Realistic Mathematics Learning Model Through Traditional Game

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Abstract. The objective of this study is to produce realistic mathematics learning models through traditional games, secondly to preserve a culture that has been largely abandoned and replaced with modern games. This study explores a learning model consisting of; students, traditional-games, and learning materials. It starts by analyzing the needs of students about a subject matter of learning that is less than the standard of competences, specifically identifying and designing traditional games that correspond to the subject matter to be developed. The results of this study are expected to be an alternative for students to get to know culture while learning and reduce student dependence on console games to foster student social enthusiasm. The results of this study in the form of research products include; 1) guidebook and supporting media, 2) learning tools and 3) teaching materials.

Keywords: RME, Traditional Games

1. Introduction

Education as a means of student interaction at school becomes the last attempt that can be done to reduce from the influence of information technology modernization by applying a learning model that can protect and preserve culture by applying a traditional game-based learning model. The era of globalization encourages us to use technology in all things digital-based life and continues to develop to obtain and find the latest technology [1]. Technology is a brilliant concept to simplify matters more easily and efficiently. Technology helps many people both in the health sector, manufacturing industry, education and so on, however the use of inappropriate technology products has a terrible impact on life such as social degradation that threatens the awareness of the younger generation. Young children's ability to use digital technology shows that mere possession at home and children use computers does not guarantee the development of computer literacy and/or information literacy skills[2]. This adds to the public norm if left unrestrained.

If we return to the concept of technology simplifying life affairs to be more effective and efficient, then not all digital technology is better than analog technology. Analog technology is better at keeping every activity moving more physically, which can have a positive impact on health. In RME is seen as a human activity, so learning activities use real context and appreciate students idea [3]. The current phenomenon, the younger generation has forgotten the best and most environmentally friendly technology called culture. Culture is the work of technology before the era of digital technology was invented, it is the work of human thought that is kindhearted to the social life of the community, furthermore, maintaining public awareness about the importance of direct socialization without intermediaries or the media. It is important for teachers to empower students’ intellectual ability through RME and games in order that meaningful and contextual learning [4]. Many traditional games...
of culture that are not recognized by children recently because they have switched to use modern games using a PC, Tablet, Smartphone, etc. The use of realistic mathematics education (RME), should be considered to improve the quality of mathematics instruction[5]. One learning approach that can be used as a realistic approach to learning mathematics is applying traditional games. This realistic mathematical learning model can help students to be able to understand the material directly while getting to know a culture that they never get in the community and can also decrease the solitary activity of children playing gadgets or another similar device [6].

1.1 Overview Traditional Games

Generally traditional games are carried out together. This makes children capable to interact with peers and the surrounding environment to develop the child's social sense, in addition, other benefits of traditional games can foster imagination, cooperation and friendship to shape the child's character to mutual respect, care and responsibility. Opportunities to meet other people can influence the behavior of children to be able to understand the character and attitudes of others. The Children's relationships currently require healthy interactions between one another so that they can provide positive benefits to a child's mental growth. Local culture-based learning models and inquiry approaches that can have a positive effect on improving understanding of pedagogical theories [7]. Gather with peers and work out something useful that can support school lessons by playing while learning. Traditional games are always performed in groups or at least two people. These games can be accomplished outdoors or indoors. The Character of the game that is organized outside tends to require more people and more levels of physical activity, while the game indoors is done more by sitting and fewer movements. Before the game starts to retain sportsmanship, the members draw to determine who starts first, this draw can use coins, tos or local said 'gamsut or gambreng' with the purpose of children indirectly learn many things such as mutual respect, responsibility and maintain order during the game. During play, the members of the game must obey the rules, and agreement in each round of the game is finished.

One of the most popular traditional games for children in ancient times is 'engklek'. Engklek is a traditional game of jumping on a surface (floor) on which it is drawn to resemble a shape figure (box, triangle, etc.) then jump with one or two from one plane to the next [8]. To draw a field usually use chalk to draw a field on the floor. This game is performed by a minimum of two people. The players must determine who first plays by means of by 'gamsut' (if only two players) and 'gambreng' (if more than two players) [9].

1.2 Overview RME

Realistic Mathematics Learning presents a contextual problem that can be linked to educational games based on local excellence [10]. Learning material in realistic mathematics learning is developed from everyday life situations that are from what students have heard, seen or experienced [11]. Teaching technique with the use of Realistic Mathematic Education contributed significantly to the development of mathematical competence of young children [12]. Characteristic of RME: The use of context ‘real world’ for students, the use of models to help students achieve higher understanding, the use of students constructions, natural interactivity in the learning process between students and teachers students with students and, associations with various mathematical unit/ topics [13].

2. Methods

The research method applied to obtain appropriate results for users are to use research and development methods by involving experienced experts to validate or provide improvements and solutions to problems that arise at this stage of development [14]. With this method, it is expected to produce a learning model that can be applied to the learning process in accordance with the expectations and eligibility criteria of a learning model. Development steps; (1) collecting information is needed to find out the extent of students' introduction to traditional games. Students will be grouped by region or region with the reason that each region has its own regional game. (2) Planning learning designs together with experts based on the findings of the preliminary study. (3) Validation of model
designs that are already in draft form or initial prototype. (4) Revision or improvement based on the results of a review of experts, as shown in the following flowchart;

**Figure 1. Flowchart Research Design**

3. Result

3.1. How to Play

- Children are gathered to create an engklek playing field by drawing a pattern on the floor, then determining the number of players followed by taking a draw to fix the starting player. Every child must have a 'katuk / kreweng', which is usually in the form of broken tiles, floor tiles or even flat stones for marking of the area.

- The first participant jumps on the pattern field according to the rules as shown by figure 2. Markers are thrown to one of the surfaces drawn on the ground, the area where it is not allowed to be stepped on / occupied by every other player. The player who completes one round first throws the ‘katuk’ by turning his back on the ‘engklek’, if it fits in the desired surface, then the area will be its ‘territory’, meaning that the player in question can step in the surface with two feet, while other players may not step on it during the game. The participant who has the most ‘territory’ is the winner.

**Figure 2. Child Playing ‘Engklek’[15]**

After finish playing ‘engklek’, students back to the room for figuring the pattern, student be able to create new model of pattern and to be used for the next game as shown by figure 4. Student encouraged to analyst all the pattern to find another geometry shape as presented by figure 5.

**Figure 3. Pattern**
Figure 4. Pattern engklek

Figure 5. Geometry Shape

Next step, students' also find the scale of respective shape and combine all the pieces to determine whole area of 'engklek'. Student learning through realistic model mathematics performed creativity, logical analyst and interest showed by following the data as presented by table 1.

Table 1. student mathematics learning data

|                | RME Model | Without RME Model |
|----------------|-----------|-------------------|
| Creativity     | 80%       | 70%               |
| Logical Analyst| 87%       | 79%               |
| Interest       | 95%       | 80%               |

* 30 students as sample

The data was collected from the students that combined between learning through model realistic mathematics and without RME, the result show student creativity higher 80% then student learning without RME, they produce more complex pattern of 'engklek'. Student also discover many combination shapes to create new model geometry, it can be seen by the score logical analyst 87%
compare to 79% lower. The most impression finding from the research is showed by exciting student learn through realistic mathematics model, student show 95% interest gets the lesson through playing while learning.

4. Discussions
So the conclusion is several things, namely: 1) the use of realistic mathematics learning model is shown to have a positive impact on learning, but it takes educators who are creative enough to innovate every learning; 2) Research products intended to have outcome such as; (1) guidebook and supporting media, (2) learning tools and (3) teaching materials, however those need further research development; 3) There are a few ideas that can be realized, that is getting support from the management of schools for further development.

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6. References
[1] B. Bimber, A. Flanagin, and C. Stohl, Collective action in organizations: Interaction and engagement in an era of technological change. Cambridge University Press, 2012.
[2] N. Mikelić Preradović, G. Lešin, and M. Šagud, “Investigating parents’ attitudes towards digital technology use in early childhood: A case study from Croatia,” Informatics Educ., 2016, doi: 10.15388/infedu.2016.07.
[3] S. Watan and Sugiman, “The Van Hiele theory and realistic mathematics education: As teachers’ instruction for teaching geometry,” AIP Conf. Proc., 2018, doi: 10.1063/1.5054479.
[4] T. Laurens, F. A. Batlolona, J. R. Batlolona, and M. Leasa, “How does realistic mathematics education (RME) improve students’ mathematics cognitive achievement?,” Eurasia J. Math. Sci. Technol. Educ., 2018, doi: 10.12973/ejmste/76959.
[5] B. Tanujaya, R. C. I. Prahmana, and J. Mumu, “Mathematics instruction, problems, challenges and opportunities: A case study in Manokwari Regency, Indonesia,” World Trans. Eng. Technol. Educ., 2017.
[6] T. Laurens, F. A. Batlolona, J. R. Batlolona, and M. Leasa, “How does realistic mathematics education (RME) improve students’ mathematics cognitive achievement?,” Eurasia J. Math. Sci. Technol. Educ., vol. 14, no. 2, pp. 569–578, 2017.
[7] S. Julita, Sudarwan, and A. F. Dwi Anggoro, “The Local Culture-Based Learning Model to Improve Teaching Abilities for Pre-Service Teachers,” in Journal of Physics: Conference Series, 2019, vol. 1179, no. 1, doi: 10.1088/1742-6596/1179/1/012058.
[8] Admin, “Traditional game: Engklek (Setatak/Tejek-tejekan/Marsitekka),” https://www.anakmandiri.org/, 2016.
[9] S. Dewi, “Engklek, a Traditional Game I Like,” www.santidewi.com, 2016.
[10] M. N. Indriani, “Pembelajaran Matematika Realistik Dalam Permainan Edukasi Berbasis Keunggulan Lokal Untuk Membangun Komunikasi Matematis,” Pros. Semin. Nas. Mat., 2018.
[11] S. Ningsih, “Realistic Mathematics Education: Model Alternatif Pembelajaran Matematika Sekolah,” J. Pendidik. Mat., 2014, doi: 10.18592/jpm.v12i2.97.
[12] S. Papadakis, M. Kalogiannakis, and N. Zaranis, “Improving Mathematics Teaching in Kindergarten with Realistic Mathematical Education,” Early Child. Educ. J., vol. 45, no. 3, pp. 369–378, May 2017, doi: 10.1007/s10643-015-0768-4.
[13] A. Treffers, Three dimensions A Model of Goal and Theory Description in Mathematics Instruction - The Wiskobas Project. 1987.
[14] J. P. G. Meredith. D. Gall, Walter R. Borg, Educational Research, 6th ed. New York:
[15] A. C. Putri, “PHOTO: Reminisce with Traditional Games at National Culture Week,” www.liputan6.com, 2019.