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Movement and Sports Activities through Games to Enhance the Skills of Creative Thinking and Quality of Learning Process for Children Aged 14–15

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Działania ruchowe i sportowe poprzez gry w celu podnoszenia umiejętności twórczego myślenia i jakości procesu uczenia się dla dzieci w wieku 14–15 lat

Streszczenie

Badanie dotyczy rozwijania ćwiczeń ruchowych poprzez gry, celem wzmocnienia kreatywnego myślenia uczniów. Aby osiągnąć cel nauczania przedmiotu sportowego i zdrowotnego, nauczyciele

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mogą zastosować opcjonalne metody kształcenia. Sprawdzono to przy użyciu eksperymentalnego projektu badawczo-rozwojowego o nazwie The Posttest-Only Control Group Design. Analizując jakość procesu uczenia się, wykorzystuje się technikę analizy ilościowo-opisowej opartą na kwestionariuszach Formative Class Evaluation (FCE). Stwierdzono, że wynik wykonania wszystkich wskaźników wynosi 89%. W małej grupie wskaźnik prawdopodobieństwa jest mniejszy niż 0,05%, czyli 0,000, a wskaźnik FCE 89,35%. W dużej grupie – 0,000, a kategoria FCE wynosi 85,26%. Konieczne jest prowadzenie badań nad rozwijaniem uczenia się ruchów wzmacniających twórcze myślenie, wykonywanych w czasie gier. Wpływ na kreatywne myślenie uczniów – zarówno tych z grupy testującej projekt, jak i grupy kontrolnej – ma także przenoszenie ćwiczeń pomiędzy grami. Bazując na FCE, można stwierdzić, że jakość uczenia się jest ważna dla zatrudnienia, a zdaniem ekspertów istotne jest wdrożenie całości projektu.

Słowa kluczowe: ruchome działania, kreatywne myślenie, jakość uczenia się, edukacja, sport.

Abstract

The study aims to develop mobile exercises through games to strengthen students' creative thinking. To achieve the goal of learning a sports and health subject, teachers may use optional teaching methods. It is carried out using an experimental research and development project called The Posttest-Only Control Group Design. When analyzing the quality of the learning process, a quantitative descriptive analysis technique based on Formative Class Evaluation (FCE) questionnaires are used. The implementation rate for all indicators was found to be 89%. The small group shows a probability index of less than 0.05% or 0.000 and an FCE index of 89.35%. The large group reveals 0.000 and the FCE category is 85.26%. It is necessary to research developing the activity of learning the movements performed by games to strengthen creative thinking, another influence on the creative thinking of students from both the product test group and the control group is the transfer of exercises through games. Based on FCE, it shows that learning quality is important for employment, and according to experts, the entire product design is also important to apply.

Keywords: moving activities, creative thinking, quality of learning, education, sport.

1. Introduction

The development of education is getting much more advanced for realizing highly competitive graduates. The increasing population surely makes the world of education encouraged to provide highly creative graduates for the tough competition. It includes the education of physical, sport, and health. The importance of the case said in the [11] explaining the need for capable, flexible, adaptive, initiative, and independent generations. They are also required to have social and cultural skills and the productivity, accountability, responsibility tradition, leadership mindset as well head to the advanced technology development. Moreover, as stated in *Tough Choices or Tough Times National Center on Education and the Economy (2007)* creativity plays a very important role in the high technology era and the world of contemporary occupations.

To create creative students, it is necessary to commence the available learning process. Krathwohl states that the higher capability is creative and it is developed

through the learning process of any fields of study [9]. Figure 1 says that creativity takes place at the top.

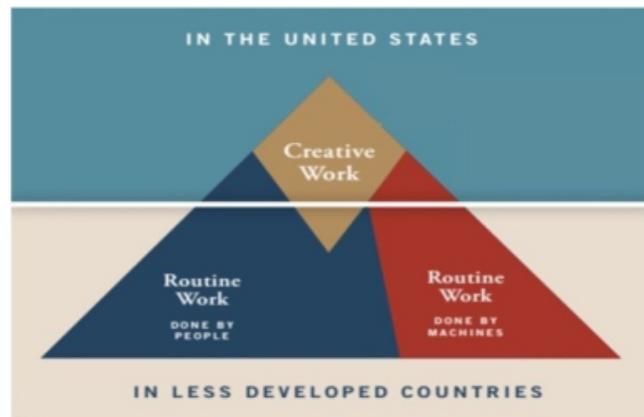


Figure 1. The position of creativity

Source: *Tough Choices or Tough Times* National Center on Education and the Economy, 2007.

The high quality of the learning process is inseparable from the well-designed curriculum. It functions as the main consideration in the learning process. It also guides the teachers in performing their tasks. The curriculum formulated in Indonesia is expected to enhance the students' creativity, critical mind, communicative competence, and collaborative works in the learning process [4]. According to Carroll; Trilling & Fadel it is necessary to transform the old into the new skills and create a new standard based on the old for the new expectations [2], [14]. To realize the so-called aspects, the schools are expected to support the transformation.

The creative students must be the focus of today learning process and the teachers, including the sport and health teachers, should make it come to reality. Referring to the Law of Indonesian Government No. 14/2005 on the Teachers and Lecturers; The Government Regulation No. 19/2017 on the Teachers say that the teachers of sport and health must have some competencies, namely: 1) personal competency, meaning that they are healthy, responsible with societies and the government; 2) professional competency, referring to the ability to perform their jobs related with their profession; 3) pedagogic competency, referring to the ability of teaching and developing the students; and 4) social competency, referring to the ability to appreciate the students, maintaining the relation among the other teachers, and keeping a sound contact with societies.

It is well known that each student has distinctive various ways of learning based on their development phase and historical learning. Therefore, it is necessary to present the best-fit and best-practice method of learning [12]. High moves and skills may be achieved by encouraging students to do much more practices and designing time-based learning. The other related ideas are also proposed by

[13] that the teacher of sport and health plays a very important role in designing the instructional for the students' motoric skills.

To make the goal of the learning process of sport and health subject achieved, the teachers may employ some optional methods of learning. Some of them are formulated in the Curriculum 2013 focusing on the scientific model, problem learning, problem-solving, inquiry, contextual and project [1]. Particularly, sport and health subject is taught with the popular model of TGFU (*Teaching Game for Understanding*) perceived as one of the teacher-centred approaches [8]. The other one that may be also employed is TPSR (*Teaching Person Social Responsibility*) in which highly competent and skilful teachers are required [5].

The study brings fort a particular activity or interview related to the employment of methods and process of learning. Some of the sport and health teachers based in 10 schools in Jombang are deeply interviewed. It is identified that 1) most of the teachers perform a direct model of learning focusing on providing a teacher-model as the type to be followed; 2) the materials are mostly presented individually without any collaboration, especially for the material of athletic and aerobic; 3) the materials are rarely provided with the games-approach; 4) most of the students keep sitting on the line waiting for a turn rather than following the given model; 5) the teachers have never performed any efforts leading to encourage and develop creative thinking. Based on the so-called ideas and reasons, the study on developing the learning activities of moves performed through games for enhancing creative thinking is necessary to conduct.

Based on the explanation above, the research question is whether moving activities can significantly affect students' creative thinking. This research will do a post-test and pre-test to investigate the assessment before and after moving activities. The study is aimed at developing moving activities through games to enhance the students' creative thinking. The product of development contains the moving activities of sport through games for enhancing the students' creative thinking. The strengths of the model are: 1) providing a stimulus for the students' creative thinking; 2) attracting the students' interest to perform moving activities; 3) the students may perform physical moves easily and happily; 4) the teachers may share a contextual learning experience.

Achieving the instructional objectives depends on the teachers' competencies and their strong will. The failure in understanding the curriculum surely affects the effectivity of teaching and learning. Therefore, they must have some important elements, such as (a) content knowledge; (b) basic pedagogy; (c) content knowledge of pedagogy; (d) knowledge of curriculum; (e) knowledge of learning contexts; (f) knowledge of the students and their characteristics; (g) knowledge of learning on the effective, interesting objectives, and ability to motivate the students to actively participate in any learning activities of the subject.

2. Research Method

The study is development research with pre-test and post-test design. Development research is defined as being designed for a product and a new procedure [6]. The phases contain testing the group, evaluating, and sorting for specific, efficient, and qualified criteria close to the standard. In addition, Gall & Borg propose ten phases in this case, such as (1) the research commences with collecting information containing the previous studies, classroom observation, preparing report of the main issues; (2) planning performed by defining some skills, formulating the goals, defining the sequence of teaching activities, and testing the small scales; (3) making an introductory book by preparing the materials, providing the guidance book, and preparing the instrument of evaluation; (4) introductory testing for 1–3 schools or 6–12 subjects; (5) revising the main product under selected recommendations of the test result of the introductory group; (6) testing the main group of 5–15 schools or 30–100 subjects; (7) revising a product based on the recommendations of test results of the main group; (8) testing group including 10–30 schools with 40–200 subjects; (9) revising the final product; and (10) making the final report on the product in a journal cooperating with a publisher for distribution and commercial publication [6].

The subject of the study consists of two teachers of physics, sports, and health of the State Junior High School in Jombang, three experts of learning (one of them a lecturer at the Universitas Negeri Surabaya and two lecturers of Universitas Negeri Malang), and some from the seventh-year-students of the State Junior High School 1 Diwek, Jombang. Two classroom-students are needed for testing the small group. One is for product testing and the other for control. For testing the large group, four classroom-students are needed, two are for product testing and the other two are for the control. The data is analyzed using SPSS 20 aimed at looking into the different effects of each group supported with *The Posttest-Only Control Group Design: Appropriateness* use to the appropriateness of the materials with the objectives, appropriateness with the students' characteristics; *Validity* use to the adequacy of material components, the updated-materials and the depth of materials; *Attractiveness* use to types of play, and the materials encourage the students' development; *Importance* used to enrich the students' knowledge, enhancing the students' skills, increasing the learning quality, and making the objective is easily achieved; *Applicability* use to best practice for the teachers, no need of expensive types of equipment, and no need of difficult adjustment of procedures for the students; and *Average of percentage*. To investigate the quality of the learning process, the technique of quantitative descriptive presented in the form of percentage and the form of Formative Class Evaluation is used. The technique is used for the data collected from the

questionnaire of testing the small and the large group. The formula used to analyze the data as stated below:

Table 1. Analysis of Percentage of Expert Evaluation and Subjects of Testing

Percentage	Category	Notes
80–100%	Very good	Used
66–79%	Good	Used
56–65%	Fair	Used
40–55%	Not Bad	Changed
<40%	Bad	Changed

3. Results

3.1. Need Analysis

The data collected in the process of learning are 1) the learning model used by the teachers is a direct model in which the teachers provide a model followed by the students; 2) there is no particular problem to solve, if any, they are not encouraged to discuss it and collaborate for the solution; 3) there is no specific approach for the materials, especially those for athletic and aerobic; 4) particularly for the big ball games, they are not instructed to join the games, but they just stand on line for turn making their move limited; 5) the materials containing aspects of encouraging them to think creatively are not given.

3.2. Product Specification

Based on the need analysis, the process of product development is performed through the games to encourage creative thinking. The following is the product made as to the outcome.

- 1) Volleyball play

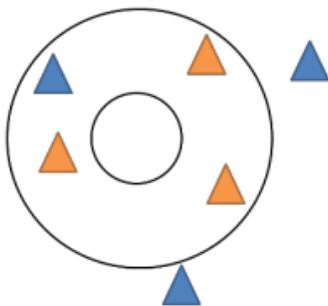


Figure 2. Rounded-Volleyball

Source: the researcher.

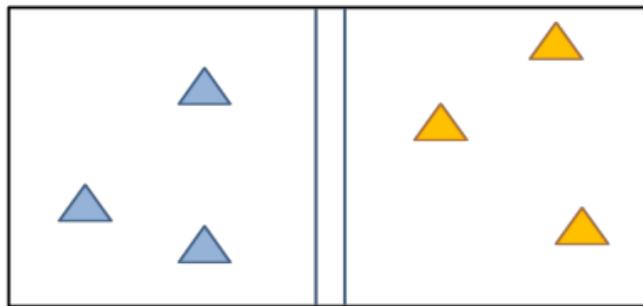


Figure 3. Connected Volleyball

Source: the researcher.

2) Basketball play

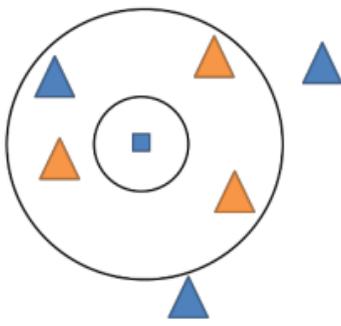


Figure 4. Rounded Basketball

Source: the researcher.

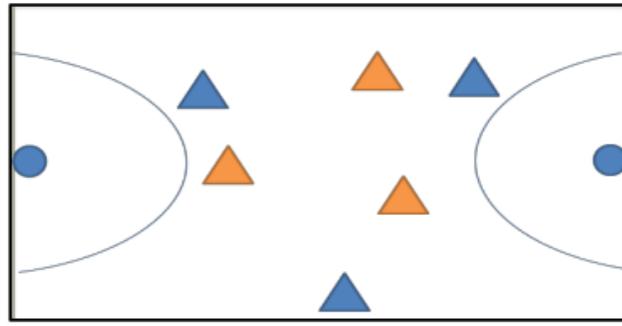


Figure 5. Basketball with 2 balls

Source: the researcher.

3) Football game

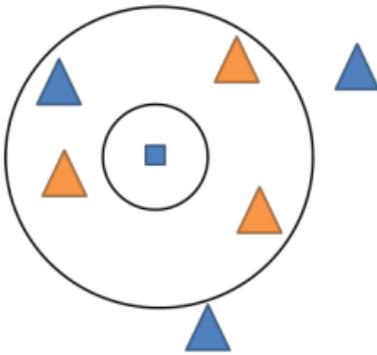


Figure 6. Rounded Football

Source: the researcher.

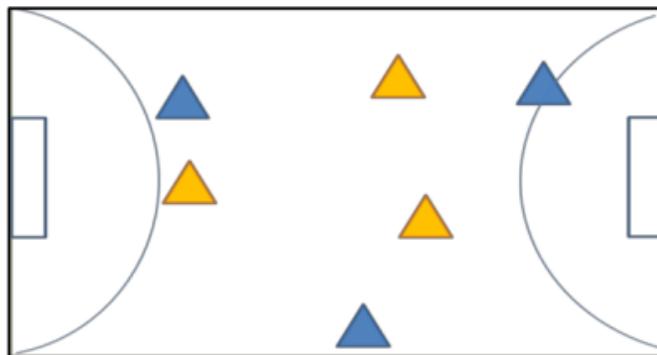


Figure 7. Football with 2 balls

Source: the researcher.

The three games above are played with the court modification, but the moves and the goal to achieve are similar. The students are divided into small groups with a small court, then they are given the right to make their own rules of the game. Finally, they come to the match. The teachers' roles are the facilitators, guiding them more for play and even giving more inputs for the better leading to creative thinking. At the end of the play, they should give any suggestions, encouragement and rewards to them.

3.3. The Result of Expert Test

The product of moving activity through games for enhancing creative thinking skills and the learning process of 14–15-year-old students are tested below. The test is done under expert evaluation. It is also done for the small group

and the large group. Each of the experts of teaching and learning is from – Universitas Negeri Malang, Universitas Negeri Yogyakarta, and Universitas Negeri Surabaya. The experts' review concerns appropriateness, validity, attractiveness, importance, and applicability as presented below.

Table 2. The Result of Expert Evaluation

INDICATORS	The Results	Descriptors	Results
	%		%
Appropriateness	92.5	Appropriateness of the materials with the objectives	90
		Appropriateness with the students' characteristics	95
Validity	88.33	Adequacy of material components	75
		The updated-materials	90
		The deepness of materials	100
Attractiveness	87.5	Types of play	75
		The materials encourage the students' development	100
Importance	85	Enriching the students' knowledge	75
		Enhancing the students' skills	100
		Increasing the learning quality	85
		Making the objectives easily achieved	80
Applicability	93.33	Best practice for the teachers	100
		No need for expensive equipment	80
		No need for difficult adjustment of procedures for the students	90
Average of percentage	89		89

Source: own research.

The result of an expert review on the appropriateness of the materials and the students' characteristics is 92.5%. The validity of play related to the updated-materials and the deepness is 88.33%. The attractiveness of play related to the type of play and the ability to encourage the students' development is 87.5%. The importance of play related to the students' enrichment of knowledge, skill enhancement, learning quality, easiness in achieving the objectives is 85%. The applicability of play related to best practice for teachers, adequacy of the types of equipment, and procedural easiness is 89%. Finally, in the view of the experts, the product design is valid to come to further steps of testing.

3.4. The Small Group Test

The subject for the test is one-classroom of students (24 students) of the State Junior High School 1 of Diwek, Jombang for the product test, and another

classroom from the same school is also prepared for the control test. The test is aimed to look into the effect of activities of play on the students' creative thinking and the learning process. The design used for the so-called term is The Posttest-Only Control Group Design, known as the research design containing two groups of treatment and a control group. Having analyzed the data related to normality and homogeneity, the researcher analyzes the comparative aspects to investigate the difference between the groups. In short, the difference is also presented in the following tables.

Table 3. Data Descriptions for Small Group Test

State Junior High School Diwek	N	Mean	Std. Deviation	Std. Error Mean
Testing product	24	87.21	5.48	1.12
Without product	27	73.11	6.07	1.17

Source: own research.

Table 4. The Result of Small Group Test

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Equal variances assumed	8.66	49	.000	14.09	1.63	10.83	17.37
Equal variances not assumed	8.72	48.98	.000	14.09	1.62	10.85	17.35

Source: own research.

Based on the selected data, it is described that the average product test of the group is 87.21 and 73.11 of the control group. The result also indicates that the probability rate of the product test is less than 0.05, and that is 0.000. It means that the null hypothesis is rejected but the research hypothesis is accepted. Thus, there is an effect of movement activities through games on the students' creative thinking. Based on the data collected from the questionnaires of *Formative Class Evaluation*.

Based on the above tables, the items may be explained that 1) the result containing the impressive experiences, skills, and knowledge is 91.67% of the sample of 24 students; 2) the indicator of wills containing eagerness and fun in the process of learning is 85.42% of the sample of 24 students; 3) indicator of the method containing fresh of learning and effort of learning, and cooperation explained in FCE for quality of learning are 89.35%. Those indicate that the product design on the view of the experts and the subjects of a small group are mostly valid for further phases.

The test needs four-classrooms of students of the State Junior High School 1 of Diwek, Jombang. Two of them are prepared for the product test, and the other two are also prepared for the control test. The data collected from the large group is analyzed related to the normality and homogeneity, the researcher analyzes the comparative aspects to investigate the difference between the groups. The differences are presented in the following tables.

Table 6. Data Description of Large Group Test

		Group Statistics			
	Product Test	N	Mean	Std. Deviation	Std. Error Mean
Results of Test	Product Test	52	83.52	6.45	.895
	Without product	54	66.58	6.47	.879

Source: own research.

Hypothesis test

If probability ≥ 0.05 , the Hypothesis accepted

If probability ≤ 0.05 , the Hypothesis rejected

Table 7. The Result of Large Group Test

Independent Samples Test								
	t-test for Equality of Means						95% Confidence Interval of the Difference	
	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper	
	Equal variances assumed	13.50	104	.000	16.95	1.25513	14.46	19.43
Equal variances not assumed	13.50	103.86	.000	16.95	1.25508	14.46	19.43	

Source: own research.

The above table indicates that the average of the product test of the large group is 83.52% and the control group is 66.58%. The result also indicates that the probability rate of the product test is less than 0.05, and that is 0.000. It means that the null hypothesis is rejected but the research hypothesis is accepted. Thus, there is a different effect of movement activities through games on the students' creative thinking in the group of product test and the control group. Based on the data collected from the questionnaires of *Formative Class Evaluation*, it is presented as follows.

Table 8. The Result of *FCE* Questionnaires Analysis of Small Group Test

Components	%	Items of Question	Number of items	N	Y	T	TT	Y %	T %	TT %
Results	85.9	Impressive experiences	1	52	141		8	90.38		5.13
		Skills	2	52	141		8	90.38		5.13
		Knowledge	3	52	120		22	76.92		14.1
Wills	83.65	Eagerness	4	52	117		12	75		7.69
		Kesenangan	5	52	144		6	92.31		3.85
Method	75	Fresh of learning	6	52	117		24	75		15.38
		Efforts of learning	7	52	117		24	75		15.38
Cooperation	96.15	Efforts of learning	8	52	153			98.08		
		Learning to cooperate	9	52	147		4	94.23		2.564
	85.18	Average						85.26		7.692

Notes:

N: Number of sample for a small group test

Y: Optional answer "Yes" of the question asked

T: Optional answer "No" of the question asked

TT: Optional answer "I don't know" of the question asked

Source: own research.

Based on the above tables, the sample of 52 students reveals that 1) the results containing the impressive experiences, skills, and knowledge are 85.9%; 2) the indicator of wills containing eagerness and fun in the process of learning is 83.65%; 3) the indicator of the method containing fresh of learning and effort of learning is 75%, and 4) attitude to friends and cooperation is 96%. The explanation of questionnaires of *FCE* for quality of learning gets 85.26%. Those indicate that the product design in the view of the experts and the subjects are valid to be used.

4. Discussion

Designing and making the product of movement activities through games for enhancing the students' creative thinking surely needs a relatively long time and

meets some weaknesses. The developed product is revised for improvement under expert considerations and recommendations and tested through the small and large groups. It is being revised for a final product. There are some revisions recommended by the experts, namely: 1) the play should be focused on the type of dependent thinking; 2) the adequacy of time and limitation of time for play should be defined; 3) the implementation of learning should be systematically constructed extending from the lower to higher level of difficulty or from the simple to the complicated one.

The product may be practised as one of the models of learning the subject of physics, sports, and health especially in the State Junior High School 1 Diwek, Jombang. The project-based learning for such a subject at the school makes the team unified and guarantees the continuance of practice for better results in the competition between groups. There are some core aspects to be enhanced through games of the sports, such as health, biological potentials under the evaluation of anthropometric index, physiological and functional, motorial capacity, the relation of psychosocial and social integration [3]. Moreover, Hastie & Peter state that the play with a cooperative learning strategy may develop a higher level of thinking, positive social behaviour, and encourage motivation and involvement [7]. Besides, the plays of innovation, target, striking, speed and net supported with planning, modification and identification of steps performed through discussion and interaction between groups are considerably urged to be a development of creative approach [10].

The product of development contains the moving activities of sport through games for enhancing the students' creative thinking. The strengths of the model are: 1) providing a stimulus for the students' creative thinking; 2) attracting the students' interest to perform any moving activities; 3) the students may perform physical moves easily and happily; 4) the teachers may share a contextual learning experience.

Achieving the instructional objectives depends on the teachers' competencies and their strong will. The failure in understanding the curriculum surely affects the effectivity of teaching and learning. Therefore, they must have some important elements, such as (a) content knowledge; (b) basic pedagogy; (c) content knowledge of pedagogy; (d) knowledge and curriculum; (e) knowledge of learning contexts; (f) knowledge on the students and their characteristics; (g) knowledge of learning on the effective, interesting objectives, and ability to motivate the students to actively participate in any learning activities of the subject.

5. Conclusion and Suggestion

5.1. Conclusion

The product of moving activity through games for enhancing creative thinking skills and the learning process of 14–15-year-old students are mostly best fits and best practices. The product is designed and made throughout a few phases, namely: (1) collecting information; (2) designing the product; (3) making the introductory product; (4) expert test; (5) revising product; (6) testing small group; (7) revising product; (8) testing large group; and (9) revising the final product. The results of the expert test, small group test, and large group test are explained as follows: Expert Test (The total rates of indicators say 89%), Small Group Test (The average rate of product test of the small group is 87.21 and the control group is 73.11), Large Group Test (The average rate of the product test of a large group is 83.52% and the control group is 66.58%).

Generally, based on the explanation of the test results and questionnaires of FCE for learning quality, the product design on the view of the experts and the subjects of tests may be implemented (best fit and best practice).

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