

Improving the Technology Competency of Junior High School Mathematics Teachers Using the Geogebra Application

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Abstract

The purpose of this science and technology application activity is to provide training to MGMP Mathematics teachers of SMP MKKS Rayon 7 Banyumas in improving the technological ability of a teacher using Geogebra software as a learning medium. The subjects in this service were MGMP Mathematics teachers of MKKS Rayon 7 Junior High School Banyumas. The location of the implementation of IbM is at SMP Negeri 2 Sokaraja. The implementation of the activity was carried out through presentations of material about the Geogebra program on flat building materials, providing instructions on how to solve geometry problems on flat buildings using the Geogebra program. The results of this service activity are increased teachers' motivation in improving the quality of learning, increasing teachers' understanding of geometry, especially regarding flat buildings, increasing teachers' practical abilities in this case the use of Geogebra software as a learning medium, and being able to apply Geogebra in solving problems in the context of classroom learning.

Keywords: Build Flat; Geogebra; Teacher Competence.

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1. INTRODUCTION

National education aims to develop the potential of students to become human beings who have faith and devotion to God Almighty, have noble character, are healthy, have faith, are capable, creative, and responsible in order to educate the life of the nation. Law No. 20 of 2003 concerning the National Education System, article 1 paragraph 1 concerning general provisions states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential (Prastowo, 2018).

Mathematics as an educational vehicle plays an important role in education. Learning mathematics is one of the means of scientific and logical thinking and has an important role in efforts to improve the quality of human resources. Given the importance of mathematics as a basic science, mathematics learning at various levels of education needs serious

attention. Thus, teachers as learning implementers must be able to implement effective and efficient methods so that learning objectives can be implemented optimally. In learning activities in schools, a teacher plays a very important role. Teachers are not only required to have the ability to have theoretical experience but also must have practical experience. Success in the teaching and learning process is an indicator that students can absorb the knowledge they get well. To increase the success of the teaching and learning process, teachers are required to be successful in choosing a learning model and determining learning strategies that are able to bring students to an active situation, so that students can develop their learning abilities to the maximum.

The development of *Information and Communication Technology* (ICT) in recent decades has been very rapid in line with the development of telecommunication technology, including computer networks. Various technologies and supporting applications have also been developed as an effort to support and facilitate human and organizational life activities, including teaching and learning activities in the world of education. In recent years, the use of ICT in the world of education has begun to become a part of the community, starting from the primary and secondary education levels, to universities, although the variety and focus of use varies from institution to institution. The presence and advancement of ICT in today's era of global communication has provided opportunities and expansion of interaction between lecturers/teachers/experts and students, and learning resources can occur anytime and anywhere without being limited by space and time. In addition, with the help of ICT, the process of delivering and presenting learning materials and ideas can become more interesting and fun. On the other hand, the presence of ICT as a new technology provides challenges for lecturers and teachers to be able to master it so that they can choose and utilize ICT effectively and efficiently in the teaching and learning process that they manage (Hidayatullah et al., 2016).

Geometry is an inseparable part of mathematics learning. But in recent years, formal geometry has been less developed. This is mainly due to three things, namely the difficulty in accurately forming the necessary real constructions, the assumption that it takes a long time to paint geometric shapes, and most students have difficulty in proving the basic concepts of Euclid geometry and learning these proofs is not useful. Meanwhile, painting plays an important role in learning geometry in schools because geometry painting connects physical space and theory (Pancahaya et al., 2022; Iswadi, 2011). In the teaching and learning process, the presence of the media has a fairly important meaning, because in these activities the unclarity of the material conveyed can be helped by presenting the media as an intermediary. The complexity of the material that will be delivered to students can be simplified with the help of the media. In addition, the media can represent what a teacher is less able to say through certain words or sentences. Even abstract material can be concretized through the media (Syaiful Bahri Djamarah and Aswan Zain, 2002).

Seeing these conditions, the presence of media has an important role in the process of learning mathematics whose object of study is abstract, including geometry, especially media that can overcome problems in learning geometry. Nowadays, computer-based learning media has developed rapidly. Several software for geometry learning has been developed, including Geogebra.

Geogebra is one of the various types of software that can be used in learning mathematics. This software can be used for geometry, algebra, calculus, and statistics. However, for junior high school lessons that are often used, it is about geometry. This program has various advantages including being lightweight, easy to use, easy to transfer to other applications, and easy to get (Hohenwarter et al., 2013). To be able to get this software, teachers can easily get it on www.geogebra.com.

Based on the description above, the implementer wants to utilize computer facilities as a medium in learning. Geogebra is a *software* used to make geometric shapes, one of which is flat building material. The use of Geogebra is indispensable to overcome the ability of different students' spatial skills. The implementer wants to share knowledge and experience and develop Geogebra on geometry materials to support mathematics learning to help prepare and improve the quality of MGMP Mathematics teachers of MKKS Rayon 7 Junior High School Banyumas to face the development of information and communication technology.

2. METHOD

The subjects in this science and technology application activity are MGMP Mathematics teachers of MKKS Rayon 7 Junior High School Banyumas

The activities/solution steps carried out are 1) Providing an overview of the importance of the development of the advancement of Education and Technology (IPTEKS) for the advancement of the world of Education, 2) Increasing the success of the teaching and learning process where teachers not only have the ability to have theoretical experience but also must have practical experience, and 3) Providing an introduction to the Geogebra program as a learning medium, especially in the field of *Information and Communication Technology* or ICT) in an effort to improve the quality of the learning process. The instruments used in this training activity are activity observation sheets and questionnaires. This activity also involves two observers to observe the course of the activity and the final results of the activity.

3. RESULTS AND DISCUSSION

The realization of problem solving in this service is by conducting participatory cooperation between the implementer and the MGMP Mathematics of SMP MKKS Rayon 7 Banyumas. The Chairman of MGMP Mathematics SMP MKKS Rayon 7 Banyumas invited the teachers, prepared a training place, as well as presentation tools including sound systems and other equipment. Meanwhile, the service implementer is in charge of providing materials, training, and certificates.

The implementation of this activity discussed the Introduction of the Geogebra program and its Elements at MGMP Mathematics SMP MKKS Rayon 7 Banyumas. The implementation of this service received a very enthusiastic welcome from the teachers because it was officially an invitation for MGMP Mathematics teachers of MKKS Rayon 7 Junior High School Banyumas which numbered 34 people.

The result of this activity is the increasing interest of teachers in the Geogebra program. This is shown by the level of enthusiasm of the teachers in participating in the

training. Another indication is that in the implementation of the training, some teachers asked questions and there was a good discussion process. Besides the fact that teachers in this case have very good theoretical skills, this can be seen from the indicators of understanding the Geogebra program. After the training, they can explain the elements of the Geogebra program. Even more than that, they are able to simulate the Geogebra program as a learning medium, especially in the field (*Information and Communication Technology* or ICT), so that it can improve the quality of learning. In line with the research, Nur'aini (2017) explained that geogebra-assisted media provides a realistic experience of geometry materials. In addition, the understanding of geometry concepts can be improved using interactive media assisted by geogebra (Handayani & Sulisworo, 2021).

4. CONCLUSION

Based on the results of observations on the implementation of service, it can be concluded that through the service to the teachers of MGMP Mathematics MKKS Rayon 7 Junior High School Banyumas, the results were obtained that (1) teachers' interest in the Geogebra program increased, (2) teachers' understanding of the Geogebra program increased, (3) teachers' ability to simulate the practice of the Geogebra program on flat building materials increased. It is still necessary to conduct further studies in the field (in the classroom) to find out the feedback that actually occurs, both the difficulties and the advantages. Hopefully, the advancement of information technology, which is the attraction and demands of this era, can be used in overcoming difficulties and facilitating mathematical understanding, especially in the field of geometry.

For the next activity, it is suggested that the activities of the Geogebra program can be practiced at the MGMP level of other junior high school mathematics with different materials and developed in their respective schools. For teachers of mathematics or other subjects, it is expected to make a variety of learning. One of the variations of learning is using the Geogebra program application because it is very helpful in instilling geometry concepts.

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