10 (1) (2021) 28 - 34

Journal of Physical Education, Sport, Health and Recreations

http://journal.unnes.ac.id/sju/index.php/peshr

Can Numeration Ability Be Enhanced Through Physical Activity of Traditional Tabak Games?

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Article History

Received 18 February 2021
Accepted February 2021
Published February 2021

Keywords:
Numeration; Physical Activity; Traditional Tabak Games

Abstract

The purpose of this study was to develop traditional tabak games into playing and learning media for elementary school students' Mathematics learning. The research method used is a product development activity, so this type of research includes research and development. In the R&D research model chosen, the research and development model developed by (Gall Borg & P). Based on the stages of the research that has been carried out, the results of this research are a discovery in learning physical education and learning mathematics based on culture which is packaged in traditional Tabak games, and the advantages of this research result are made in video form and can be accessed easily via YouTube account. The conclusion in this study is that the traditional game of tabak based on numeracy skills is a discovery in learning mathematics and physical education based on culture which is packaged through tabak games. This research innovation makes it easier for elementary school students to understand mathematics learning, especially arithmetic material, and can be applied through physical education learning and students can play independently and in groups in the student's neighborhood. This product can help to enrich the cultural knowledge of West Kalimantan and increase physical activity.

How to Cite

Hidasari, F. P., Bafadal, M. F., & Yani, A. (2021). Can Numeration Ability Be Enhanced Through Physical Activity of Traditional Tabak Games?. *Journal of Physical Education, Sport, Health and Recreation,* 10 (1), 28-34

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p-ISSN 2460-724X
e-ISSN 2252-6773

INTRODUCTION

Physical activity and play are activities that are necessary for elementary school-age children. Active behavior and more energy that children have tend to make children unable to stay still for a long time. For children to feel facilitated in expressing and exploring themselves, the learning process must be more dynamic, monotonous activities will give a sense of boredom and loss of motivation to learn. That's because play is a necessity for children, just as a necessity to work for adults. Physical activity can be in the form of traditional games, which can improve physical, mental, affective, and social health (Dehkordi, 2017)

Learning models in elementary schools must be able to adapt to the characteristics of their students. A lot of data released the low math ability of Indonesian children, including the results of the 2018 Program for International Student Assessment (PISA) which put Indonesia in position 73 (Hewi & Saleh, 2020), ranked seventh from the bottom with a score of 379 from the OECD average. 489. Although the test was conducted on students at the secondary school level, mathematics learning began in elementary school.

Seeing the above results are in line with the basic problems in this study : 1) Elementary school children still think that learning mathematics is a difficult thing so that many are less interested and not happy with mathematics. Many methods and models of learning mathematics still exist that have not shown positive results (Hariastuti, 2017).

This situation encourages teachers to be more creative in managing mathematics learning in the classroom (Setiawan et al., 2018). For the results of the learning process to be measured, evaluation is needed. Learning methods to play and get out of the classroom to learn can be an alternative activity by not eliminating the essence of learning itself. (Ucus, 2015) states that games help children developing knowledge, skills, and values to become active participants in the class and even in society. In essence, the teacher has an important role when children experience the learning process through play. When the teacher chooses the right game that fits the learning objectives permanent learning outcomes can be obtained, and children can find enjoyment and interest in learning. Children who enter the realm of concrete operations will find it more difficult to concentrate on abstract concepts. that is why immersing games in the learning process is always prepared for children at the elementary school level.

In recent times, games have become important in learning as there have been many studies between playing time and learning outcomes, one of which is a study conducted by Francois (Trudeau & Shephard, 2008) which states that cross-sectional observations show a positive Relationship between academic performance and physical activity, but physical fitness does not show the same data. Physical activity has a positive effect on concentration power, memory, and classroom behavior. Data from a quasi-experimental study found experimental assistance on cognitive function, in essence, there is a positive relationship between physical activity and intellectual performance. The results of other studies (Resaland et al., 2016) state that there is no significant impact between physical activity and academic performance in general, but in the numeracy category there is a significant increase or impact on children with low abilities. So that integrating physical activity and numeracy might be a good model to stimulate children's willingness to learn in some elementary schools.

The mathematics learning phase starts from playing, searching for forms, representation, symbolization, and formalization. Then, (Vetter et al., 2020) concluded from the results of their study on the effectiveness of physical activity in mathematics learning and concluded that there was no detrimental impact on physical activity, the results of the study showed that an increase in math ability and MVPA (Moderate Vigorous Physical Activity). Traditional games in this case are physical activities that are very close to children amidst the influence of smartphones/gadgets. (Petersen et al., 2016) Currently, smartphones and the applications in them have changed the way humans live, work, and communicate, and children are also affected by this change. The physical activity approach of traditional games to preserve traditional games as part of the rich cultural elements in Indonesia to become a useful heritage is a secondary objective of this research.

The urgency of this study is based on the difficulties experienced by students in learning and the low quality of mathematics learning outcomes of elementary school students so that researchers use traditional tabak physical activity as an approach in improving students' mathematical abilities because the promising strategies to increase physical and academic activity are by integrating it into learning (Vazou et al., 2018). Referring to Piaget's theory that at the age of 7, children enter a concrete operational stage, where

children have been able to solve concrete (actual) problems. Children can think more logically than before because at this point the children can consider something. Then it is necessary to provide appropriate methods and treatment to students according to their characteristics.

METHODS

The research method used is a product development activity, therefore, this type of research includes research and development or abbreviated as R & D. In the R&D research model chosen, the research and development model developed by (Gall et al., 2015) includes 1) potentials and problems, 2) literature studies and information gathering, 3) designing initial product drafts, 4) design validation, 5) design revision, 6) product manufacture, 7) initial (limited) field test, 8) initial product revision, 9) main field test, 10) major product revision, 11) operational field test, 12) final product revision, and 13) dissemination and implementation.

Data collection techniques in the early stages, namely literature study and information collection using; 1). observation techniques, 2). indirect communication, and 3). documentation.

At the design and development stage of the product draft, the respondents were divided into two groups. The first group is 4 experts (expert judgment) consisting of 2 physical education teachers and 2 mathematics teachers, the first group is intended to assess the suitability of the product draft made, evaluate the product development process, and provide suggestions on the product draft that has been made. The first group applied data collection techniques with indirect communication techniques.

The second group is elementary school students in Pontianak City, the second group is intended to test product acceptance. In the second group, data collection techniques were applied using observation and documentation techniques.

Data collection tools at an early stage are literature study and information collection using; 1). observation sheet to determine conditions in the field, 2). questionnaires for teachers, 3) observations for students, and 3). documentation.

At the design and development stage of the product draft, the respondents were divided into two groups. The data collection tool for the first group (experts and participant teachers) is a questionnaire to get the value and validation of the product draft developed including props, videos (content, appearance, and clarity), and manuals (content, book format, and syntax).

The second group is elementary school students in Pontianak City, the second group will use product development in learning so that the results of observations will be used to test the effectiveness of the product by users.

The data will be analyzed based on the type of data. The initial stage of data analysis will use qualitative descriptive analysis. Qualitative descriptive analysis is used because it can interpret the information obtained from the results of expert evaluations and field observations using observation sheets and questionnaires with elementary school teachers.

In the design and development stage of the product draft, several methods will be used, namely; 1) at the stage of the initial product draft design validation, quantitative descriptive analysis was used to interpret the assessment data from the experts and qualitative descriptive analysis was used to interpret the data from the experts' suggestions, 2) at the field trial (development) stage, a quantitative descriptive analysis approach and experimental methods would be used.

RESULTS AND DISCUSSION

Design Validation Stage

At this stage, the construct validation method is used for the research product design. The researcher together with the expert judges reviewed the draft that was made in the Focus Group Discussion (FGD) activity to then proceed to the limited public trial stage on September 11, 2020. The teams involved in the Focus Group Discussion (FGD) were the chairman and members of the researcher. , 2 Physical Education teachers from SDN 20 SouthPontianak and SDN 28 North Pontianak and 2 Mathematics teachers from Bruder Melati Elementary School Pontianak Kota. At this stage, an instrument is also produced to measure the arithmetic operation ability of students.

At this stage, there are changes to the video layout, manual book systematics, and the addition of prayer activities and opening greetings to the video in the early stages before the game starts and closing greetings at the end of the video.

The following is a **Table 1** of the results of product design validation by experts.

The initial product design is given to the experts to assess its feasibility by giving a score on the initial product design assessment rubric. There were 2 experts involved, namely physical education experts and mathematicians.

Based on **Table 1** above, the expert valida-

tion value is 64 or 83% if the percentage is present. This means that the product design is considered very good in terms of the four aspects of the assessment, namely the video display gets a 90% assessment, the clarity of language use gets a 100% assessment, the clarity of the purpose and substance of the material gets an assessment of 94.28%, and the tools used to get a 75% assessment.

Table 1. Results of Product Design

Assessment Aspects	∑value	∑maximum value	%	Category
Video Display	36	40	90	Very Good
Clarity of Language	35	35	100	Very Good
Clarity of purpose and substance of material	33	35	94.28	Very Good
Tools used	15	20	75	Good
∑ Total	199		359.28	
X	29.75		9.82	Very Good

Limited test phase

In the limited testing phase, a test was conducted at one of the elementary schools in Pontianak. At this stage, the researcher plans for: (a) test results for product acceptance by students, (b) data collection on a small scale. The following are the results of product acceptance by students. The data source was taken by direct communication/interview method, this was done because the research subjects had not been **Table 2.** to process information in written form.

The product acceptance test is carried out to determine and measure the acceptance level of products made to users, namely lower grade elementary school students. The results obtained from the respondents were 8 out of 10 people stated that the product was made attractive, 10 out of 10 people said the product made could provide joy, and 7 out of 10 people agreed that the product provided convenience and could help solve calculation operation problems.

Table 2. Student Acceptance Test Results

∑N	Aspects assessed Maximum	value	Maximum Value	%	Information
10	Interesting products	8	10	80	Very Good
	Generates excitement	10	10	100	Very Good
	Make it easier to learn arithmetic operations	7	10	70	Good
∑ Total		25	30	250	
X		8.33		83.33	Very Good

The following shows **Table 3** the results of the small/limited trial:

Table 3. Results of Small-Scale Trials in Students

∑N	Aspects assessed Maximum	Value	Maximum Value	%	Information
10	Research implementation	44	50	88	Well done and conducive
	Knowledge test achievement (arithmetic operation questions)	84	100	84	
∑ Total		128	150	172	
X		64		86	

The **Table 3** above explains that at the small-scale trial stage 88% of the circumstances and conditions in the implementation of the research went well and under control. After treatment

with the physical activity model of traditional games, then the knowledge test performance is measured by using integer arithmetic operations. Based on the table above, shows that as many as 84% of the questions could be answered correctly by students.

Operational trials

The following is an operational scale trial result **Table 4**.

Table 4. The Results of the Operational Scale Trial on Students

∑N	Aspects assessed Maximum	Value	Maximum Value	%	Information
15	Research implementation	47	50	94	Well done and conducive
	Knowledge test achievement (arithmetic operation questions)	85	100	85	
∑ Total		132	150	179	
X		66		89.5	

The **Table 4** above explains that at the large-scale trial stage 94% of the circumstances and conditions in the implementation of the research went well and under control. After treatment with the physical activity model of traditional games, then the knowledge test performance is measured by using integer arithmetic operations. Based on

Description	Average	Difference average	P Value 0.05	Information
Limited Test	64	-2	0.031	Sig.
Operational Test	66			

Final product revision

Improvements made in the final stage include completeness of information from the accompanying video and manual. Some things that need to be added are the existence of information about faculties and universities.

And the final result of this research product is a traditional tabak game video based on numerical abilities. This video contains the understanding, history and rules of the game, the procedure for calculating the number of wins. And this video has advantages, namely that it can be accessed easily via a YouTube account and can be played at school and in the student's neighborhood. Below are some images of the numerical ability-based tabak video game.

Figure 1. Video preview

Figure 2. One form of tabak game

Figure 3. Rules of tabak game

This research produces a learning video that is packaged into a traditional tabak game combined with arithmetic operations in elementary school children. From the 7 stages of developing this product, traditional mathematics learning-based tabak games can be accepted by physical education teachers and mathematics teachers.

This product is the result of an integration between increasing physical activity and learning to count as well as developing local culture by applying the traditional tabak game. The current systematic review found evidence to suggest that there is a positive association between physical activity, fitness, cognition, and academic achievement (Donnelly et al., 2016).

This tabak game based on mathematics learning applies the concept of playing while learning which is useful for improving mathematics learning outcomes in elementary school students (Haryati, 2019). The results of the study (Hraste et al., 2018) show a dominance of the synergistic effect of the cognitive and motor components of the central nervous system, compared to the cognitive component alone, without considering the motor component. This research is strengthened by research (Muzdalipah & Yulianto, 2015) which shows that community activities such as traditional games contain elements of mathematics learning such as counting, measuring, making designs. And traditional games also contain elements of congruence, comparisons of numbers and relations and contain cultural values (Risdiyanti & Prahmana, 2018). Traditional games can also improve physical education learning outcomes in elementary schools (Ardhika, 2015; Hidasari et al., 2021), and traditional games in physical education learning for elementary school students in a sub-district of Brangsong Kendal are classified as good and suitable for elementary school students (Husain, 2014). This research is a discovery in physical education learning and mathematics learning based on culture which is packaged in traditional tabak games and the advantages of this research result are made in the form of videos and can be accessed easily via a youtube account.(https://www.youtube.com/watch?v=eqMHAskH9c)

So that with this research innovation it can make it easier for elementary school students to understand mathematics learning, especially arithmetic material, and can be applied through physical education learning and students can play independently and in groups in the environment where students live.

CONCLUSION

The conclusion in this study is that the traditional game of tabak based on numeracy skills is a discovery in learning mathematics and physical education based on culture which is packaged through tabak games. This research innovation makes it easier for elementary school students to understand mathematics learning, especially arithmetic material, and can be applied through physical education learning and students can play independently and in groups in the student's neighborhood. This product can help enrich the cultural knowledge of West Kalimantan and increase physical activity.

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