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DEVELOPMENT OF APSIO TO IMPROVE MATHEMATICAL CONNECTION ABILITY

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Abstract. In this article, we want to explain the development of mobile learning the name is APSIO. APSIO is mobile learning to learn rasio as one off matehematics material that students hard to connected. It is known that mathematical connections are an important ability for students to have. This research aim to development mobile apps that called APSIO for improve students connection mathematics ability. This research use ADDIE model. The subject of this product consists of expert, teacher and students. The technique used to collect data that is observations, interviews, and questionnaire. Instruments used in collecting data is questionnaire. The technique used in analyzing data is analysis qualitative descriptive and quantitative descriptive analysis techniques.

INTRODUCTION

In everyday life we cannot be separated from mathematics. Mathematics is an integrated science (NCTM, 1989). Furthermore, NCTM (1989) states that mathematics is not a collection of separate topics and abilities, despite the fact that studying mathematics is often narrowed down and taught again in several special branches. Bruner (in Ruseffendi, 1991: 152) suggests that in order for students to be more successful in learning mathematics, students must be given more opportunities to see connections, both connections between propositions and postulates, between theory and theory, between topic and topic, as well as between branches of mathematics (algebra and geometry for example). This is confirmed by the opinion of Ayunani et al (2020) when students are able to connect these mathematical concepts, their understanding of the concepts becomes deeper and is retained longer. One component of mathematics learning competency that is needed and developed in the mathematics learning process is mathematical connections.

Mathematical connections have a very important role in connecting students' prior knowledge with the knowledge they have just learned. Bingölbali (2016) mathematical connections have a very important role not only in studying mathematics and solving mathematical problems, but also in other sciences and in everyday life. NCTM (2020) conveys two conditions related to connection, namely without a connection and with a connection. The first condition is that without connection, students have to learn by remembering too many isolated concepts and skills. Furthermore, the second condition is that with connections, students can build a new understanding of previous knowledge. In addition, according to Suryono, W.A et al (2020), mathematical connections can help students succeed with new concepts and see that mathematics can be useful in everyday activities. In line with Ariyani, according to Glacey (2011), if students have connected and applied problem solving to other situations, then this will change the entire learning process. This means that students can interpret the learning process.

Another important role of connection is that it can help students remember, conceptualize and use them appropriately in problem solving (Hidayati et al., 2020). Dean (2008) explains that mathematics is difficult and boring for students, because they do not see the connections in mathematics. With mathematical connections, students will reach various problems both inside and outside school. Through connections, students' horizons will be broadened and students' desire to deepen their insights will grow. When students' desires develop, students' confidence in their abilities will also develop.

Students need mathematics to meet practical needs and solve problems, both problems in other subjects or in everyday life. However, until now, there are still many students who think that mathematics is a difficult subject and is a lesson full of formulas. Especially in solving problems related to story problems or everyday life.

The low problem solving abilities that students can perform is a result of low mathematical reasoning (Hasanah, et al: 2019). There is also a direct relationship between mathematical reasoning abilities and mathematical connection abilities (Hanifah & Karyati, 2019). Different from the research results of Baiduri et al (2020), they found that mathematical problem solving abilities were influenced by mathematical connection abilities.

Learning mathematics is universal knowledge that has an important role in the discipline of science. Comparative material is mathematics material taught in grade VII junior high school and has many contributions to everyday life. Based on observations, many students experienced difficulties when solving comparison questions.

The success of the learning process is supported by three components, namely, teachers, students, and learning media(Istiqlal, 2017; Dwiantara & Masi, 2016). In this case, students will more easily understand basic mathematical concepts if there is interaction between student experiences and learning media so that mathematics learning becomes more meaningful and interesting (Ariana et al., 2020).

The increasingly rapid development of information technology in the current era of globalization cannot avoid its influence on the world of education. Global demands require the world of education to always adapt technological developments to efforts to improve the quality of education, especially adjusting the use of Information and Communication Technology (ICT) for education.

Technology-based media will be of great interest to many parties, especially students themselves. With the help of technology, the resulting media will attract more students' interest in learning mathematics. Technology is very important in teaching and learning mathematics. This influences the mathematics taught and improves student learning (NCTM, 2000:24). The use of ICT-based media can create easier and more interesting mathematics learning (Widjayanti, Masfingatin, & Setyansah, 2019).

Utilizing appropriate learning media can increase students' active learning in discovering and understanding mathematical concepts. One learning media that can improve student learning outcomes is multimedia learning. Multimedia consists of several elements such as photo text, images, audio, video and animation (Illahi, Sukartiningsih, & Subroto, 2018). Elements in multimedia allow the use of more than one sense, either separately or simultaneously. In connection with this statement, Trilaksono et al (2018) stated that the possibility that information can be understood, comprehended and retained in memory is in line with the number of sensory devices used when using media in learning. Multimedia is able to create interactivity with its users because it is equipped with a controller so that users can choose what they want (Putra, Jampel, & Sudatha, 2018).

This multimedia capability makes it superior to other learning media. This can make students more active because they are directly involved in their operations in learning (Kumalasani, 2018). The use of interactive learning media is very effective in increasing students' learning motivation (Irawan and Suryo, 2017).

Android is a Linux-based operating system for mobile phones such as smartphones and tablet computers. Android provides an open platform for developers to create their own applications for use by various mobile devices. The Android operating system makes special learning media for children packaged in the form of software or applications easier to use.

There are several platforms that can be used to create Android applications. Among these platforms are Appery.oi, MIT App Inventor, App Maker, Kodular and so on. Of these various options, the Kodular platform is highly recommended because it is easier to use. Apart from that, it is suitable for beginners who want to create their own Android applications. With this platform, beginners do not need to understand code language which is the basic knowledge in creating an Android application. That way, creating applications will be easier.

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Kodular is a website that provides tools for building Android applications with the drag and drop block programming concept. Block programming is the core feature of Kodular, with this feature we no longer need to enter program code manually to create Android applications. Kodular also provides mini dBase and storage functions so you can save and download data as desired. In terms of interface/GUI, the code can be adapted to the theme to create a more modern and professional application (Kumala & Winardi, 2020).

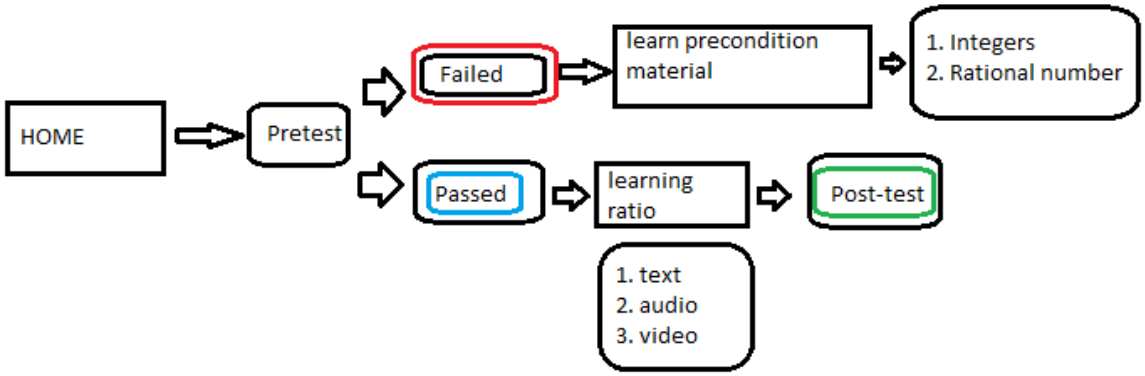
METHODS

This research is development research with stages that refer to the model ADDIE development consists of 5 stages, namely the analysis, design, development, implementation, evaluation. Tegeh et al (2014) said the ADDIE model is a systematic and providing research and development model evaluation opportunities at each stage so as to have a positive impact on product quality developed. This model was chosen because it can be used to develop multimedia products provide an opportunity for a formative evaluation so that any errors can be corrected minimized from the beginning. The function of this development model is to serve as a guide in forming training program tools and intrastructure that are effective, dynamic and support the performance of the training itselfS

In this research, the author only reached the analysis and design stage. At the analysis stage, the writer carried out the selection of subject matter. In accordance with the name of the application, namely APSIO, the lesson material that will be presented is comparison or ratio material. In both the curriculum and the 2013 curriculum, this comparison or ratio material is at the junior high school level, specifically in grade seventh.

The second stage is creating a flow program or flowchart. The program flow in making the application is shown as follows:

Image 1.
Flowchart program APSIO



RESULTS

The stages of the ADDIE model implemented in this paper are analysis and design. At this analysis stage the main activity is to analyze the need for developing Android-based learning media. The first step taken in creating Android-based learning media using the ADDIE model is to carry out product analysis. based on the existing problem, namely the low ability of students' mathematical connections.

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At the design stage, the activity that will be carried out is to design a learning media product that will be made in accordance with the analysis of the previous stage. The flow chart created is in accordance with image 1 above. At this stage students start by doing a pretest. The pretest is carried out as a starting point for students' ability to learn this material. When a student has not succeeded in the pretest, he follows the prerequisite learning. If he lacks mastery of the integer material then he will study and practice again from the integer material, as well as rational numbers. Next, if the student has passed the pretest, then he is directed to study ratio material. In this material there are three forms of teaching materials, the first in text form, the second in audio form, and the third in video form. This is so that students learn according to their learning style tendencies.

DISCUSSION

Further development of this application is needed so that it can run and be formed according to its objectives. Apart from that, questions are needed both during the pretest and posttest that are appropriate to mathematical connection abilities.

REFERENCES

Abdulrahaman, M. D., Faruk, N., Oloyede, A. A., Surajudeen-Bakinde, N. T., Olawoyin, L. A., Mejabi, O. V., Imam-Fulani, Y. O., Fahm, A. O., & Azeez, A. L. (2020). Multimedia tools in the teaching and learning processes: A systematic review. *Heliyon*, *6*(11), e05312. https://doi.org/10.1016/j.heliyon.2020.e05312

Ariana, Situmorang, & Krave. (2020). Pengembangan Modul Berbasis Discovery Learning Pada Materi Jaringan Tumbuhan Untuk Meningkatkan Kemampuan Literasi Sains Siswa Kelas XI IPA SMA. Jurnal Pendidikan Matematika dan IPA, 11(1), 34–46. https://Doi.Org/Http://Dx.Doi.Org/10.26418/Jpmipa.V11i1.31381.

Ayunani, D. S., Mardiyana, & Indriati, D. (2020). Analyzing mathematical connection skill in solving a contextual problem. Journal of Physics: Conference Series, 1511(1), 1–10. https://doi.org/10.1088/1742-6596/1511/1/012095

Baiduri, B., Putri, O. R. U., & Alfani, P. I. (2020). Mathematical connection process of students with high mathematics ability in solving PISA problems. *European Journal of Educational Research*, *19*(4), 1527-1537.

Bingölbali, E., & Coşkun, M. (2016). A proposed conceptual framework for enhancing the use of making connections skill in mathematics teaching. *Egitim ve Bilim*, *41*(183).

Dean, S. (2008). Using non-traditional activities to enhance mathematical connections. Math in the Middle Institute Partnership Action Research Project Report. Lincoln: University of Nebraska

Dwiantara, G. A., & Masi, L. (2016). Pengaruh Penggunaan Pendekatan Pembelajaran Open-Ended Terhadap Peningkatan Kemampuan Berpikir Kreatif Matematis Siswa Kelas XI IPA SMA Negeri 2 Kendari. Jurnal Penelitian Pendidikan Matematika, 4(1), 57–70. https://Doi.Org/Http://Dx.Doi.Org/10.36709/Jppm.V4i1.3052.

Glacey, K. (2011). A study of mathematical connections through children's literature in a fifth- and sixth-grade classroom. Math in the Middle Institute Partnership Action Research Project Report. Omaha: University of Nebraska.

QRCBN 62-6861-0508-697
https://proceeding.unnes.ac.id/icmse

Hidayati, V. R., Subanji, S., & Sisworo, S. (2020). Students' Mathematical Connection Error in Solving PISA Circle Problem. Mathematics Education Scientific Journal/ Jurnal Ilmiah Pendidikan Matematika, 8(2), 76–84. https://doi.org/10.25273/jipm.v8i2.5588

Illahi, T. Rahmah, Sukartiningsih, W., & Subroto, W. T. (2018). Pengembangan Multimedia Interaktif Pada Pembelajaran Materi Jenis-Jenis Pekerjaan Untuk Meningkatkan Kemampuan Berpikir Kritis. Jurnal Kajian Pendidikan Dan Hasil Penelitian, 4(3). Https://Doi.Org/Http://Dx.Doi.Org/10.26740/Jrpd.V4n3.P826-.

Istiqlal, M. (2017). Pengembangan Multimedia Interaktif Dalam Pembelajaran Matematika. Jipmat, 2(1). https://Doi.Org/10.26877/Jipmat.V2i1.1480

Kumalasani, M. P. (2018). Kepraktisan Penggunaan Multimedia Interaktif Pada Pembelajaran Tematik Kelas Iv SD. Jurnal Bidang Pendidikan Dasar, 2(1). Https://Doi.Org/Https://Doi.Org/10.21067/Jbpd.V2i1a.2345.

National Council of Teachers of Mathematics. (2000). Principles and standards for schools mathematics. Reston, VA: NCTM.

NCTM (1989). Curriculum and Evaluation Standard for School Mathematics. Reston : V.A

Putra, I. N. A., Jampel, I. N., & Sudatha, I. G. W. (2018). Pengembangan multimedia Flashcard Untuk Meningkatkan Kemampuan Menyimak Di Tk Negeri Pembina Singaraja. Edutech Undiksha, 6(1), 32. Https://Doi.Org/Http://Dx.Doi.Org/10.23887/Jeu.V6i1.20260.

Rashid, T., & Asghar, H. M. (2016). *Technology use, self-directed learning, student engagement and academic performance: Examining the interrelations. Computers in Human Behavior, 63, 604–612.* doi:10.1016/j.chb.2016.05.084

Ruseffendi, E.T. (1991). Pengantar Kepada Membantu Guru Mengembangkan Kompetensinya dalam Pengajaran Matematika untuk Meningkatkan CBSA. Bandung: Tarsito

Siregar, N. D., & Surya, E. (2017). Analysis of students' junior high school mathematical connection ability. International Journal of Sciences: Basic and Applied Research, 33(2), 309–320.

Suryono, W. A., Suyitno, H., & Junaedi, I. (2020). Mathematical Connection Ability And Studentsâ€™ Independence in Missouri Mathematics Project E-Learning. *Unnes Journal of Mathematics Education Research*, *9*(2), 185-189.

Tasni, N., & Susanti, E. (2017). Membangun koneksi matematis siswa dalam pemecahan masalah verbal [Building students' mathematical connections in verbal problem solving]. Beta Tadris Mathematics Journal/ Beta Jurnal Tadris Matematika, 10(1), 103–116. https://doi.org/10.20414/betajtm.v10i1.108

Tegeh, I. M., Jampel, I. N., & Pudjawan, K. (2014). Pengembangan Buku Ajar Model Penelitian Pengembangan dengan Model ADDIE. Seminar Nasional Riset Inovatif IV.

Trilaksono, D., Darmadi, D., & Murtafi'ah, W. (2018). Pengembangan Media Pembelajaran Matematika Menggunakan Adobe Flash Professional Berbasis Literasi Untuk Meningkatkan Kreativitas Siswa Aksioma: Jurnal Program Studi Pendidikan.

Widjayanti, W. R., Masfingatin, T., & Setyansah, R. K. (2019). Media Pembelajaran Interaktif Berbasis Animasi Pada Materi Statistika Untuk Siswa Kelas 7 Smp. Jurnal Pendidikan Matematika, 13(1), 101–112. Https://Doi.Org/10.22342/Jpm.13.1.6294.101-112