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Exploring Ethnomathematics Through a Game Lens Maggurecceng : Improving Students' Conceptual Understanding Based Ethnogames 3D

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ABSTRACT

Students' lack of conceptual understanding of mathematical concepts is an obstacle to why students have difficulty solving problems at the reasoning level. This can be seen from the results of the National Examination for mathematics subjects in Bone Regency which obtained a score below 50% in the low category. This research aims to determine the increase in students' understanding of ethnomathematics concepts through the integrated maggurecceng gameethnogames 3D. The research method used is methodquasi eksperimental tipe non-equivalent control group design. This research was carried out at SMA Negeri 11 Bone with a research sample consisting of two classes, namely class X MIPA 2 as the control class and class X MIPA 3 as the experimental class. Data collection techniques in this research include observation, tests and questionnaires. Based on the research results, it shows that there is a significant increase in the experimental class with a gain value of 0.83 or 83%.

Keywords: *Maggurecceng 1, Ethnogames 2, Education 3, Understanding Concepts 4, Ethnomathematics 5*

1. INTRODUCTION

Based on Minister of National Education Regulation no. 22 of 2006, one of the objectives of learning mathematics is that students have the ability to understand appropriate mathematical concepts in solving a problem. Thus, conceptual understanding is the ability to understand in depth a concept by empowering critical, creative and innovative thinking and being able to take responsibility for a concept (Giawa, GEE and Harefa, 2022; Maratusyo seen, Adillah and Ulfah, 2021). In the 21st century, mathematics learning has objectives with 4C characteristics, namely communication (communication skills), collaboration (cooperation), critical thinking and problem solving (critical thinking and

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problem solving skills), creativity and Innovation (creative and innovative). (Ellis, 2019). Language is an element of culture and is central to human communication and interaction (Lavy, 2020). Therefore, a person's language can be influenced by their cultural background (cultural identity) based on what they see, hear and feel. Culture will influence individual behaviour and has a large role in the development of individual understanding, including in language learning.

The importance of students' conceptual understanding at the high school level is currently not in line with the quality of their actual concept understanding abilities. The reality shows that the mathematics achievement of Indonesian students is still relatively low. TIMSS (Trends in International Mathematics and Sciences Study) as an international study in the field of mathematics and science carried out to find out and obtain information about

Mathematics and science achievements in participating countries reported that in 2019, the average mathematics achievement score of Indonesian students was ranked 379th out of 487 international scores (OCED, 2019). PISA (Programme Internationale for Student Assessment) which is a form of evaluating ability and knowledge in the fields of mathematics, science and language. In 2019, Indonesia's ranking for mathematics was 64 out of 70 countries. The low ability to understand students' concepts was also experienced by class X students at SMAN 11 Bone in understanding a given mathematical concept. This happens because the learning process is still monotonous, where so far students have only focused on the formulations in the textbook.

The monotonous learning process is one of the factors causing students' low ability to understand concepts, even though the teacher has used media in the form of a projector and interspersed with several question and answer methods, the final evaluation results still show students' low abilities (Dewi et al., 2022; Damayanti et al. ., 2022). This is also due to the lack of application of learning media that can stimulate students' thinking processes to solve mathematical problems. In fact, the application of learning media can increase students' interest and motivation in learning mathematics (Suripah and Susanti, 2022). One of the media that can be used in the learning process to improve students' ability to understand concepts in mathematics lessons is the traditional game maggurecceng which is unique and full of numeracy. However, so far no one has studied the maggurecceng game as a learning medium, especially in mathematics lessons regarding opportunities, so this research is a novelty that provides innovation in the world of culture-based education.

The application of local culture or wisdom in the mathematics learning process is known as ethnomathematics (Muslimahayati and Wardani, 2019; Arif and Mahmudah, 20220; Turmuzi, Sudiarta and Suharta, 2022). Mathematics learning needs to involve the culture around students so that it is meaningful and students can more easily understand the mathematical concepts they will learn in everyday life (Asfar and Asfar, 2021). The application of the maggurecceng game in this research will provide a picture of joyful learning for students as a form of ethnogames with ethnomathematics nuances. To facilitate the process of integrating traditional games, you can apply technology-based learning which

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is currently increasingly developing. Therefore, this research will integrate the traditional game maggurecceng as a learning medium in the form of 3D ethnogames.

2. METHOD

This type of research is a type of quantitative research with methodsquasi experimentaltypenon-equivalent control group design to describe and systematically search for improvements in students' understanding of concepts. Data collection techniques in this research include observation, tests and questionnaires in stagespre-test (giving initial tests to control and experimental classes), treatment (media ethnogames 3D through the gamemaggurecceng in the experimental class) and post-test (giving the final test to the control and experimental classes). This research is focused on increasing students' conceptual understanding abilities through playing maggurecceng based on 3D ethnogames. The data analysis used in this research was the normality test gain to find out how much students' understanding of ethnomathematics concepts has increased through media-based maggurecceng gameethnogames 3D before and after the implementation of learning.

3. RESULTS AND DISCUSSION

This research was carried out at SMA Negeri 11 Bone Parigi Jalan Andi Firdaus Petta Wawo, Pitumpidange Village, Libureng District, Bone Regency, South Sulawesi Province. This research was carried out to determine the increase in students' understanding of mathematical concepts, especially opportunity material, after applying media-based learning ethnogames 3D through the game maggurecceng. The following are the stages of game learning media maggurecceng based ethnogames 3D.

Table 1. Learning Stages

No	Syntax	Learning Stages
1.	*Maps*	This stage is the initial stage, namely group division, where the teacher prepares learning media and divides students into several groups. The process of forming groups is carried out so that students are able to discuss learning with other students.
2.	*Mattaro*	This stage is the second stage after stage *map*, namely the stage of the problem solving process. This stage aims to solve problems regarding the material that has been given. This stage emphasizes increasing students' understanding of concepts through games*maggurecceng* based *ethnogames* 3D.
3.	*Mangala*	This stage is the presentation stage. This stage aims to convey the results of discussions that have been obtained from each group member to equalize perceptions with other groups.

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No	Syntax	Learning Stages
4.	*Mabbage*	This stage is the evaluation stage. At this stage students solve problems regarding opportunity material through game media *maggurecceng* based *ethnogames* 3D as an evaluation of students' understanding of mathematical concepts. This stage aims to see an increase in students' understanding of concepts after applying game media *maggurecceng* based *ethnogames* 3D in the learning process.

Table 2. Results of Analysis of Students' Concept Understanding

Mark	Control	Experiment
Pretest	51,17	45,12
Posttest	70,35	90,65

From the table above, it can be seen that students' understanding of concepts has increased in the control class and experimental class. In the control class, the pretest score was obtained at 51.17. After being given treatment, the posttest score was 45.12. Meanwhile, in the experimental class, the pretest score was 70.35 and the posttest score was 88.65. From these data, it can be seen that both classes experienced an increase in students' ability to understand concepts. However, the increase in the concept understanding ability of experimental class students was more significant than the increase in concept understanding ability of control class students. This shows that the implementation of learning by integrating the 3D ethnogames-based maggurecceng game in the experimental class is more effective compared to group-based learning in the control class. Differences in students' conceptual understanding abilities can also be seen from the results of the analysis gain score which shows a percentage increase in the control class of 0.39 or 39% and the experimental class of 0.83 or 83%. As for the results of the analysis gain score Students' ability to understand concepts can be seen in the following

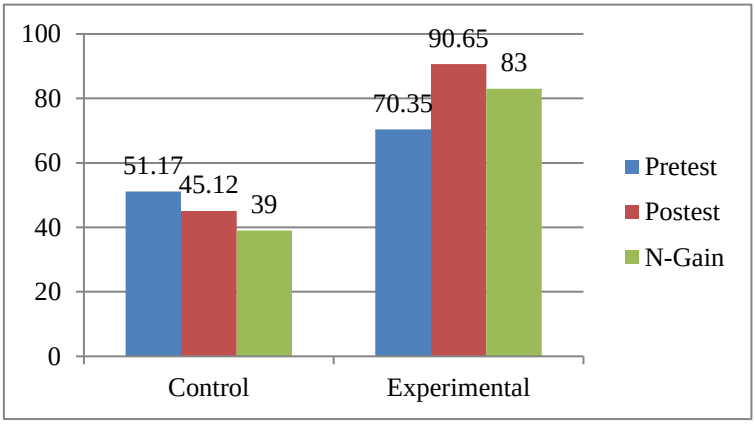

Figure 1. Students' Concept Understanding Ability

From the picture above, it can be seen that the students' ability to understand concepts is affected by the resultspretest shows that students do not understand the concept of the

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material provided. This happens because students are not yet able to understand and differentiate the probability materials for an event and find it difficult to apply them in learning activities. Apart from that, the low ability of students to understand concepts is caused by the learning process which is still monotonous, where so far students have only focused on the formulations in the textbook, even though the teacher has used media in the form of a projector and interspersed with several question and answer methods, but the final evaluation results still show low ability of students to understand concepts. This is also due to the lack of application of learning media that can stimulate students' thinking processes to solve mathematical problems. One effort to increase students' understanding of concepts is by implementing integrated learning media with traditional games maggurecceng which is unique and loaded with numeration.

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