Pre-service Elementary Teachers: Analysis of Mathematics and Physics Concepts with Traditional Games in Sundanese Ethnomathematics Learning

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Abstract. *Endog-endogan* and *engklek* are traditional games used in Sundanese ethnomathematics learning. This game has many mathematics and physics ideas for elementary school teacher education students to explore and apply in lectures and science. This research goal is to discover the ideas of mathematics and students' physical and positive responses in the traditional *endog-endogan* and *engklek* games. This study used quantitative research with survey methods. The research subjects used were 56 students. Data collection tools with observations and questionnaire data were analyzed Rash model. The results show that this game's main concepts of mathematics and physics are subtraction, integer and fraction operations, pressure, work and energy, parabolic motion; momentum and impulses; and rigid body stability. Student responses are positive because they can improve understanding of math and physics concepts.

Keywords: Sundanese · Ethnomathematics · Learning

1 Introduction

The youngsters had a great equal education in mobile and offline games traditional. On the other hand, when the perception of the people in charge of the study is considered, they perceive that the children understood the concepts better when using the traditional method [1]. Mathematics and science learning with mobile and traditional technologies [2] will be more actual if students are actively elaborating on connecting local culture because the concept of learning mathematics and science that is formed is valuable in solving everyday problems.

One method to realize the learning of mathematics and science is with ethnomathematics, mathematics with culture [3]. Sundanese ethnomathematics is one way to connect Sundanese culture in East Jawa, Indonesia, with mathematics [4–6]. One of the cultures that can be used is the traditional Sundanese game which can support solving problems of learning difficulties in mathematics in mathematical science understanding skills. This article aims to describe the effect of using mobile applications and traditional games

A. Doyan et al. (Eds.): ICSES 2022, APR 8, pp. 186–190, 2023.
https://doi.org/10.2991/978-94-6463-232-3_19

for Sundanese ethnomathematics learning on understanding elementary school teacher education with students offline and online in the COVID-19 pandemic.

2 Methods

This study used quantitative research with survey methods. The research subjects used were 56 primary elementary teacher students. Data collection tools with observations and questionnaires. Mobile and offline game traditional learning was used, then give eight questionnaire items on mathematics and physics concepts as instruments adapted to Sundanese ethnomathematics learning with *Endog-endogan* and *Engklek* games. Data were analyzed Rash model: person and item reliability and item measure.

3 Result and Discussion

The resulting is the consequences of observation about connecting *endog-endogan* and *engklek* ide with mathematics and physics concepts: (Fig. 1).

1. The Sundanese ethnomathematics learning *endog-endogan* and *engklek* games make it easier for students to understand addition and subtraction operations on natural numbers and integers and concepts.

2. The ethnomathematics of Sundanese *engklek* and *endog-endogan* games make it easier for students to understand Parabolic Motion, Rigid Body, Equilibrium, Work and Energi, Momentum, and Impuls, this finding is corroborated by [7] (Table 1).

Then elementary school teacher education students were given a questionnaire to get data about their understanding of concepts in mathematics and physics (Fig. 2).

Cronbach's alpha value (measuring reliability) = 0.92 logit which means very good. And for the Person Reliability value of 0.73 and Item Reliability of 0.83, the situation be able to be decided that the constancy of the responses from the respondents is quite good, and the excellence of the items in the instrument is upright (Fig. 3).

The measure is the item logit value; item P8, with 1.77 logits, designates the item most problematic for respondents to agree on in the connection questionnaire instrument,

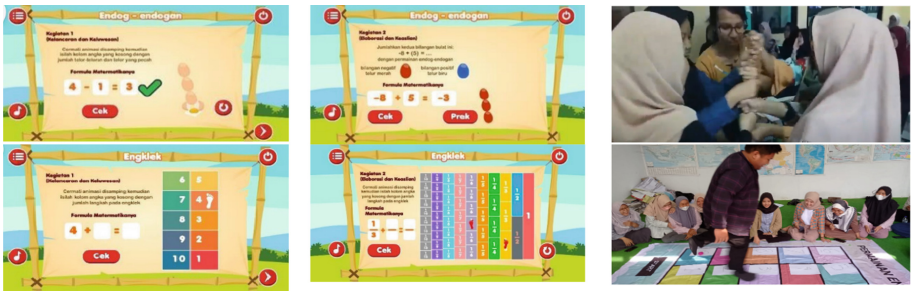

Fig. 1. Sundanese Ethnomathematics Learning with mathematics concept

Table 1. Sundanese Ethnomathematics Learning with physics concept

Physics Concepts	Activity	Description and Theory
Parabolic Motion	Flinging *gaco* toa swath	Once *gaco* is mixed, players must control the first speed of the *gaco,* which is accustomed to the ribbon to speak.
Rigid Body Equilibrium	Stand on one leg on both swaths without falling	Once a participant is on each ribbon, the player must stand on one strongest leg and not fall.
Work and Energy	Jumping since one swath to another	Once a participant successfully hurdles a ribbon, the participant wants a disgusting power that determination touches the participant's drive.
Momentum and Impuls	*Gaco* hitting additional *gaco* in a swath or tile.	Once a participant tosses a *gaco* on a ribbon and successes an additional participant's *gaco.* The change in momentum (impulse)

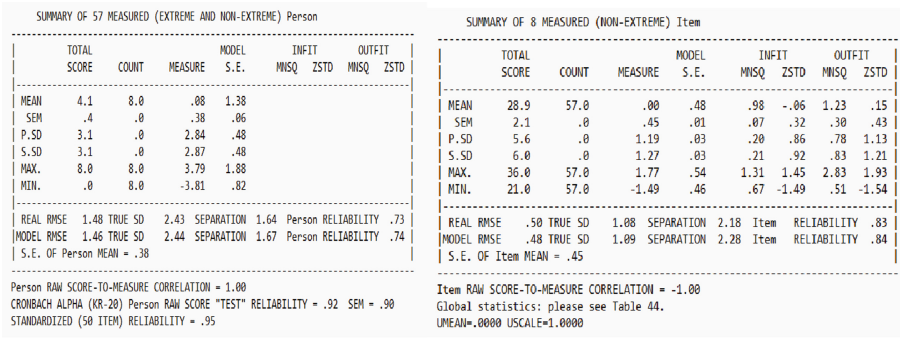

Fig. 2. Reliability Person and Item

while items P1 and P6, with −1.49 logit, are the easiest items to approve. The influence of this study is to deliver new information that many mathematics and physics ideas can be traveled from the *endog-endogan* and the *Engklek* game. This Connection between math and physics concepts can surely be combined into ethnomathematics and science education, which has much help for students. This result can also create a fun learning atmosphere while at the same time preserving traditional games that are now preliminary to be wild, and this finding is corroborated by [7, 8].

ITEM MEASURE (KONEKSI) - Notepad

File Edit View

TABLE 13.1 C:\Users\user\Documents\Dikti Pak Sup ZOU972WS.TXTs Oct 9 2022 19: 1
INPUT: 57 Person 8 Item REPORTED: 57 Person 8 Item 2 CATS MINISTEP 5.1.7.0

Person: REAL SEP.: 1.64 REL.: .73 ... Item: REAL SEP.: 2.18 REL.: .83

Item STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	JMLE MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEASUR-AL CORR.	PTMEASUR-AL EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item
8	21	57	1.77	.54	1.25	.89	2.83	1.93	.76	.81	80.0	83.9	P8
2	24	57	1.00	.49	.90	-.33	.65	-.67	.83	.81	80.0	80.0	P2
7	24	57	1.00	.49	.86	-.49	.89	-.08	.82	.81	86.7	80.0	P7
3	27	57	.34	.46	.67	-1.49	.51	-1.54	.85	.81	83.3	77.5	P3
5	28	57	.13	.46	1.05	.28	.91	-.14	.80	.80	73.3	76.8	P5
4	35	57	-1.27	.46	.87	-.58	.67	-.58	.79	.77	80.0	75.4	P4
1	36	57	-1.49	.46	.94	-.24	2.18	1.78	.75	.76	83.3	75.7	P1
6	36	57	-1.49	.46	1.31	1.45	1.19	.51	.72	.76	70.0	75.7	P6
MEAN	28.9	57.0	.00	.48	.98	-.06	1.23	.15			79.6	78.1	
P.SD	5.6	.0	1.19	.03	.20	.86	.78	1.13			5.1	2.8	

Fig. 3. Item Measure

4 Conclusion

Elementary school teachers' mathematical and physics concept educates students through Sundanese ethnomathematical learning to facilitate understanding of mathematics and physics.

Acknowledgments. The authors recognize elementary teacher students of Universitas Pendidikan Indonesia Serang campus and Indonesia as healthy as the Directorate of Higher Education Ministry of Education, Culture Research and due to permit and funding this study.

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