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Implementation of ICT Using Hawgent Dynamic Mathematics Software to Teach Line and Angle Zhang Xiangjie1*,Zhou Ying2 , Tommy Tanu Wijaya3 1Guangxi Normal University, Guilin, China; *949221694@qq.com 2Guangxi Normal University, Guilin, China; *799936971@qq.com 3Guangxi Normal University, Guilin, China; *tommytanu@foxmail.com Info Artikel: Dikirim: --- ; Direvisi: ---; Diterima: --- Cara sitasi: Noto, M. S, & Sundawan, M. D. (2019). Pengembangan Perangkat Pembelajaran SMART Materi Geometri. JNPM (Jurnal Nasional Pendidikan Matematika) xx(yy), xx-yy. Abstract.

In this study, the researchers will use Hawgent dynamic mathematics software to design a learning media for dynamic learning of line and angle, which will weaken the difficulties faced by students when learning line and angle in traditional teaching. This study is based on ADDIE model,data processing with SPSS and excel .According to the analysis results of media and materials experts, the learning media designed by Hawgent dynamic mathematics software can be used to explain the basic concept of line and angle.

According to field experiments and feedback from students and teachers, the learning media plays a positive role in the in-depth learning of line and angle. These results can also be obtained from six aspects of the students' post-test. Classroom experiments also showed that students were more active when teachers used the Hawgent dynamic mathematics software to explain the concept of line and angle. Therefore, the suggestion based on this study is to introduce dynamic learning media into teaching, such as Hawgent dynamic mathematics software, which can better help students' classroom learning.

keywords: Hawgent dynamic mathematics software, Line and angle, ICT. Introduction

Mathematics is an important part of the development of human civilization (Dini, Wijaya, & Sugandi, 2018). Geometry is a branch of mathematics that deals with points, lines, plane shapes, Spaces, spatial shapes, and the relationships between them (Kushwaha, Chaurasia, & Singhal, 2014; Lognoli, 2017). The ability of students to understand geometry is lower than that of other subjects of mathematics. Learning patterns can affect students' understanding of mathematics (Badraeni et al.,

2020; Vavougios & Karakasidis, 2008; Wijaya, Dewi, Fauziah, & Afrilianto, 2018). In order to create a learning environment that encourages learners, teachers can create new and innovative learning opportunities that may be greater to solve problems in cooperation than in competitive or personalized learning environments. The combination of learning mode can improve students' academic performance (Listiawan, Purwanto, As'Ari, & Muksar, 2018; Oner, 2020; Sukaesih, Ridlo, & Saptono, 2019). . Lines and angles are the basic concepts of geometry.

In order to better understand geometry, students must have a good understanding of lines and angles. We know that the "location" is the most basic elements. Space in Euclidean geometry, people will position the abstract as the "point", and the connection path between two points is called "line", there are two kinds of the definition of "Angle", one is controlled by a public endpoints raises two rays of graphics. The second is a radiographic OA by original position O rotate around its endpoint to another location OB graphics. three lines intersect, except for the intersection of three lines and a point, there is another case is "line and angle."

In the traditional line and angle teaching, due to the lack of in-depth explanation and display of the inherent attributes of knowledge, students will confuse the existence conditions of alternate interior angles and the same side interior angles after learning parallel lines, and think that they can only exist when they are parallel (Salim, 2019; Utami, Kusmayadi, & Usodo, 2017). [5] This shows that students did not understand "line and angle" and did not abstract the concepts of alternate interior angles from it, which hindered the subsequent teaching of geometric .

With the continuous development of information technology, it is found that teachers' use of ICT in class has a significant positive effect on students' math literacy and computer test scores, and the use of dynamic geometry software has a better effect (Bernard & Chotimah, 2018; Rohaeti & Bernard, 2018). Hawgent dynamic mathematics software is a math software from Guangzhou, China, which is designed according to the needs of practitioners and scholars in the field of education (Wijaya, Ying, & Purnama, 2020).

Compared with the familiar geometric drawing board and other dynamic mathematical software, Hawgent in many aspects of innovation, in addition to flexible and convenient operation, powerful teaching function, rich curriculum resources and other advantages, but also has the following three aspects of outstanding characteristics: Menus and commands can be customized, internal and extended functions are rich, mathematical objects and relationships can be copied. Hawgent dynamic software not only has the function of mathematical objects in mathematical learning, but also can make the static geometric relationship dynamic, through flicker, movement and other changes can arouse students' interest in learning, highlighting the essence of the formation (Cunhua, Ying, Qunzhuang, & Wijaya, 2019). What we want to use Hawgent dynamic design content.

"line and angle" is the beginning of geometry learning for students, and it is also the first complex figure that students are exposed to in junior middle school, which plays a role of connecting the preceding and the following in the whole geometry learning. therefore, the teaching design of line and angle is particularly important for teachers. Method The research method adopted in this study is to use ADDIE model for research and development (Abadi, Asih, & Jupri, 2018; Bernard, Sumarna, Rolina, & Akbar, 2019).

The model aims to solve problems systematically according to requirements and problem characteristics (Zainuddin, Hasanah, Salam, Misbah, & Mahtari, 2019). Research methods include analysis, design, development, implementation and evaluation (Kristanto, Mustaji, Mariono, Sulistiowati, & Nuryati, 2018). The steps for the ADDIE model are shown in figure 1. / Figure 1. Steps to make the learning media by ADDIE model The steps for making the learning media are shown in figure 1.In the analysis phase, the researchers will analyze the difficulties faced by students in learning the line and angle at school, and find out the abilities that meet the standards of the curriculum.

In the design phase, the Hawgent dynamic mathematics software will be used to make the learning media. Upon completion of the learning media, the learning media will be validated by 3 materials and 3 media experts from China. After the media has been modified according to the materials and the opinions of media experts, learning media will be implemented in SMP Putra Juang, Cianjur, Indonesia. In the implementation phase, researchers will travel to schools and use the Hawgent dynamic software as a learning medium to ask teachers and students for their reactions and evaluations of learning media.

In the improve stage, the learning media is modified according to the suggestions of teachers and students. This research will only focus on learning the design of the media until the learning medias are verified to be worth using. The data in this research is

collected in a formative way with always evaluating every data. The data that are collected and evaluated are the evaluation of difficulties faced by teachers when explaining Line and angle using ICT, result from the media expert, result from the material expert and implementation result when using Hawgent dynamic mathematics software for students in SMP Putra Juang, Cianjur. In this study, the data of media and material experts will be collected by means of questionnaire survey.

The data provided by the media and materials experts will be analyzed by calculating the average score given by the media and materials experts. The average score was then classified according to the criteria shown in table 1. Tabel 1. Assessment criteria of learning media Score _Validity criteria _Description _ _3.26 = x = 4.00 _Valid/very good _No revision _ _2.51= x =3.26 _Valid enough _Need a little revision _ _1.76= x =2.51 _Not very valid _Need a lot of revision _ _1.00= x =1.76 _Not valid _Not to be used _ _ Results and discussion Analysis In mathematics, there are names, labels, and conventions that are arbitrary to students. Therefore, students must remember them so that they can convey their ideas to others.

An example of anything is "a line has 180 degrees". The teacher could not explain why it was 180 degrees because it was a convention and that was why there was no reason behind the arbitrary thing. Therefore, teachers can only tell students arbitrary things in a way that goes into the field of students' memory. On the other hand, teachers should not tell students what is necessary. Otherwise, students will remember them. Students should work out what is necessary so that they can recognize and provide reasons. For example, students can calculate the missing angles of a triangle, in which there are two angles.

To figure this out, students must be aware that, therefore, everything necessary is in the realm of consciousness. learning media design In the learning media making phase, Hawgent dynamic mathematics software is designed according to the initial observation on line and angle and the national curriculum. Learn media with animations, such as flashing or moving pictures, so that it can capture students' interest. An example of learning media using the Hawgent dynamic mathematics software is shown in figure 3. / (a) / (b) Figure 2.

(a) Separate the angles to be observed (b) Flicker the Angle to be observed In figure 3, we can see that there are two different colors dividing the three line segments. By moving, the same side Angle to be observed can be separated from it for easy observation. Compared with the traditional teaching process, this operation simplifies the cognitive process of line and angle. In addition, the angles before and after separation can also be compared by marking the angles. Line and angle can be deeply

understood in different forms. In traditional teaching, teachers teach by drawing pictures on the blackboard and then marking the corners.

As the teaching process is single and the focus is not prominent enough, students do not have the enthusiasm for deep learning in the learning process, which may cause the following problems: unable to correctly understand the three-line octagonal structure, unable to express the process of methods, difficulty in extracting relevant concepts, etc. The process of applying Hawgent dynamic mathematics software can be roughly divided into the following three parts: the first and third octagonal dynamic display. Teachers display learning medias to attract students' interest. In the process of explanation, the key points are highlighted dynamically to facilitate students' observation. Second, students operate.

Students can carry out the simulation operation according to the teacher's demonstration, strengthen the hands-on ability and deepen the understanding of the three-line octagonal structure. Third, teachers guide students to understand relevant concepts and promote in-depth learning.The specific implementation process is shown in figure 3. Application of Hawgent dynamic mathematics software for teaching will have the following effects: first, dynamic display, attract interest.

Dynamic Angle separation will attract students' attention, and then with the teacher's appropriate explanation, deepen students' understanding. Second, the method process is operational. Teachers can not only show the three-line octagon, but also let students operate by themselves, to strengthen the process of memory. Finally, the abstract concept is supplemented by vivid and intuitive dynamic effect to help students to enhance the storage and extraction of relevant conceptual information. / Figure 3.

Learning media implementation process Validity Result of Interactive Multimedia After designing the learning media on probability using Hawgent dynamic mathematics software, the next stage is for the media to be validated by the media and material experts to see the effectiveness of the learning media. Three materials and three media experts were invited to rate the learning media according to the criteria in table 1. The media experts rated the content in four aspects: the accuracy of the way the material is presented, the completeness of the components in each chapter of teaching material, the problem solving steps, the design, and the animation.

For the accuracy of the way the material is presented, the average media expert score is 4.33, which can be classified as valid. For the completeness of the components in each chapter of teaching material, the average score of the media expert is 4, which can be classified as valid. For problem solving steps, the average media expert scored 3.66,

which can be classified as effective. For design and animation, the average media expert score is 4.33, which can be classified as valid. The specific score is shown in table 2. Table 2.

Assessment from learning media expert No _Statement _expert _average _category _ _ _ _1 _2 _3 _ _ _ _1 _The accuracy of the way the material is presented _4 _4 _5 _4.33 _Valid _ _2 _Completeness of the components in each chapter of teaching material _4 _4 _4 _4 _Valid _ _3 _Problem solving steps _4 _3 _4 _3.66 _valid _ _4 _Design and animation _4 _4 _5 _4.33 _Valid _ _ Similar to media experts, material experts will also rate the following four areas: the accuracy of the selection of summary content, clarity of examples given, conformity between the final chapter test and learning objectives, clarity of material description. For the accuracy of the selection of summary content, the average media expert score is 3.33, which can be classified as valid. For clarity of examples given, the average score of the media expert is 4.6, which can be classified as valid.

For conformity between the final chapter test and learning objectives, the average media expert scored 3.66, which can be classified as effective. For clarity of material description, the average media expert score is 4.66, which can be classified as valid. The specific score is shown in table 3. Table 3. Assessment from learning material expert No _Statement _expert _average _category _ _ _ _1 _2 _3 _ _ _ _1 _The accuracy of the selection of summary content _4 _3 _3 _3.33 _Valid _ _2 _Clarity of examples given _4 _5 _5 _4.66 _Valid _ _3 _Conformity between the final chapter test and learning objectives. _4 _3 _4 _3.66 _Valid _ _4 _Clarity of material description. _4 _5 _5 _4.66 _Valid _ _ Practicality of interactive multimedia After media and materials experts declared learning media to be feasible and valid, the researchers used Hawgent dynamic mathematics software to teach the line and angle course.

As can be seen from table 4, the students' post-test results are very satisfactory. The students' post-test includes six aspects. Among them, 28 students understood the meaning of line and angle, accounting for 87.50% of the total. There were 26 students who could explain how to get the result, 81.25% of the total. There are 26 students who can link line and its angle, accounting for 81.25% of the total. There are 24 students who know work process method, accounting for 75.00% of the total. There were 29 students who could evaluate the proof of result, accounting for 90.63% of the total. There are 30 students who can describe angle according to data, accounting for 93.75% of the total.

Therefore, using Hawgent dynamic mathematics software to develop line and angle learning media is an interesting and effective way to learn. Table 4. Students' ability in answering the post-test problem No _Findings _Number of Students _Percentage _ _1 _Understanding the meaning of line and angle _28 _87.50% _ _2 _Explaining how to get

the result _26 _81.25% _ _3 _Linking line and its angle _26 _81.25% _ _4 _Work process method _24 _75.00% _ _5 _Evaluate the proof of result _29 _90.63% _ _6 _Describing angle according to data _30 _93.75% _ _ Conclusion Based on the research and discussions conducted, the development of learning media has been recognized as useful by media and materials experts, and the post-test results of students are ideal.

Therefore, using Hawgent dynamic mathematics software to develop line and angle learning media is an interesting and effective way for students to learn. Based on the research results, it is concluded that a dynamic learning medium is needed in the process of mathematics teaching, such as the course designed by Hawgent dynamic mathematics software, to help teachers explain basic concepts and deepen students' understanding. References Abadi, M. K., Asih, E. C. M., & Jupri, A. (2018). The Development of Interactive Mathematics Learning Material Based on Local Wisdom with .swf Format. Journal of Physics: Conference Series, 1013(1). https://doi.org/10.1088/1742-6596/1013/1/012131 Badraeni, N., Pamungkas, R. A., Hidayat, W., Rohaeti, E. E., Wijaya, T. T., Sudirman, J. J., & Barat, J. (2020). Analisis kesulitan siswa berdasarkan kemampuan pemahaman matematik dalam mengerjakan soal pada materi bangun ruang sisi datar. 04(01), 247–253.

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