understanding test were analyzed for normality test, homogeneity test, research hypothesis testing, with the help of the SPSS 23 application. Test conditions normality data, that is, if the significant value is greater than 0.05, then the data is normally distributed. The homogeneity test aims to determine whether the data has variance or not. Determination of the homogeneity of a data follows the criteria as shown in [Table 2](#).

**Table 2.** Homogeneity Test Criteria

Homogeneity	Information
Sig. < 0.05	Heterogeneous population variance
Sig. > 0.05	Homogeneous population variance

To find out whether there is a difference in understanding of the concept between the experimental and control classes, the data analysis process uses an independent sample t test with the research hypothesis. The criteria for independent sample t test are shown in [Table 3](#).

**Table 3.** Hypothesis Criteria

Condition	H0	H1
Sig. (2-tailed) > 0.05	Received	Rejected
Sig. (2-tailed) < 0.05	Rejected	Received

## 3. RESULT AND DISCUSSION

### Result

This research is to improve students' understanding of the concept of using multimedia based on local wisdom of the kris to the science material of junior high school. This research is an R&D study with data analysis techniques using quasi-experimental design techniques in the form of a nonequivalent control group design. The display of the results of the M-Keris development is presented in [Figure 1](#) and the results of the analysis are presented in [Table 4](#).



**Figure 1.** Display of M-keris

**Table 4.** Independent Samples Test

Statistic	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	0.003	0.959	2,430	54	0.018	11.565	4.759	2.0234	21.107
Equal variances not assumed			2,430	53,889	0.018	11.565	4.759	2.023	21.108

While the results of the output on [Table 4](#) obtained big data Sig value. (2-tailed) is  $0.018 < 0.05$ . In accordance with the established hypothesis criteria, H0 is rejected and H1 is accepted. So, it can be concluded that there is a difference in the average understanding of the concept between the experimental class and the control class. From the output results of [Table 3](#) and [Table 4](#), it can be concluded that M-Keris is more effective in improving students' conceptual understanding than ordinary multimedia.

**Discussion**

Based on the results of the analysis, it was found that M-Keris was more effective in improving students' conceptual understanding than ordinary multimedia. The ability of M-Keris in improving concept understanding is caused by the combination of multimedia elements with local wisdom of the keris which is a unique feature in the student learning environment. Effectively, students at a young age will be motivated when learning concepts that are related to the features of the environment around them. M-Keris is also supported by audio and video. Audio acts as a guide for the use of M-Keris as well as explains the concepts presented, while video acts as a real concept description to clarify the delivery of information. So, Thus, the learning process using simulation and direct experience on M-Keris is very effective in increasing students' memory of the concepts or materials they are learning. Virtual simulations allow students to interact directly effectively with virtual environments that are almost similar to real environments, and are able to positively influence students' understanding of concepts and process skills.

In addition, the interactive concept that M-Keris has, provides opportunities for students to be able to participate in learning activities, so that the learning atmosphere will feel fun and minimize teacher-centered learning. In addition to the environmental features, the animation, simulation and video elements contained in the M-Keris stimulate a strong interest and curiosity to learn more about the concepts given in the real world. There is a significant increase in concept understanding when students are involved in the actual experimental process with animated content ([Hsieh, 2017](#)). The use of animation and video is very effective in helping students learn and understand the concepts given compared to conventional teaching methods that are still teacher-centered ([Ela Paramita, Hasmalena, 2017](#); [Walangadi & Pratama, 2020](#)). The role of the multimedia elements contained in the M-Keris is an important factor to build interest in learning and students' understanding of the concepts presented. The characteristics of the M-Keris development that combine multimedia elements such as simulations with local wisdom around the student learning environment (keris) allow students to be able to learn and interact with the virtual environment, where the presentation of the simulation of the keris making process is almost similar to the actual event ([Arjulayana, 2018](#); [Mutakinati et al., 2018](#)). Therefore, learning with M-Keris is more effective and makes it easier for students to understand the concepts given compared to other conventional multimedia, besides that with M-Keris, the teacher's function will fully become a facilitator who directs and helps students explain things that are not yet understood.

This finding is reinforced by previous findings which state that multimedia can increase students' interest in learning ([Istiqal, 2017](#); [Widyaningsih, 2021](#)). The use of interactive powerpoint-based learning media can also have a positive influence in the learning process, learning will be effective, efficient and can create a conducive learning atmosphere ([Anisa et al., 2021](#); [Jayusman et al., 2017](#)). The discussion shows that M-keris is effectively used in the learning process to improve understanding of science concepts. The implication of this research is that teachers are expected to be able to use M-keris in the learning process. So as to improve student learning outcomes. This M-keris has the advantage that this learning media contains local wisdom which can indirectly preserve culture. However, this study has limitations, namely the lack of supporting infrastructure resulting in not all students listening well. Therefore, it is hoped that further research can prepare equipment so that research can be carried out optimally.



#### 4. CONCLUSION

M-Keris is more effective in increasing students' understanding of concepts than ordinary multimedia. There is a difference in effectiveness between M-Keris and conventional Multimedia on understanding the concepts of class VII students of SMP Pangudi Luhur Moyudan. Which is proven by the results. The comparison of the mean value of the experimental class and the control class is that the mean value of the experimental class is greater than the mean value of the control class.

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