

# Identifying the Factor Structure of Physical Education Learning Model and its Effectiveness in Improving the Character Values of Students

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**Abstract:** The primary purpose of this study is to explore and confirm the factor structure of physical education learning model, which is discipline, hard work, and cooperation. Also, this study aims to test the effectiveness of physical education learning model among elementary school students. This study is designed using a combination of quantitative and qualitative data analyses. A total of 302 respondents have participated in this study, which consists of 50 teachers and 252 elementary school students. The data collected using interviews and self-administered questionnaire. The instrument has validated by seven experts using Delphi and Aiken methods. The data analysed using Explanatory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The reliability tested by using the correlation coefficient interclass (ICC). The results of this study showed that the physical education learning model consists of 3 components, namely physical activity (K), facilities and equipment (L), and language, pictures, and book design (M). By using the paired t-test, the study found that the physical education learning model (discipline, hard work, and cooperation) is effective. Also, this study indicated that there is a significant difference before and after the implementation of the physical education learning model on character values among students.

**Keywords:** Physical education, learning models, character values, discipline, hard work, and cooperation.

## Introduction

Crisis of character is a universal issue faced in this modern era. As the foundation of human behaviour, the character plays an important role that characterises a person and the nature of human. All efforts have been made by the government to ensure the society have good characters. It can be possessed by every human being, both individually and communally. Childhood is a critical time in the development of mental attitude [1]. Sports activities are correlating with character development [2]. It consists of a mini volleyball game and divided into two categories, i.e. personal and social characters. Personal characters consist of discipline, hard work, honesty, responsibility, courage, and communication. While, the social character contains cooperation, respect for friends and opponents [3]. Sport is an appropriate source of conveying character values, with direct application in the field [4]. One of the purposes of sports activities is to develop character [5]. Its activities are a great power to enrich or explore, develop, and display good character in young children [6].

There are two types of characters often to be developed in a sports environment, namely social character and moral character [7]. Effective character education is carried out at home and schools, where parents and teachers become the models of good moral character [8]. Four areas in developing character in a person include hard work, relationships, self-control, and empathy [9]. Discipline in a classroom is the current issue and involves not only teachers and school staffs, but also school members. Naturally, discipline can be accustomed to the child through their daily activities [10]. Spray (2002) stated that for making children disciplined in learning, teachers should be able to manage the climate or conditions of student learning in the physical education learning process [11]. In a team sports game, teamwork is needed for the success of the team [12]. Kao (2019) stated that team cohesiveness could be improved in physical education learning, for example, using SEM (sports education model) [13]. Teamwork is an individual's ability to work in a team, which is very important and needed in all fields [14]. For creating teamwork, it is necessary to have a strong bond and a culture accustomed to them to achieve a strong bond [15]. Physical education learning needs to be done with group work methods to strengthen themselves as individuals in teams directly and try to work together with colleagues in teams [16].

Elementary school children in recent decades experience lack of movement, obesity, mental weakness in their downtime and free time [17]. For this reason, schools must be a place to promote physical activity through physical education [1]. Furthermore, Palmer (2012) said that work activity should be done with sincerity to reduce the risk of work or activities [18]. The character value of hard work or fighting spirit can be formed through physical activities or sports as well as in physical education where moral behaviour is instilled, in which each student does material or learning with maximum effort [19]. Also, the physical education aims to form the child's movement skills, shape attitudes and instills character values [20]. Physical and sports education is also expected to train children to have a

strong mentality. Facing trials such as challenging learning materials to make students can fight fatigue and fight themselves, while habituation makes students get used to them [21]. In learning processes, hard work is not only a domain of students, but teachers are also expected to make efforts in dealing with some students who have special needs or concerns [22].

Habit or routine is an activity carried out repeatedly by someone. Habit characteristics can be seen in cognitive, motivational, and neurobiological abilities [23]. If there is a change in the environment, individual's routines or habits will also be affected, so that someone will make efforts to habituate again [24]. Habit can also be defined as a choice regarding something important, in which every day after will be continuously done but not correctly being put a lot of thought into [25]. Habit or routine can construct experience, and it needs to be understood by everyone that human life in a community jointly acts [26]. Nine forms of habit or routine include habit as tic; habit as neural networks; habit as conditioned responses; habit as addiction; habit as single, everyday activities; habit as routine; habit as custom, ritual, rite, or ceremony; habit as a character; and habit as habitus [27].

Changing a habit or routine requires understanding and effective approaches so that bad habits or bad routines, such as smoking and drinking alcoholic beverages, are not adapted to prevent the dangers that will occur later after the adaptation of bad habits [28]. Someone can also use the concept of habit or routine as an effort to change their behaviour or maintain the passion of the current behaviour to stay or persist [29]. This study proposed to habituate character values, including discipline, cooperation, and hard work through volleyball games in the physical, sports, and health education subject in elementary schools. Every learning material in the mini volleyball game indirectly makes children get used to being disciplined, work together, and work hard.

Activity Theory developed by Leont'ev (1978) stated that activities should facilitate for analysis; keep the quality; consciously by objects; dynamically change when conditions change; internal and external elements fused together; the smallest unit of analysis; impossible to be separated from their contexts; relate with artefacts or other activities; useful to develop research, and explain the sociocultural theory. Activity is a human activity carried out with a specific purpose [30]. Hashim & Jones (2007) stated that the main key to the activity theory is that there is a conscious understanding, and it is shaped by the experience and subjectivity of human consciousness [31]. Activity system has six core components, including subject, object, tools, community, rules, and worker division (Foot, 2014). Social influence greatly affects individual activities, while a collection of individual activities will later form a system of activities [32]

## **Methodology**

This study involved as much as 50 physical education teachers and 252 students. Physical education teachers are public or private elementary schools, and either civil servants or honorary employees. The age of students in this research was between 10-12-years old, both male and female spread across five districts in Yogyakarta, Indonesia, with different areas of urban, and rural. The sampling technique in this research uses proportional random sampling.

Several instruments used in this study are First, the instrument for exploring initial information/need assessment. This test instrument used unstructured interviews with the workgroup of 30 physical education teachers. Second, the instrument for evaluating the model draft using Delphi method or Expert Test and involving seven experts. Third, instruments to assess the draft model when testing/implementing the model used questionnaires and qualitative input from the teacher/assessor. The last, instruments for testing the effectiveness of character habituation (discipline, hard work, and collaboration) through the learning model of volleyball game materials using assessment rubrics or authentic assessment in testing the validity of the effectiveness instruments using the Delphi method.

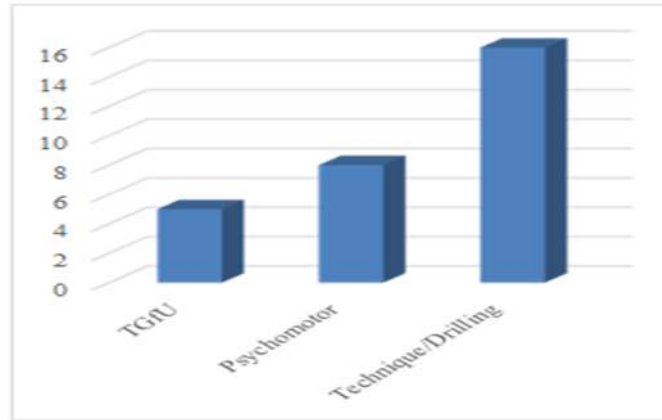
## **Data Analysis**

The data analysed using the combination of qualitative and quantitative approaches. The qualitative approach was used to analyse the data collected from the interview and validated process with experts. Further, the quantitative approach uses exploratory and confirmatory factor analysis. Also, to examine the effectiveness of the learning model on character improvement was done using an experimental test, namely pre and post-test. The authentic assessment rubric in this research is consistent with the stance that the problems inappropriate education evaluation should use authentic assessments which initially requires the performance of exemplary tasks [33].

Authentic assessment has been proposed as having the potential to enhance student learning in preparation for a changing world [34]. Authentic performance assessment involves the whole section consisting of instructional cycles and formative feedback from teachers and fellow students, to help students understand the strengths and weaknesses of students, and students can identify areas of growth and movement of their abilities [35].

**Results**

The results of the interview with 30 physical education teachers in elementary schools can be seen in the following Figure 1.



**Figure 1.** The result of interviews through a related physical education learning model

Figure 1 displays there are three types of learning models applied by educator, namely tactical approach (TGfU), psychomotor and drilling. There are five teachers, or 16.7% teacher used tactical approach (TGfU), the psychomotor approach is eight teachers or 26.7%, and the drilling approach is 16 teachers or 53.3% in their learning processes. The conceptual model of physical education learning explicitly for developed volleyball learning, as seen in Figure 2.

The conceptual model and the technical guidelines for implementing the model were initially carried out using Aiken V calculation.

In this test, the experts assessed five items in the model development of the volleyball game materials to improve the character values (discipline, cooperation, and hard work) including Item 1 (The purpose of the learning model); Item 2 (Character values and physical activities in volleyball games); Item 3 (Learning model); Item 4 (Facility size); and Item 5 (Authentic valuation items). The results of content validity, as seen in Table 1.

**Table 1.** The result of content validity using Aiken V

Evaluator	Item 1		Item 2		Item 3		Item 4		Item 5	
	Score	s	Score	s	Score	s	Score	s	Score	s
A	0	0	1	1	1	1	1	1	1	1
B	1	1	1	1	1	1	0	0	1	1
C	1	1	1	1	1	1	1	1	1	1
D	1	1	1	1	0	0	1	1	1	1
E	1	1	0	0	1	1	1	1	1	1
F	1	1	1	1	1	1	1	1	1	1
G	1	1	1	1	1	1	1	1	0	0
Σs	6		6		6		6		6	
V	0.857		0.857		0.857		0.857		0.857	

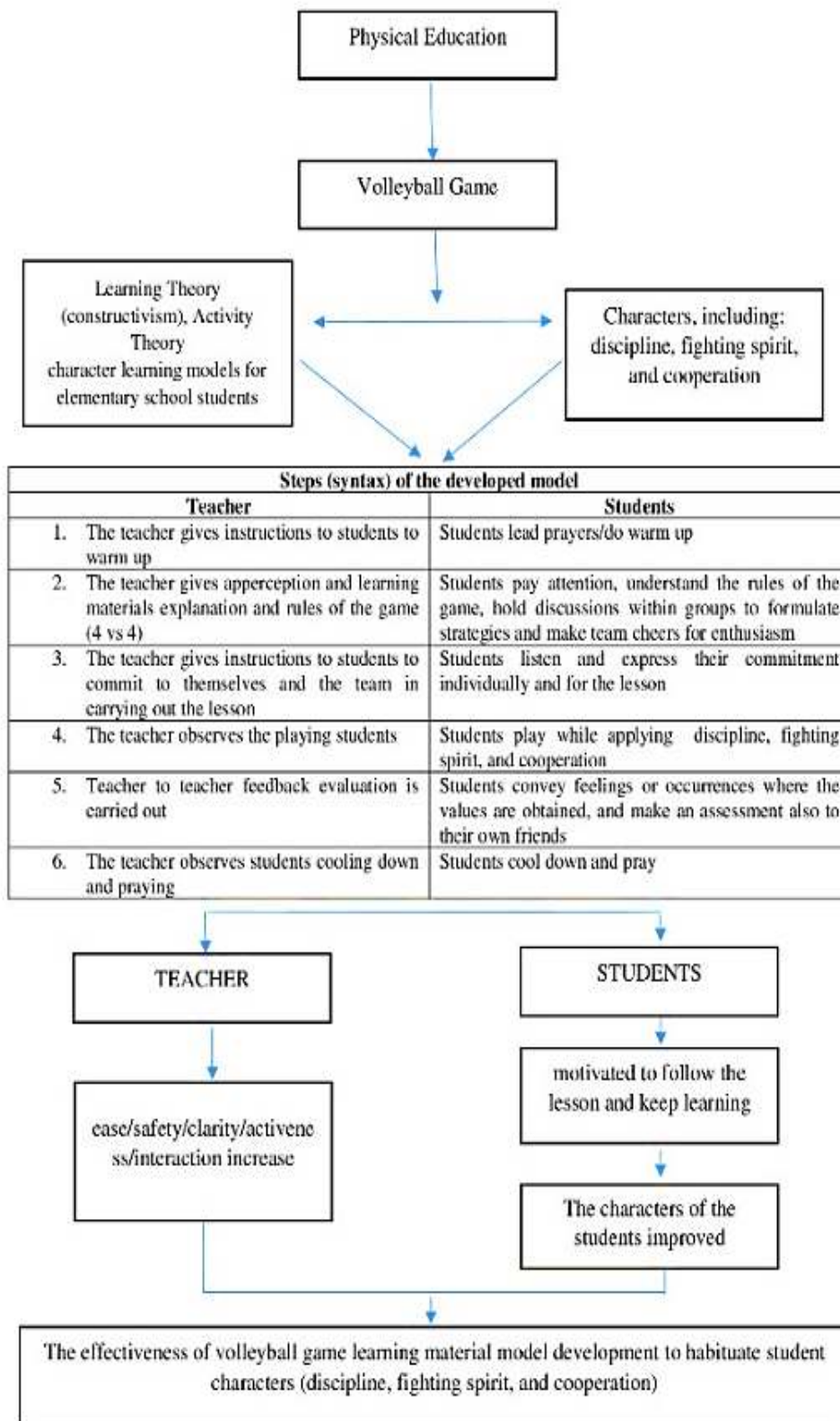


Figure 2. The conceptual model of physical education learning

The following is the formula for calculating the content validity coefficient using Aiken's V. Hendryadi (2014) formulated the Aiken's V formula to calculate the content-validity coefficient based on the results of an expert panel's evaluation of n-number of people on an item from the extent to which the item represents the measured construct. The coefficient value of Aiken's V ranges from 0-1. Depending on the number of rate and item in the model which were validated, in which the result coefficient must be higher than the V index.

The more rate of mean, the smallest V value is required. In this research, the learning model has validated by seven experts and had five items in the model. The results are coefficients of 0.857 (Item 1), 0.857 (Item 2), 0.857 (Item 3), 0.857 (Item 4), and 0.857 (Item 5). The required V value for items 5 and 7 experts, according to V index, was greater than 0.82. Thus, the learning model compiled by researchers has adequate content validity.

After expert validation, a small-scale test of the model was then arranged, with the following results: construct validity refers to the extent to which the instrument measures the nature of the construct. The construct validity approach is based on a rational approach and an empirical approach. The rational approach is made by paying attention to the elements that make up the construct. Moreover, the rational approach is directed at the application of items in accordance with the elements contained in the construct. The empirical approach is intended to assess the extent of compatibility of the elements in the instrument with what is predicted in the construct. The construct validity in this research was carried out using factor analysis. The principle of factor analysis is to group data based on the intercorrelation between items.

The results obtained from the analysis are statistical analysis in the form of the rotated component matrix. In addition, factor analysis displays the results of the extraction of questions or statements into several components desired by researchers. The table in the rotated component matrix shows the distribution of items on variables for several factors. The figures contained in the table represent factor loading or the amount of intercorrelation between variable items and existing factors. Based on the results of the factor analysis, interpretation is made to determine whether an item should be dropped or not. The criteria used are based on in accordance with what Safrit & Wood (1989) stating that if an item has a factor loading below 0.30, the item is dropped. Factor analysis in this study assisted by statistical software, namely SPSS - 23.0.

The instrument validity of physical education learning model for mini volleyball games was carried out against the content validity. This was to measure the extent to which the instruments used have reflected all aspects needed to be measured. The steps taken included (1) compiling the items of the instrument based on the indicators that have been determined for the construct of each research variable, and (2) consultation with expert judgment to systematically examine the contents of the instrument of the research variable and evaluate its relevance to the specified variable. The underlying assumption of whether factor analysis is used is that the data matrix must have sufficient correlation. Bartlett Test of Sphericity is a statistical test to determine whether there is a correlation between variables. Another testing tool used to measure the degree of intercorrelation between variables and factor analysis is the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO MSA).

**Table 2.** The result of the measure of sampling adequacy test

<b>The measure of Sampling Adequacy</b>		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.758
Bartlett's Test of Sphericity	Approx. Chi-Square	158.868
	df	36
	Sig.	0.000

The KMO value must be greater than 0.50, and we can proceed to factor analysis. The result of the analysis showed that the value of KMO is 0.758; thus, factor analysis can be performed. The value Bartlett test with Chi-square is 158.868 and significance at 0.000; thus, the factor analysis test can be continued.

The results of data analysis with nine variables show three viable factors based on eigenvalue > 1. Factor 1 with an eigen value of 4.191. Factor 2 with an eigenvalue of 2.001, factor 3 with eigenvalue of 1.262, and factor 4 with an eigenvalue of 0.435. Factor 1 is able to explain the variance of 46.572%, Factor 2 is able to explain the variance of 22.230%, and Factor 3 is able to explain the variance of 14.024%; thus, three factors are able to explain the variance of 82.826%.

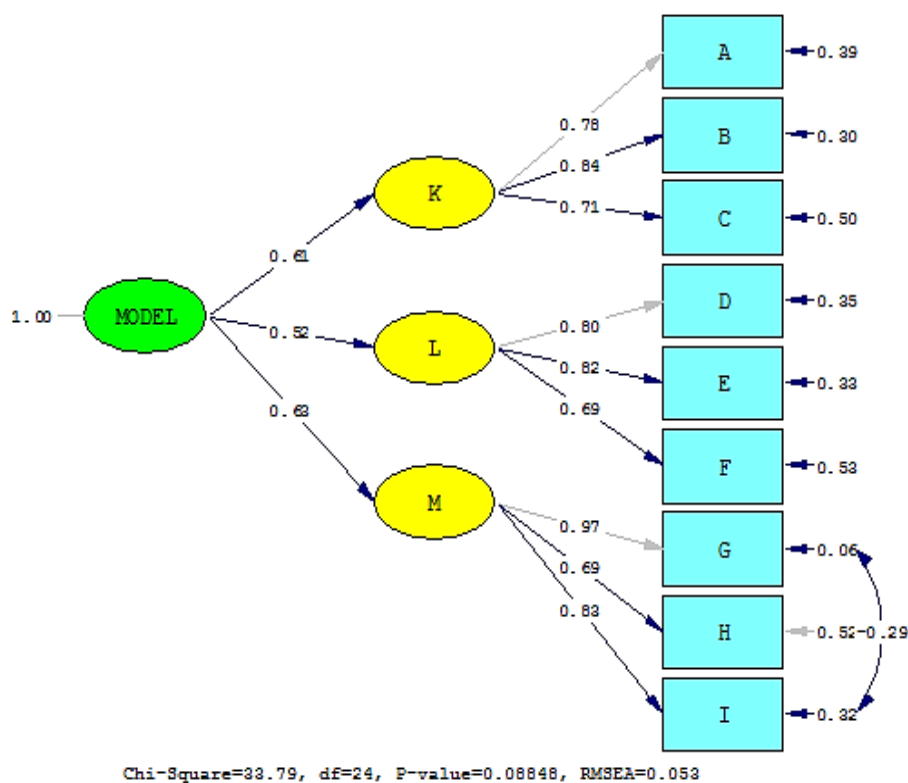
By looking at the component matrix and varimax rotated of the component matrix, it is clear that what we're grouped in Factor 1 included the basic motion of passing, the basic motion of service, and the basic motion of the blocks respectively with loading factors above 0.564. Grouping on Factor 2 included mini volleyball, volleyball field or modification, and mini volleyball learning support tools respectively with a loading factor above 0.657. Whereas grouping in Factor 3 included the use of language in the model book, pictures in the model book, and the design of the

model book respectively with loading factors above 0.500. To further strengthen the trials, it was necessary to be done in a large-scale test. The results of a large-scale test from 172 students, were confirmatory factor analysis.

**Table 3.** The result of Eigenvalues

Component	Total Variance Explained			Extraction Sums of Squared Loadings		
	Initial Eigenvalues Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	4.191	46.572	46.572	4.191	46.572	46.572
2	2.001	22.230	68.802	2.001	22.230	68.802
3	1.262	14.024	82.826	1.262	14.024	82.826
4	0.435	4.837	87.663			
5	0.358	3.979	91.642			

The instruments of the large-scale test using CFA, namely in five elementary schools in the Special Region of Yogyakarta (TurunanPanggang State Elementary School of GunungKidul; MuhamadiyahSapen Yogyakarta Elementary School; Muhammadiyah PendowoharjoSewon Elementary School, Bantul; KlopoSawitTuri State Elementary School, Sleman and Proman State Elementary School, KokapKulonProgo) in 5 districts and conducted by random cluster sampling where the schools are either public or private, with the number of students of 147 people, can be seen in Figure 3.



**Figure 3.** Standardised CFA

Figure 3 shows that the learning model consists of 3 variables: physical activity of volleyball game (K), volleyball game facilities and equipment (L), and language, pictures, and book design in the learning model (M). Indicators of the physical activity of volleyball variable include low and top passing motion material (A), basic serve move material (B), and basic smash and block move material (C). Indicators of the volleyball game facilities and equipment include mini volleyball (D), mini volleyball court or its modification (E), and learning support equipment: blankets, cones, baskets

(F). Indicators of language variables are the model book design and pictures, including language in the model (G), picture in the model (H), and the model of book design (I). In detail, the results, as seen in Table 4.

**Table 4.** Model of Fitness Index Criteria

Standard	Decision Criteria	Result	Decision
P value	> 0.05	0.08	Achieved
RMSEA	< 0.08	0.05	Achieved
Chi-Square	≤ 2 df/dk	33,79 < 48	Achieved

After conducting the content validity test via experts and EFA and CFA, the hypothetical model was constructed to set the effectiveness test. However, before being tested, it was necessary to make an instrument to test its effectiveness and validated by experts. Seven experts who validated this instrument are experts in character education, experts in the field of educational evaluation, and experts in the field of physical education. The results of the experts' validation of the instrument for the test of model effectiveness can be seen in Table 5.

**Table 5.** The result of Experts' validation for instruments used

Evaluator	Item 1		Item 2		Item 3	
	Score	s	Score	s	Score	s
A	1	1	1	1	1	1
B	1	1	1	1	1	1
C	1	1	1	1	1	1
∑ s	3		3		3	
V	1		1		1	

For the reliability of the test instrument of model effectiveness, a test was conducted using the inter class correlation test (ICC) to calculate its reliability as can be seen in Table 6.

**Table 6.** Interclass Correlation Coefficient

	Intraclass Correlation <sup>b</sup>	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	0.814 <sup>a</sup>	0.764	.856	14.106	146	292	.000
Average Measures	0.929 <sup>c</sup>	0.907	.947	14.106	146	292	.000

After the content validity instrument of the model effectiveness has been met, the effectiveness of the mini volleyball learning model is tested to habituate the character values (discipline, cooperation, and hard work) among elementary school students. The effectiveness test was carried out in 3 elementary schools consisting of 75 students and four meetings for each school. The results can be seen in Table 8.

**Table 8.** The result of paired t-test

	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
Pre – Post	-2.50	1.85	0.21	-11.70	74	0.000

The results of the mean difference between pre-test and post-test were tested using paired t-test analysis and obtained the significant value is 0.000 or  $<0.05$ . It means that there were significant differences in the character values of students before and after the implementation of a learning model for mini volleyball games.

## **Discussion**

The learning models of physical education for volleyball game materials have three indicators namely physical activity learning, learning facilities and tools, and language, pictures, book design, and book models which support volleyball learning with 9 items of high validity and reliability. Therefore, it is appropriate to habituate the character values of discipline, hard work, and cooperation.

Habituation of character values is a learning process that cannot be automatically formed, but it requires a long process, in which learning is habituated both in theory and practice to prepare the children to face future challenges. This is in line with the research by Pala (2011) showing the basic guidelines for effective and comprehensive character education for developing children's character [36]. Developing instruments for testing the feasibility of the model was done by calculating the values based on the Aiken V and Delphi method for the validity of the content by three academicians, namely: college lecturer in volleyball, in evaluation, and in physical education.

Results were obtained with an absolute value of 1. The input for improvement was carried out and adjusted to the direction of the expert. The calculation of reliability was done by seven experts using the correlation coefficient interclass (ICC), with the ICC calculation results of 0.81. Thus, reliability was included in the category of good agreement. This means that the instruments used in testing the effectiveness of the model were good in regard to content analysis and good agreement value. The result of the mean difference with the t-test was obtained at  $0.000 < 0.05$ ; thus, there was a significant difference before and after the implementation of a learning model for mini volleyball to adapt to the values of the character of discipline, cooperation, and hard work. The treatment given to students made students unconsciously possess these character values. The results of this research are supported by the research by Thompson (2002) stating that character education at schools has a positive impact on children's behaviour [37].

Other impacts that appeared after the implementation of character habituation in this research included: 1) the value of self-confidence, shown when students succeeded in doing a large number of top pass with 43 times pass to the wall; 2) the value of helping or mutual assistance, shown when one student fetched the fallen chest number of another student and returned it to their friend; 3) the value of honesty, shown when a student reported to the teacher that their chest number was damaged due to being exposed to the ice cream that they drank; 4) communication value, shown on blanket ball play where the four players counted together when throwing and catching the ball; 5) the value of courage, shown when students dared to ask to the teacher, and when one of the students dared to perform their slogans and playing pledges; 6) the value of sportsmanship, shown when playing mini volleyball, in which each player played earnestly but not caring towards who ultimately won or lost, everyone can accept whatever the results of the game.

These results are in line with research by Gomez & Buckley (2017). 4 - 8 values approximately appeared in the habituation of values in each learning material, depending on the game and the ability of the teachers to design the volleyball game materials [3].

The hierarchy of character habituation activities in this research began with the value of cooperation as the main philosophical value of mini volleyball games. Furthermore, character values of discipline and hard work are interconnected with each other in every mini volleyball activity. Activities in the mini volleyball game begin with the lowest level of difficulty, then increase to a higher level of difficulty in order the students to easily learn the material of moves activities and the habituation of values in the game.

The activities in the game can shape the character values of children, as what was expected from the purpose of the analysis in developing this learning model. Learning activities carried out by students consciously were also relevant to the theory of games that must be done consciously, voluntarily, and seriously. Activities in the game can be modified or changed as per conditions, such as the weather and/or the students. Activities in learning mini volleyball games can be taken from both printed media and/or through technology which can be accessed by the teacher or the student's devices.

The teacher's role in this learning model was to observe, model, assess, and facilitate the habituation of students' character values through mini volleyball games. The teacher also interacted with students in order to achieve learning goals. The teacher should also guide the students to understand the causes and the consequences of physical education learning. Other values found in volleyball learning include the value of helping or mutual assistance, confidence, creativity, honesty, and sportsmanship. The values found in this model included cooperation (16 times, hard work (14 times), and discipline (10 times).

## **Conclusion**

In conclusion, this study found there are eight learning material models and character value assessment instrument of physical education learning models for mini volleyball games to improve the character values (discipline, hard work,



and cooperation) among elementary school students. The materials of physical education learning are feasible to use so that the learning model is easy, practical, and safe. Also, there is a significant difference in the character values of students before and after the implementation of the learning model for mini volleyball games. It showed that the effectiveness of the physical education learning model in practice.

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