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Development of Statistic's Teaching Aids on Mean, Median, Modus Topic for Sixth Grade Elementary School Students

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ABSTRACT

This study aims to develop a statistical teaching aid that is valid, effective, and practical on the material of Mean, Median, and Mode of Class VI Elementary School students. The development was carried out using the ADDIE (Implementation, Design, Development, Implementation, Evaluation) method, and the data was collected through observation and interviews, which were then analyzed descriptively. This article starts with how to make and test the props, which then comes to the part where the props made are by the original purpose of making the props and by the characteristics of good teaching aids. The validity of the teaching aids is based on the validator's assessment. For effectiveness, it is assessed from the results of students working on solutions about the Mean, Median, and Mode using the Statistics Board Teaching Aid. At the same time, practicality is known from the trial results to find out the difficulties experienced by students. The study results indicate that the statistics board is a valid, efficient, and practical money- teaching tool. The study results indicate that the Statistics Board is a valid, efficient, and practical teaching aid.

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1. INTRODUCTION

In education, there is such a thing as the learning and learning process. The two activities, learning and learning cannot be separated and are interrelated (Pane & Dasopang, 2017; Susilana et al., 2022). As we know, learning can make a person gain knowledge, and learning can be done anywhere, anytime, and in any way (Johan et al., 2020; Lubis et al.,2022; Palittin et al., 2019; Napratilora et al., 2020). Meanwhile, learning is a means for students to develop the potential that exists within them. One of the school lessons is learning mathematics.

In mathematics, a category of material that students must learn is statistics. According to Latifah and Afriansyah (2021), statistics is an essential material to learn; studying statistics can help us in our daily lives, and even statistics can be used in scientific fields. The statistical materials that are the main focus of this study are the mean, median, and mode. Mean, median, and mode are often found in everyday life; this is in line with Junaidi's (2014) opinion that we often use this material in everyday life, for example, the statement "the average woman there has long hair." Hearing this statement, we must think that the average here is mean, but in fact, the statement is more towards "mostly," so this is the mode. Learning statistics is vital.

Contrary to the importance of statistics, we know that statistics, especially mathematics, is a frightening subject for students (Mazana et al., 2020; Nurfatanah et al., 2021). Students find mathematics difficult and unpleasant. Satriawan (2018) research explained students' difficulties in mathematics in the material mean, median, and mode. According to him, students had difficulty distinguishing the use and application of the formulas from the three. Due to the difficulties and mindset that consider mathematics unpleasant make students bored and unwilling to learn mathematics; in the opinion of Lestari (2017), students who like mathematics will enjoy learning it, while students who do not like it will feel bored with learning mathematics.

Responding to these problems, the teacher as a facilitator must prepare various plans so that students can be happy and focus on learning mathematics, especially statistics (Hubbard & Livy, 2021; Pakpahan et al., 2020; Roesken-Winter et al., 2021). Talking about the facilitator the role of a facilitator refers to trying to facilitate a person or group to obtain something related to their interests and talents (Agung, 2017). One of the things that might be a solution to this problem is the teacher facilitating or using learning media in the learning class. Learning media has the primary function, namely to stimulate all students' senses and make them process information so that they can understand and retain it in their memory (Alwi, 2017; Johan et al., 2020; Mufidah et al., 2020).

One of the learning media is a visual aid. Mathematical teaching aids are designed to help understand the concepts and principles of mathematics (Annisah, 2017; Verawati et al., 2022). The previous research that discussed statistical teaching aids was conducted by Anggraeni (2021). In his research, he developed a teaching tool called Percastik; he explained that the teaching aid he made was used on data concentration and quartile size material; besides that, he also explained that the teaching aid was made of patchwork. Different from this, researchers want to develop teaching aids on the material mean, median, and mode.

2. METHODOLOGY

In developing teaching aids, researchers used a research method: Analyze, Design, Develop, Implement, and Evaluation (ADDIE). ADDIE is a model that guides the developing of practical, dynamic learning and supports learning (Barokati & Annas, 2013; Budoya et al., 2019). Data collection techniques in this study were carried out through observation and

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interviews with qualitative analysis. The development of the Statistics Board teaching aid in this study is the Mathematics Learning Media Board Statistics to understand the mode, median, and mean of a single data for sixth-grade elementary school students. Research on the development of teaching aids uses four types of research, in the form of developmental research to develop teaching aids, research or quasi- experimental studies with the aim that researchers can investigate the effect of using teaching aids, and direct interviews aimed at determining the level of student satisfaction. Qualitative research aims so that researchers can determine the views of students' opinions on the product. The subjects of this study were 3 grade VI elementary school students.

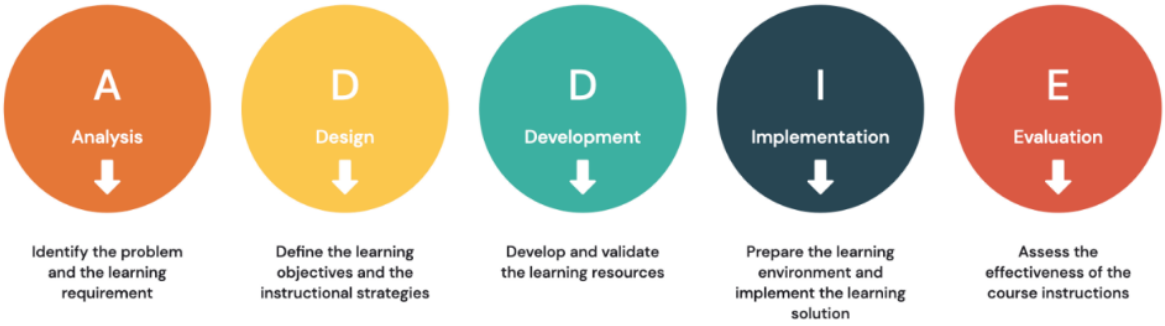

Figure 1. ADDIE Method

With the ADDIE method, there are steps in developing the teaching aids used by researchers;, the ADDIE method consists of 5 steps: analysis, design, development, implementation, and evaluation (Peterson, 2003).

3. RESULTS & DISCUSSION

The researcher made the Development of a Statistics Board visual aid. This statistics board is designed to help students understand concepts and make students interested in learning mathematics, especially statistics, specifically in the material Mean, Mode and Median for grade VI elementary school students.

3.1. Analysis Stage

At this stage, Material Analysis is carried out by researchers. In this case, the researcher chose the Mean, Median, and Modus material for grade VI Elementary School students and developed from a YouTube video the making of a Statistical Board Teaching Tool with the username Desnia Math is Yuvi Asnah Cania, a student at the Muslim Nusantara University Al Washliyah Medan with a video link https://youtu.be/_90IzJm-Ctw. The following is the researcher's reference design made by Yuvi's sister.

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Figure 2. Reference Design

Weaknesses in these props are limited when using more than 7 data, so you must add bars. In addition, the cardboard material wrapped in cardboard is less durable, so we, as researchers, are developing it by changing materials and designs. Therefore, we developed a statistic board by changing its material and shape.

3.2. Product Design Stage

At this stage, after selecting the Mean, Median, and Modus material, the researcher prepares a design/sketch of the product to be designed, to be then presented and receive criticism and suggestions from the Expert Review, which in this case is the Lecturer for the Mathematical Learning Media course in Mathematics Education Sriwijaya University. The tools and materials for designing prototypes are Scissors/Cutters, Rulers, Cardboard, Sticky Notes, Pens, Pins, Styrofoam, Thread, and Glue. The following is the product design before it is designed.

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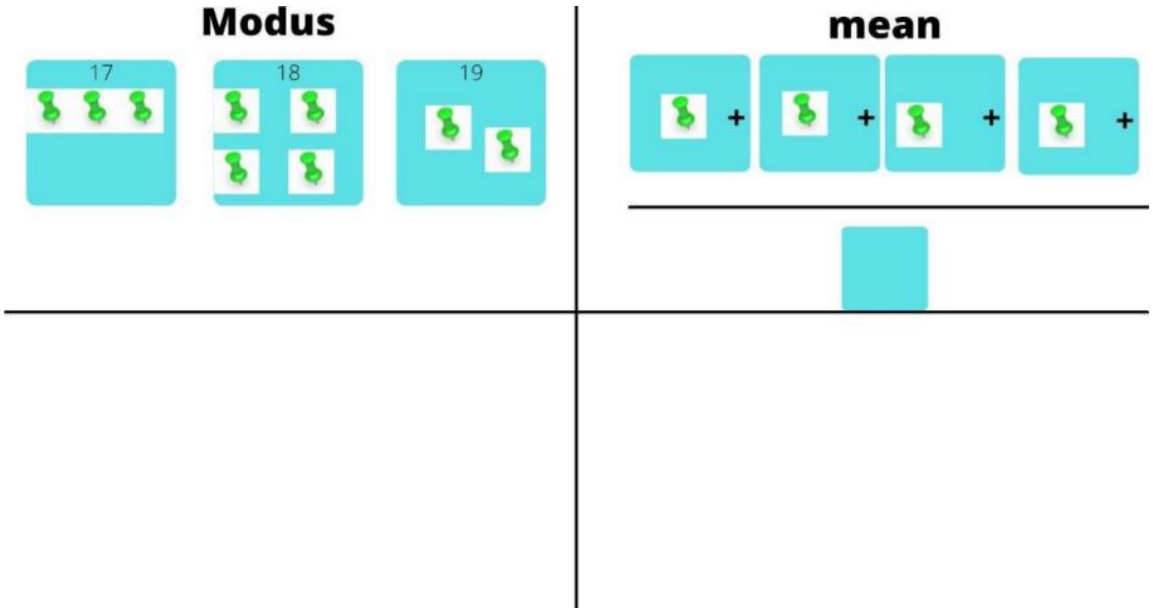

Figure 2. Prototype Sketch 1

3.3. Development Stage (Development)

At this stage, the sketches that have been designed are presented and given criticism and suggestions by the validator through a video conferencing application, namely zoom meetings.

Tabel 1. Expert Review Validation Stage

Comments/Suggestions	Researcher Response
If the purpose of making is to find concepts in junior high school students, then making this teaching aid is not quite right.	The researcher still decided to make teaching aids according to the design described because the purpose of the teaching aids made was to help elementary school children understand the concept, so that it can be said to be appropriate.
The use of Styrofoam is less durable and easily damaged and give color to make it look more attractive	Researchers still use styrofoam, this is because the tool used by students is tuspin, so the right base is styrofoam when compared to boards that last a long time but require cardboard as a wrapper. For the use of color, the researcher accepts the suggestion

At this stage, the researcher starts designing prototype 2, the result of the design/sketch that has been given comments/suggestions on the prototype. Next, the researchers designed Prototype 2 according to the results of the design/sketches according to the planned tools and materials. After preparing the tools and materials, the researcher designed the teaching aids with the following steps: 1) Cut a small piece of styrofoam with a size of 60 cm x 5 cm to

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place the spin and sticky notes. 2) Then, divide the remaining styrofoam into 4 parts 3) As a barrier for each part, use a little cardboard and glue it with glue 4) Print out the usage instructions and stick it on the styrofoam 5) For the top left is used for mode, the correct top box is for the mean, the lower left box for the median, and the lower correct box for the usage instructions. Moreover, here is the resulting prototype 2.

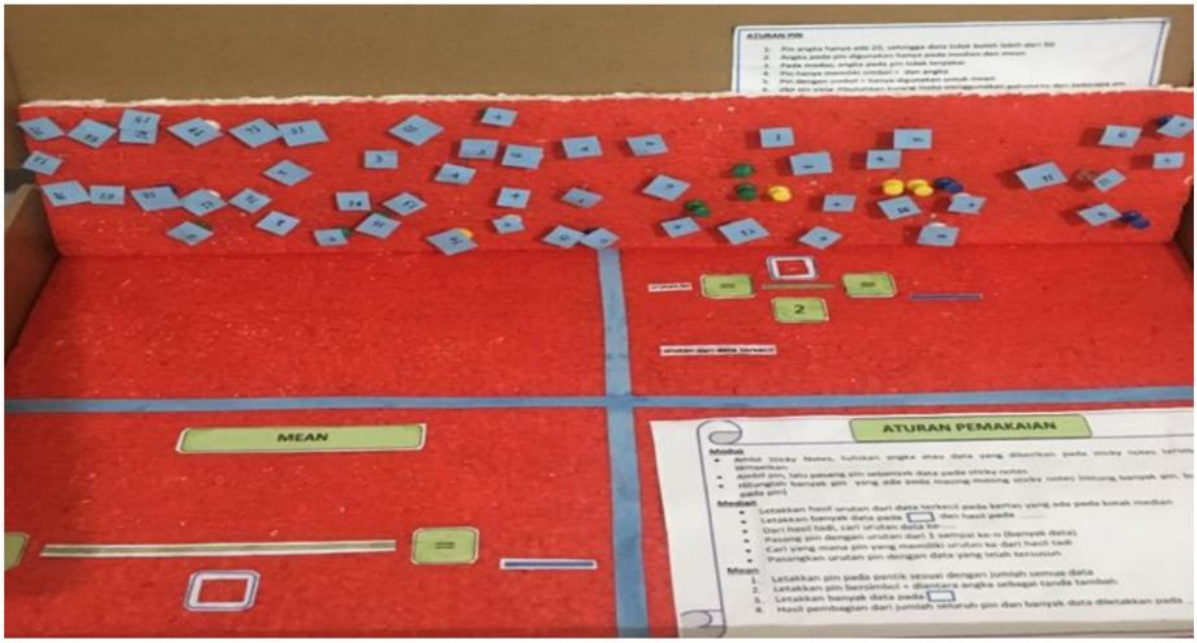

Figure 3. Prototype 2, Researcher Statistics Board Teaching Aid

3.4. Implementation

At this stage, prototype 2 was tested on 3 students on a limited basis. Because the purpose of making teaching aids is to help students understand the concept, the researcher chose 2 grade 6 students who had studied the material mean, median, and mode and 1 grade 5 student who had not studied this material. While learning mathematics, using the media makes students enthusiastic so that learning becomes effective. The following is the result of student work based on the questions asked.

Figure 4. Questions Tested on Students

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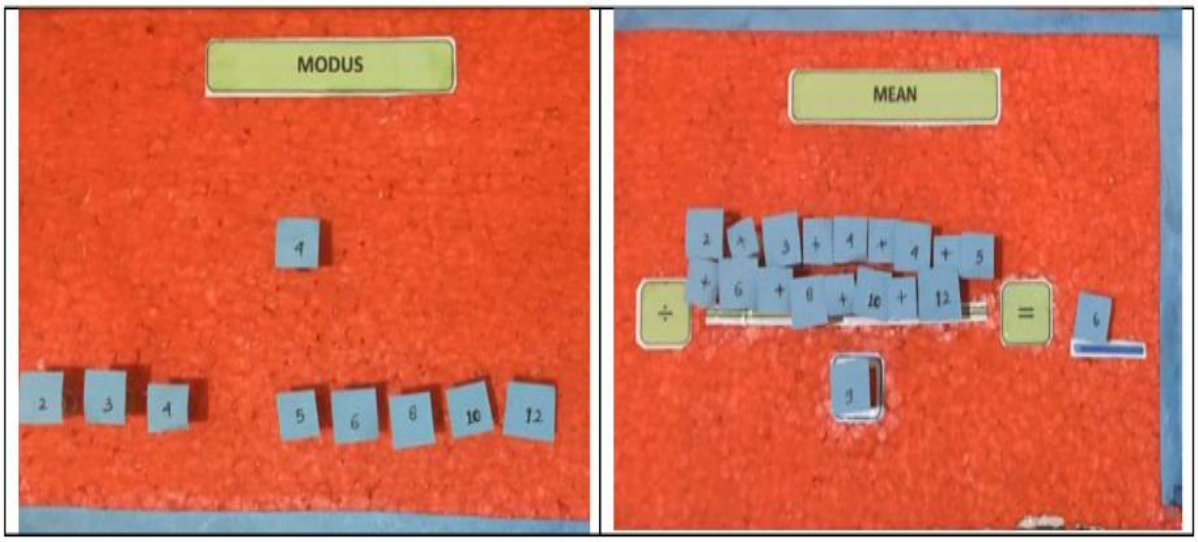

Figure 5. Solution for Mode (Left) and Mean (right)

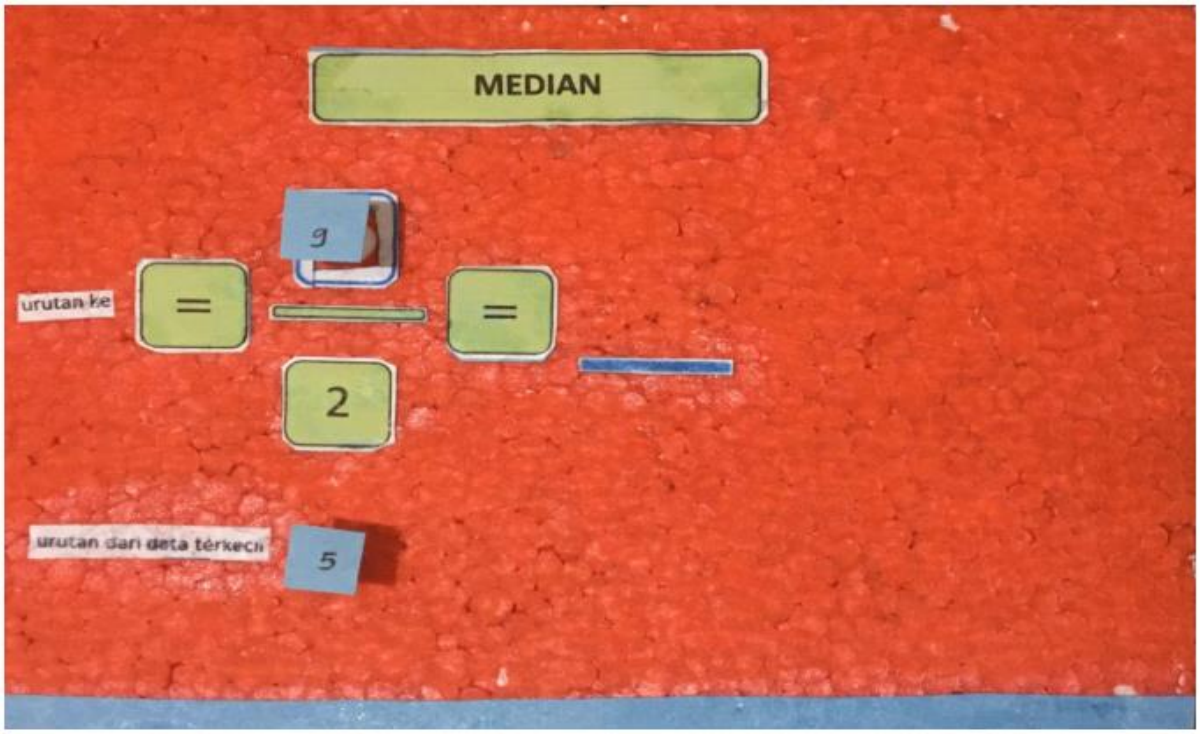

Figure 6. Solving for the Median

From the results of the work done by students, it can be seen that students understand the material mean, median, and mode of the teaching aids given, as well as when the researcher observes the way students use their teaching aids. With the learning media also made, students felt the material was fun. This is illustrated when the researcher observes the process of working on the props and follows the process of interviewing the researcher and the student.

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Tabel 2. Student Interview Transcript

Comments/Suggestions	Researcher Response
Do you find it difficult to use this Props?	No
Does learning math make you understand better?	Yes, it's fun and exciting
So, do you prefer giving material directly or with props?	Using props
Does the teacher use teaching aids at school?	No
What impression do you want to convey after using this prop?	Learning is good, it's like taking lessons, but if the tutoring place still explains the material, it gets a bit boring sometimes

Based on the Trial Stage and Interview Results, students are assisted when using Learning Media that has been designed so that the purpose of making it is achieved. Students have not found any obstacles and no comments at this stage, so the Prototype 2 design process was completed without revisions/improvements from the Trial Stage.

3.5. Evaluation Stage

The evaluation process is carried out through the validation stage with the expert, where the comments from the validator are used to improve the teaching aids explained at the development stage. For practicality, researchers observed the process of students using visual aids and effectiveness in terms of data on student work or interviews, as explained in the previous implementation stage.

By using this Statistics Board, it can be seen that students enjoy being enthusiastic in working on questions related to the Mean, Median, and Mode; this is in line with Putra et al., (2021) research which states that students who like mathematics will enjoy learning it, while students who are less like to be bored with learning mathematics. Students can also understand this visual aid, both how to use and when it helps in solving problems, so it can be said that this Statistical Board meets the characteristics of good teaching aids as research by Deviana & Prihatnani (2018) says that good teaching aids are a teaching aid that has criteria that can be used routinely so that it requires tools with materials that are more durable, the media used must be fun so that it is not dull, practical and effective in learning.

4. CONCLUSION

Based on the analysis of the results based on the trials and the results of interviews with students, which have been carried out, it can be concluded that the teaching aids the researchers have developed are valid, effective, and practical. Validity is based on the results of the assessment given by the validator. Practicality is seen based on the results of trials that have been carried out. Moreover, declared effective by the results of interviews and observations when students work.

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p- ISSN p. ISSN 1693-5276 e-ISSN 2579-7700

REFERENCES

Agung, I. (2017). Peran fasilitator guru dalam penguatan pendidikan karakter (PPK). *Perspektif Ilmu Pendidikan, 31*(2), 106-119.

Alwi, S. (2017). Problematika guru dalam pengembangan media pembelajaran. ITQAN: Jurnal Ilmu-Ilmu Kependidikan, 8(2), 145-167.

Anggraeni, D. (2021). Pengembangan media percastik sebagai alat peraga matematika alternatif untuk menyelesaikan ukuran pemusatan data dan kuartil. *Jurnal Ilmiah Pro Guru, 3*(2), 259-271.

Annisah, S. (2017). Alat peraga pembelajaran matematika. *Tarbawiyah: Jurnal Ilmiah Pendidikan, 11*(01), 1-15.

Barokati, N., & Annas, F. (2013). Pengembangan pembelajaran berbasis blended learning pada mata kuliah pemrograman komputer. *SISFO, 4*(5), 1-15.

Budoya, C., Kissaka, M., & Mtebe, J. (2019). Instructional design enabled agile method using ADDIE model and feature driven development method. *International Journal of Education and Development using ICT*, *15*(1).

Deviana, D. R., & Prihatnani, E. (2018). Pengembangan media monopoli matematika pada materi peluang untuk Siswa SMP. *JRPM (Jurnal Review Pembelajaran Matematika), 3*(2), 114-131.

Hubbard, J., & Livy, S. (2021). Self-Study of a Mathematics Learning Consultant: Supporting Teachers to Plan Lessons for Implementing Differentiation in the Classroom. *Mathematics Teacher Education and Development*, *23*(3), 148-165.

Johan, R. C., Rullyana, G., Hanoum, N., Fathoni, T., & Wulandari, Y. (2019, October). Cultural Literacy: Getting to Know Digital-Based Folklore. In *2019 5th International Conference on Education and Technology (ICET)* (pp. 66-71). IEEE.

Johan, R. C., Sutisna, M. R., Rullyana, G., & Ardiansah, A. (2020). Developing online learning communities. In *Borderless Education as a Challenge in the 5.0 Society* (pp. 145-153). CRC Press.

Junaidi, J. (2014). Statistika Deskriptif dengan Microsoft Excel. Jambi : Fakultas Ekonomi dan Bisnis Universitas.

Latifah, T., & Afriansyah, E. A. (2021). Kesulitan dalam kemampuan pemecahan masalah matematis siswa pada materi statistika. *Journal of Authentic Research on Mathematics Education (JARME), 3*(2), 134-150.

Lestari, W. (2017). Pengaruh kemampuan awal matematika dan motivasi belajar terhadap hasil belajar matematika. *Jurnal Analisa, 3*(1), 76-84.

Lubis, A. H., Dasopang, M. D., Ramadhini, F., & Dalimunthe, E. M. (2022). Augmented reality pictorial storybook: How does it influence on elementary school mathematics anxiety. *Premiere Educandum: Jurnal Pendidikan Dasar dan Pembelajaran*, *12*(1), 41-53.

DOI: https://doi.org/10.17509/pdgia.v2012.45939
p- ISSN p. ISSN 1693-5276 e-ISSN 2579-7700

Mazana, M. Y., Montero, C. S., & Casmir, R. O. (2020). Assessing students' performance in mathematics in Tanzania: the teacher's perspective. *International Electronic Journal of Mathematics Education*, *15*(3), em0589.

Mufidah, I., Nulhakim, L., & Alamsyah, T. P. (2020). Development of learning media for video audio-visual stop motion based on contextual teaching and learning in science learning water cycle material. *Jurnal Ilmiah Sekolah Dasar, 4*(3), 449-462.

Mufidah, I., Nulhakim, L., & Alamsyah, T. P. (2020). Development of learning media for video audio-visual stop motion based on contextual teaching and learning in science learning water cycle material. *Jurnal Ilmiah Sekolah Dasar*, *4*(3), 449-462.

Napratilora, M., Lisa, H., & Bangsawan, I. (2020). Using WhatsApp as a learning media in teaching reading. *Mitra PGMI: Jurnal Kependidikan MI, 6*(2), 116-125.

Nurfatanah, N., Yudha, C. B., Marini, A., & Sumantri, M. S. (2021, April). Development of matemathic media games education based on e-learning in the Planting of Basic Concepts in Numeracy. *In Journal of Physics: Conference Series* (Vol. 1869, No. 1, p. 012127). IOP Publishing.

Pakpahan, A. F., Ardiana, D. P. Y., Mawati, A. T., Wagiu, E. B., Simarmata, J., Mansyur, M. Z., ... & Iskandar, A. (2020). *Pengembangan media pembelajaran*. Medan : Yayasan Kita Menulis.

Palittin, I. D., Wolo, W., & Purwanty, R. (2019). Hubungan motivasi belajar dengan hasil belajar siswa. *MAGISTRA: Jurnal Keguruan Dan Ilmu Pendidikan, 6*(2), 101-109.

Pane, A., & Dasopang, M. D. (2017). Belajar dan pembelajaran*. Fitrah: Jurnal Kajian Ilmu-Ilmu Keislaman, 3*(2), 333-352.

Peterson, C. (2003). Bringing ADDIE to life: Instructional design at its best. *Journal of Educational Multimedia and Hypermedia*, *12*(3), 227-241.

Putra, Z. H., Wulandari, W., Alpusari, M., & Hermita, N. (2021, June). Developing a Dynamic Number Card Game to Support Students' Number Sense: A Preliminary Study. In *2021 1st International Conference on Technology Enhanced Learning in Higher Education (TELE)* (pp. 107-110). IEEE.

Roesken-Winter, B., Stahnke, R., Prediger, S., & Gasteiger, H. (2021). Towards a research base for implementation strategies addressing mathematics teachers and facilitators. *ZDM–Mathematics Education*, 1-13.

Satriawan, H. (2018). Problematika pembelajaran matematika pada materi statistika SMP Kelas IX. *Jurnal Pembelajaran Matematika, 5*(3), 278–285.

Susilana, R., Rullyana, G., & Wulandari, Y. (2022). Pedagogia Dictionary: Web Application Development. *International Journal of Instruction*, *15*(1), 197-218.

Verawati, A., Agustito, D., Pusporini, W., Utami, W. B., & Widodo, S. A. (2022). Designing Android learning media to improve problem-solving skills of ratio. *Advances in Mobile Learning Educational Research, 2*(1), 216-224.

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