ETHNOMATHEMATICS FOR ELEMENTARY SCHOOL STUDENTS IN KEBUMEN REGENCY USING CORN PLANT MEDIA

Abdul Aziz[1], Iswahyudi Joko Suprayitno[2], Rully Cahritas Indra Prahmana[3], Puguh Prasetyo[4]
Universitas Muhammadiyah Semarang[1,2]
Universitas Ahmad Dahlan[3,4]
Corresponding author : abdulazizrbg@gmail.com

Abstract. This article aims to find out design research and explore the potential for developing local culture-based learning methods for elementary school students in Kebumen district. This paper describes the concept of ethnomathematics-based design research at SD N Tambaksari, Kebumen Regency, Central Java in improving literacy and numeracy skills. Literacy and numeracy skills are indicators that need to be strengthened. The basic research design used is a research design that describes learning activities using local culture-based learning media or games with corn plants. The media used is by using food culture in the form of corn with abundant availability. The use of corn seeds is used by 2nd grade students of SD N Tambaksari to learn arithmetic operations. There are two aspects to be considered in this activity, namely literacy and numeracy. At the time of learning students are also invited to observe learning videos about arithmetic operations for further Based on these activities students are more active in participating in learning. Learning based on local food culture that can be applied in campus teaching programs to strengthen the literacy and numeracy aspects of students.

Keywords: design research, ethnomathematics, traditional games

INTRODUCTION

One of the most important learning is the elementary level. The purpose of this activity is to equip elementary school students about realistic mathematics approaches. Various activities carried out by prospective teachers who are included in this activity are expected to be able to improve the quality of an educational institution (Duran & Dökme, 2016). The diversity of prospective teachers is expected to increase the potential that exists in schools that may not have been optimally explored. Whether it's the potential of the students in the school or the school's resources that have not been worked out to the fullest. It is hoped that the presence of prospective teachers from various study programs in campus teaching activities as a means of ethnomathematical learning is expected to generate school potential and help schools improve the quality of education.

In addition, this activity places teacher candidates and teacher partners to innovate in design research activities (Levy & Petrulis, 2012) as well as technology adaptation. Elementary school students are an effort to boost the quality of education in Indonesia. In addition, technological adaptation also needs to be carried out in design research activities in

online learning (Skaggs, G. & Bodenborn, 2006). Of course, this also requires the readiness of equipment and skills in the use of technology. Especially for the category of elementary school students who are the next generation of the nation, which in the future, almost all aspects of life cannot be separated from the use of modern technology. Therefore, there is a need for technology-based learning as a form of student adaptation that grows and develops in line with technological advances (Berkowitz & Hoppe, 2009).

This design research activity also aims to strengthen social skills. These social skills are also important in social life. Students are not only cognitively proficient but also have empathy, communication, leadership, creativity, problem solving and are able to innovate regarding their competencies. This kind of ability needs to be developed for students who take part in the campus teaching program.

The ongoing ethnomathematical activities are one way that can be done to improve the quality of learning. The way that can be done is using ethnomathematical-based learning which so far has not been studied in depth, especially if it is associated with teaching campus programs in strengthening students' literacy and numeracy skills. Ethnomathematics here plays an important role in the learning aspect, because it is considered as contextual learning (Skaggs, G. & Bodenborn, 2006). Students are used to seeing the culture that is around them, of course, with this kind of thing, they can be used as learning media.

Local cultural wisdom that can be raised in learning media for teaching campuses is to use corn planting media. The district of Kebumen especially around SDN Tambaksari is an area that is quite easy to find corn and students often observe and also practice the process from planting corn to harvesting corn. The knowledge of traditional corn games owned by students can of course be used as a reference in the learning process. The corn media is expected to help strengthen the numeracy skills of the students of SDN Tambaksari in the independent teaching and learning program.

The study of local culture (food) in the teaching campus program at SDN Tambaksari Kebumen which is framed in ethnomathematics-based learning is expected to improve the quality of learning so that the goal is to strengthen aspects of literacy and numeracy as one of the indicators of national assessment. National assessment can be achieved. This is also in line with the Teaching Campus Program whose function is to strengthen literacy and numeracy skills as well as adapting the application of technology.

The national assessment is also focused on computational thinking which is in line with research (Zahid, 2020) and is also followed up in ethnomathematical activities regarding aspects of technology adaptation, where this activity can be applied to students to be able to have good computational thinking.

METHOD

This study uses a design research research scheme. The Research Design was chosen because in this case the method used is systematic and flexible and describes learning activities in the classroom with collaboration between prospective teachers and teachers to develop learning designs based on local food culture. This research design research is also combined with research design to determine the extent of students' knowledge level in participating in ethnomathematical-based learning. The development of learning designs is carried out in three stages, namely: initial design, experimental design, and retrospective analysis (Risdiyanti & Prahmana, 2018). The preliminary design activity aims to design a Hypothetical Learning Trajectory (HLT), and then refined at the design experiment stage. carried out at this stage in collaboration with the teacher to conduct a literature review related to number material and realistic mathematics education, which can be used in learning number patterns by utilizing local culture (food) corn which is abundantly available in Kebumen district in general. Curriculum design activities are used as the basis for designing learning trajectories and developing assumptions into HLT. In this aspect, the theory aims as a guide that will be corrected in each learning activity, so that it is flexible and can be revised during the experimental design stage.

At the experimental design stage, the learning trajectory that has been designed in the preliminary stage is then practiced in the learning process (Sundayana et al. 2017). The purpose of this activity is to explore and observe students' strategies and thoughts. There are two stages for the initial cycle, namely a pilot experiment which aims to evaluate and improve the learning trajectory that has been designed. The next cycle is an experimental learning that seeks to implement learning using the concept of corn for literacy, numeracy and technology adaptation activities.

The next stage is a retrospective analysis. The data collected in the experimental design stage is analyzed by comparing the conjecture and HLT with the results of the application of learning trajectory that has been carried out at the experimental design research stage (Artigue & Blomhøj, 2013). From these results, an overview of the learning trajectory of aspects of literacy, numeracy and technology adaptation will be obtained.

This research stage is supported by 7 prospective program teachers from different universities and study programs. The activities carried out by the seven students were using corn planting media in the learning process. Corn planting media and corn media are used to improve literacy and numeracy skills. The process of learning and playing corn which is carried out using planting media found in schools is used to strengthen the literacy aspect, which in this activity is implemented in grade 2 elementary school. Students are directed to discuss, make presentations, read books on how to plant corn and how to care for it. . Meanwhile, in the aspect of numeracy, corn kernels are used to teach arithmetic operations. Corn kernels that already exist are used as learning media.

The ethnomathematics-based learning process is also introduced to technological adaptation, using a laptop. This laptop is introduced to students about the components in

laptops and the features available in laptops and how to use them. Students are also introduced to Ms. Office, namely Ms. Word and Ms. Excel, here students are also invited to search for information on the internet using laptops related to learning corn planting media.

RESULTS AND DISCUSSION

The design research activities that emerged were preliminary analysis to determine student performance at the beginning.

Preliminary Analysis

Activity Description : On this occasion I filled in class 2 with Ka Sintami. This literacy and numeracy activity we designed with corn planting activities. Before the teaching and learning activities started, we started by praying first. Furthermore, in order to raise the spirit of the 2nd graders, Ka Sintami led the applause, which was then continued by singing planting corn, as the opening act of this corn planting activity. Furthermore, in the corn planting activity, students were given a glass of aqua each, then cotton as a planting medium, and continued to explain the technicalities for growing corn. Grade 2 students can practice individually so that it is more felt in practice. Then, students are invited to leave the class to fill the aqua glass that has been given a cap, then given water, in this session, students are assisted by Ka Sintami to fill the water in the aqua glass. Furthermore, students are given corn seeds, each student gets 3 seeds. The system, students lined up neatly, then I distributed corn kernels to each student. After getting corn seeds, students practice planting corn in aqua glass that already contains cotton and is given water. After students finish, return to class and then give the name of each aqua glass so as not to be confused. After the corn planting activity was completed, students were given a worksheet to do. In the upper part of the worksheet box, students are invited to tell about today's corn planting activities. Next, the lower part of the worksheet, related to numeracy, students learn how to play while sticking corn seeds in the box provided. In numeracy questions, numbers have been given above, so students just stick to the number of numbers given, then add them, and answer the question. After everything has been answered, both literacy and numeracy, each student is welcome to come forward and present their respective activities and work today. After the activity is finished, then it is closed by praying and students can go home.

Applying Experiments

The introduction of technology activities is still continuing the previous activities. On this occasion, students were introduced to the features of ms.word, one of which was insert. Students here practice how to insert images into word. Students use online inserts, or clip art. On this occasion, students freely want to choose what picture. From each group work together to solve this. Then, after choosing the image they like, the next task is to type and create a story from the selected image. For example, there is a group that chooses a picture of a beach, so the group tells a story about a beach, for example where the beach is located, what kind of atmosphere and so on. Each group works together to complete and make a story. Then students practice giving titles, and other features in Ms. Word is related to left, right, center or left-aligned paragraphs. Then in the title section students are introduced to BOLD,

giving the title in bold. After making the story, then each group tells the story they made. Next, students practice saving documents as before. In telling the story, then the students will give simple questions related to stories that have been told by other groups. So that students are expected to learn to listen when their friends are talking. After all groups have finished telling stories, the next activity is closing. Students are prepared to close open files, and practice turning off laptops. Then the students packed up their belongings and continued with praying to go home. As usual before going home, students are given a quiz, who can quickly answer the quiz, then the student goes home first. On this occasion, the quiz given is not related to numeracy but general knowledge, to assess students' insight into general knowledge, but the quiz questions given are still related to the subject being studied.

Retrospective Analysis

The activity of using technology for Grade 2 elementary school students can be seen in Figure 3. In the picture, students pay close attention to the devices and features on the laptop and also get to know Ms. Offices. Technology-based activities make students proficient in dealing with technological developments (Arbaugh et al., 2008).

Based on these activities, learning activities using interactive multimedia learning can increase students' learning motivation (Aditomo et al., 2013). Students are actively encouraged to take part in ethnomathematical-based learning with collaborative learning strategies (Skill, 2019). Local culture-based learning media that are often encountered by students every day can help the learning process contextually (Risdiyanti & Prahmana, 2018). Contextual learning can strengthen students' literacy and numeracy skills (Arisetyawan & Supriadi, 2020).

CONCLUSION

In ethnomathematics-based learning activities which are one of the independent learning activities, when in the learning process using corn plant learning media based on local culture can make students more active in learning about literacy and numeracy. This is a fairly important finding considering that it is still rare. local culture-based elementary school learning in mathematics learning. With a concept like this, it is hoped that students will feel happy and enthusiastic about learning, because what they often encounter around and are also easy to obtain for the forms of media will help students improve their literacy and numeracy skills. In the future, research subjects can be directed to students with a higher level of education and it can be done to develop assessments related to literacy and numeracy that can be used to determine students' overall abilities.

REFERENCES

Aditomo, A. *et al.* (2013) 'Inquiry-based learning in higher education: Principal forms, educational objectives, and disciplinary variations', *Studies in Higher Education*, 38(9), pp. 1239–1258. doi: 10.1080/03075079.2011.616584.

Arbaugh, J. B. *et al.* (2008) 'Internet and Higher Education Developing a community of inquiry instrument : Testing a measure of the Community of Inquiry framework using a multi-institutional sample', *The Internet and Higher Education*. Elsevier Inc., 11(3–4),

pp. 133–136. doi: 10.1016/j.iheduc.2008.06.003.

Arisetyawan, A. and Supriadi, S. (2020) 'Ethnomathematics study in calendar system of Baduy tribe', 7(1), pp. 25–29.

Artigue, M. and Blomhøj, M. (2013) 'Conceptualizing inquiry-based education in mathematics', *ZDM - International Journal on Mathematics Education*, 45(6), pp. 797–810. doi: 10.1007/s11858-013-0506-6.

Berkowitz, M. W. and Hoppe, M. A. (2009) 'Character education and gifted children', *High Ability Studies*, 20(2), pp. 131–142. doi: 10.1080/13598130903358493.

Duran, M. and Dökme, I. (2016) 'The effect of the inquiry-based learning approach on student's critical-thinking skills', *Eurasia Journal of Mathematics, Science and Technology Education*, 12(12), pp. 2887–2908. doi: 10.12973/eurasia.2016.02311a.

Levy, P. and Petrulis, R. (2012) 'How do first-year university students experience inquiry and research, and what are the implications for the practice of inquiry-based learning?', *Studies in Higher Education*, 37(1), pp. 85–101. doi: 10.1080/03075079.2010.499166.

Risdiyanti, I. and Prahmana, R. C. I. (2018) 'Desain Hypothetical Learning Trajectory Dalam Pembelajaran Rotasi Menggunakan Motif Batik Kawung', *Prima: Jurnal Pendidikan Matematika*, 2(1), p. 19. doi: 10.31000/prima.v2i1.411.

Skaggs, G .& Bodenborn, N. (2006) 'Relationship Between Imlementing Character Education, Students Behavior, and Students Achievment', 18(1), pp. 82–114.

Skill, C. T. (2019) 'International Journal of Educational Methodology Testing the Effectiveness of Interdisciplinary Curriculum-Based Multicultural Education on Tolerance and Critical Thinking Skill', 6(1), pp. 43–55. doi: 10.12973/ijem.6.1.43.

Sundayana, R. *et al.* (2017) 'Using ASSURE learning design to develop students' mathematical communication ability', *World Transactions on Engineering and Technology Education*, 15(3), pp. 245–249.

Zahid, M. Z. (2020) 'Telaah kerangka kerja PISA 2021 : Era Integrasi Computational Thinking dalam Bidang Matematika', *Prosiding Seminar Nasional Matematika*, 3(March 2020), pp. 706–713. Available at: https://journal.unnes.ac.id/sju/index.php/prisma/.