



Development of Smart Beater and Pole Base Kasti Ball Game for Elementary School

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ABSTRACT

The purpose of the study. Development of batting equipment adapted to the developmental characteristics of children in elementary schools and portable baseball perch poles, which can be used on dirt and concrete courts.

Materials and methods. This study uses qualitative and quantitative research using research and development procedures (Research and Development). a) Needs analysis; (b) Model development planning; (c) Expert validation from media experts and material experts, (d) Small group trials and revisions, and (e) Field trials and revisions. Data collection was carried out by observation, interviews and questionnaires. The data collection was adjusted to the model stages. The data collection stages were carried out in the early stages, expert tests, limited tests were carried out on small groups of 30 subjects, and field tests (field testing) of 60 subjects from two different elementary schools. In this study a closed form questionnaire was used containing questions accompanied by available answer choices so that students only need to mark the selected answer. The data obtained are grouped into frequency distributions, then the average percentage of group data is sought.

Results. The research results from the first material expert validation test obtained an average of 81.94%, and the second material expert obtained 87.5% in the Very Eligible category. The small group test results obtained 90% with very good criteria, and the large group test results obtained 93% with very decent categories.

Conclusions. The use of batting media that has been adapted to reduce weight, and the development.

Keywords: *Beater; Pole Base; Kasti Ball Game.*

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INTRODUCTION

Learning can be interpreted as a process of changing behavior from individual interactions with the environment. In the learning process, both in educational units and in tertiary institutions, media is needed to support the learning process (Suhairi et al., 2022). Physical education, Sport, and health (PJOK) Subjects are learning stages of general education programs that contribute to the overall growth and development of

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children, especially through movement experiences. This is a learning program that pays attention to all learning domains, including psychomotor, cognitive, and affective, Rusli Lutan quoted by (Supriatana & Suhairi, 2021) . The scope of PJOK subjects includes games and sports, development activities, gymnastic activities, rhythmic activities, water activities, and out-of-school education. Games and sports include traditional sports, games, skills, locomotor-non-locomotor and manipulative, athletics, baseball, rounders, kippers, football, takraw, volleyball, table tennis, tennis, badminton, and martial arts, as well as other activities Ministry of National Education, (Zenitha & Hartoto, 2019) synonymous with physical activity in learning. Physical activity is very important for the health and physical and psychological development of children. Physical education is education that uses physical activity in the learning process which has a direct impact on the physical or psychomotor conditions of students as well as affective and cognitive students (Widiastuti, 2019).

Various types of games related to physical activity in PJOK learning. PJOK learning is expected to be able to improve students' cognitive, affective, psychomotor, and physical fitness elements, this paradigm will make students able to understand and understand how a skill concept is learned to a higher level so that all physical activities can be more useful and meaningful (Winarno M E, 2020). The baseball game is a physical activity in the form of a game. Elements of a game of baseball that involve a lot of large muscles in their activities with speed, agility, power, and others, so as to improve gross motor skills efficiently (Hadi et al., 2021). One form of play that can be carried out and given to students in enriching their movement activities is the baseball game. Especially in increasing the ability to throw and catch balls related to the development of gross motor skills of students (Ninik et al., 2018).

The baseball game is a type of game that is easy to get and simple, but the form of the game that has been given to students has experienced many difficulties when hitting this game and injuries often occur due to using a bat that is too heavy, with sizes that are not friendly for children, and using a perch pole from a net pole on the school field due to a collision when perching from high speed (Siregar et al., 2021). Innovations for bats and Perch/Base Poles to help students easily take shots are needed



to provide valuable experience and confidence when successfully hitting well. Loss of interest and decreased motivation of students towards baseball games, one of which is the difficulty of students in hitting because the bat and Perch Pole/Base have a very small cross-section so the punches made by students rarely hit the ball. The game of baseball in this game requires good skills, cooperation, discipline, and high sportsmanship. Implementation The development of this baseball game tool must at least be adapted to the growth rate of elementary school students and also pay attention to safety and security factors for students and at least also refer to the content of educational objectives which include developing skills, self-management in efforts to develop and physical fitness and healthy lifestyle through various physical activities and sports.

Based on the description of the background above, it is necessary to review the baseball bat innovation in elementary schools. The use of existing baseball bats makes it difficult for students to carry out basic hitting movements, because the length and weight of the bats are not comparable to the growth and development of children in elementary schools, with the application of basic hitting motions through modification of bats, it shows a significant increase (Febrianto, 2016). This study on modifications to baseball bats will later be presented and adapted to the characteristics of the growth rate of elementary school students which cannot be separated from student safety and security factors, so that students will feel interested, feel safe, happy and comfortable using the adapted bat and not be afraid. and awkward in the game. Implementation of Baseball Game Innovations will be presented in the form of modifications to the shape of the bat and Perch Pole/Kasti Base by changing the cross-sectional size, length, and weight measurement so that Elementary School students can use the bat and Perch Pole/Kasti Base comfortably and safely.

The reasons behind this bat and base development research are: (1) There is no innovation of baseball game tools for PJOK learning for elementary school students; (2) Innovations of similar tools have not been carried out yet so there is no guide on Innovation of bats and Perches/Base for baseball games, and (3) Innovations of baseball bats require equipment that is simple, easy to procure and inexpensive. Then



to strengthen the results of the needs analysis above, a needs analysis is carried out with several important points which are the key to the need for development to be carried out, including obtaining: 1) from 30 students, 100% of students stated that the teacher had never made a base/perch pole in learning ball rounders (only using net poles on the school field); 2) from 30 students, it was found that 62% of students felt insecure in using base poles/perching nets on the school field in baseball games; 3) out of 30 students, 87% of students stated difficulty in hitting because the bat was long and heavy; 4) 100% of 30 students stated that it was necessary to develop a base/perch pole to play baseball. 5) out of 30 students, 64% of students stated that they needed to develop a baseball bat.

The following will describe a comparison of equipment renewal from old and new safety-based equipment. The results of observations in the field of researchers also interviewed teachers regarding the games and equipment used in baseball permanent learning, the results obtained that the baseball game is very fun in that the game has elements of speed and agility but in the game the use of a base pole/perch by using a net pole often makes the child was injured by a collision with the perch pole (pole from the volleyball net) so it is necessary to develop a base/perch pole that is safe and comfortable in the use of baseball games. The following describes a comparison of updates in Table 1., as follows:

Table 1. Comparison of Old and New Kasti Equipment Updates.

Old	New
Existing equipment has not considered the characteristics of children and safety while playing.	Equipment innovation that takes into account the characteristics of children and safety when playing..
Beating equipment with a beater length of 50-60 centimeters. The size of the beater is oval with a diameter of 5 centimeters. The length of the handle is 15-20 centimeters.	Beating equipment with a bat length of 50-55 centimeters. The size of the beater is oval with a diameter of 6 centimeters. The length of the handle is 10-15 centimeters.
There is no special base for baseball games (using the ones in the school yard).	Portable perch/base (adjustable to average user height).
The unavailability of baseball game equipment packages accompanied by a manual book for use in baseball games.	Availability of baseball game equipment packages accompanied by a manual book for use in baseball games.

This research, in its development, chose the innovation of baseball bats and perch poles/bases. Benefit from innovation in the development of bats and perches/base for baseball games. This batting media innovation is adapted to the physical characteristics

and development of children both in terms of size and level of comfort, as well as a portable perch/base which was developed in the form of a perch that is safe, comfortable and fun with safety considerations while playing. Perch pole/base that can be used both in soil and cement structured fields that can be disassembled.

State of the art from the results of this research can be used as a study and provide benefits and uses for students and teachers in a broad or limited scope theoretically and practically. Theoretically the results of this research can produce new findings to enrich the repertoire of the field of sports education studies. practically the research results are expected to be a new breakthrough for educational practitioners in Landak District, West Kalimantan. In general, the results of this study are in the form of developing a Perch Pole and baseball bat for elementary school students according to the level of development and growth of the child and the level of safety while playing which is an innovation that aims to help ease students' difficulties in hitting the ball..

It is hoped that with the innovation of developing bats and perches for baseball games, it will be more effective and efficient in learning small ball games, especially in mastering the gross motor skills of throwing, catching, and running in playing baseball on small ball material. Mastery of baseball game skills is necessary for the game to run well, especially throwing, catching, and hitting skills. The baseball game is expected to improve gross motor skills (Hadi et al., 2021). Learning through pictures alone will be less attractive to students' learning interests without animation and video supporting interesting and attractive teaching and learning activities (Yulita, 2011). Regarding the statement stated above, both sourced from the results of research, articles, and media publications, the needs analysis shows that it is necessary to develop an innovative baseball bat that is under the characteristics of elementary school children and perches/base with consideration of safety for games that will later be used for castle game.

MATERIALS AND METHODS

Study participants

Data collection was carried out by observation, interviews, and questionnaires. The data collection was adjusted to the model stages, the data collection stages were



carried out in the early stages, expert tests, limited tests were carried out on small groups, and field tests (field testing). The data collection uses (a) Observation, namely collecting information through observation using all the senses. Observation is a data collection technique that is carried out by making systematic observations and recording the phenomenon under study (Robert C. Bog. & Knopp Biklen, 2007). In this case, the observation is direct observation in the field or location under the reality on the ground, in baseball learning, which is related to the conditions of the learning process, educational facilities, and infrastructure, media, and methods used. In addition, observations are also used to find out the practicality of implementing learning by using innovative development equipment for baseball bats and perch poles used; (b) Interviews were conducted to check and obtain information that was not obtained from observation or to obtain complete data obtained from observations. Interviews were conducted orally and directly regarding the information or various kinds of information needed. By conducting interviews or interviews, researchers are more maximal in obtaining information. (c) The questionnaire was used to gather opinions from users, in this case, elementary school students at SD Negeri 07 Tubang Raeng, Jelimpo District, Landak Regency and MI Dirosatul Ihsan, Ngabang Landak District, about the innovation of the Kasti Ball Game equipment used in learning. There are two types of questionnaires, namely closed or structured form questionnaires, and types of questionnaires, namely closed or structured form questionnaires (Donald Ary, Luchy Cheser Jacobs, 2004). In this study, a closed-form questionnaire was used containing questions accompanied by available answer choices so that students only need to mark the selected answer.

Study Organization

This research uses qualitative and quantitative research using research and development procedures. Referring to previous views or models from research and development according Borg and Gall, cite opinions (Nouval, 2019) that research and development methods originate from observing various phenomena that exist in society, especially in the field of education. Development research is usually called development-based research (research-based development) is a type of research



whose purpose is to solve practical problems. Development research is a type of product-oriented research, and is expected to be able to bridge the gap in research that tests theory more towards producing products that can be directly used by users. According to Borg and Gall in (Sugiyono, 2015) Development research is a process that is widely used in education and learning, which is basically a development research procedure consisting of two main objectives, namely: (1) developing products and, (2) testing the effectiveness of products to achieve goals. The first objective is referred to as the development function, while the second objective is referred to as the validation function.

The development of innovation in the development of baseball equipment refers to research and development at Borg and Gall which is planned with the following details: (a) Needs analysis; (b) Model development planning; (c) Expert validation and revision of the training model, and (d) Small group trials and revisions, and (e) Field trials and revisions. The following describes the stages of development carried out.

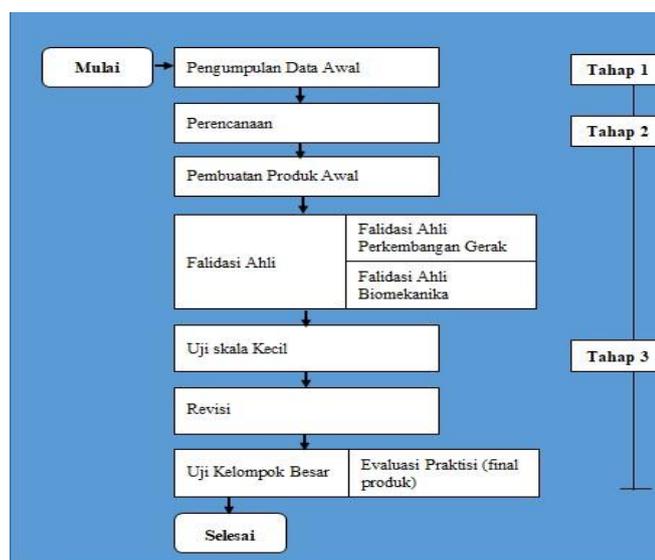


Figure 1. Chat Flow Research on the Development of Baseball Game Equipment for Brog and Gall Adoption Elementary Schools.

Test and measurement procedures

The questionnaire sheets used as instruments for collecting data included three types, according to the roles and positions of the respondents, namely questionnaires for media experts, questionnaires for biomechanics experts, questionnaires for material experts, and questionnaires for users, in this case, students. The questions in the

questionnaire are arranged based on the elements contained in the developed media tool, namely: tool accuracy, tool comfort, tool design, and ease of use. The data obtained is adjusted to the objectives and development designs used. Analysis of research data was carried out quantitatively and qualitatively in each process, starting from the time the data collection was carried out intensively.

The process of qualitative data analysis begins by examining all available data. Qualitative data analysis is in the form of questionnaires in field trials which are included in the attitude scale, and will be processed using a Likert scale, then suggestions from media experts, biomechanics experts, and baseball material experts are then described. Suggestions, comments, from experts, and student questionnaires are used as a basis for revising baseball learning media products. These suggestions and comments concern product design and the product itself, as well as the baseball learning process using safety-based baseball bats and perch equipment innovations. Then consulted with experts to be reviewed so that the resulting product is truly appropriate.

While the analysis of quantitative data in the form of tests of gross motor skills using standardized tests. The data obtained are grouped into frequency distributions, then the average percentage of group data is sought. The suitability of the use of the product can be seen from trials on small groups, field try-outs (Maksum, 2012).

RESULTS

The product profile developed is the development of baseball game equipment consisting of baseball bats adapted to the developmental level of elementary school children, and safe base/perch poles packaged into a baseball equipment package. In the development of baseball, game equipment is developed through several stages so that the equipment is declared fit for use, including: (1) Preliminary Study: Then to strengthen the results of the needs analysis above, a needs analysis was carried out with several important points which were the key to the need for development to be carried out, including the following: 1) from 30 students, 100% of students stated that the teacher had never made a base/perch pole in learning ball rounders (only using net poles on the school field); 2) from 30 students, it was found that 62% of students



felt insecure in using base poles/perching nets on the school field in baseball games; 3) out of 30 students, 87% of students stated difficulty in hitting because the bat was long and heavy; 4) 100% of 30 students stated that it was necessary to develop a base/perch pole to play baseball. 5) out of 30 students, 64% of students stated that they needed to develop a baseball bat. (2) Initial Product Manufacture: At this stage, the researcher makes a product design. First, create a storyboard; create development flow, materials gathering, supporting, designing, producing, and displaying related materials to complete the product. The storyboard contains development ideas about the material presented. A storyboard can be said as a description of each scene that clearly describes the whole material. For hitting equipment, it is adjusted in terms of length, weight, and width of the hitting section. The bat is made of solid wood with a size of 50-55 cm, a handle length of 10-15 cm, a weight of 60-70 grams (slightly shorter and lighter than the existing size), and a diameter of 6 centimeters. Pole Perch/base with material from galvanized iron round size $\frac{3}{4}$ inc, with an overall height of 120 cm which is equipped with protective foam on the outside of the perch pole, there is a peer at a third of the height of the pole to maintain shock elasticity when perched, which can be plugged into the ground and equipped with ballast for concrete court. The following describes development innovations in terms of the size, weight, and shape of the baseball game equipment design consisting of a baseball bat, a perch/base, and a baseball equipment holder, consisting of (1) Baseball bat designed under developments for elementary school children; (2) Baseball perch/base, and (3) bag for baseball equipment/equipment, as follows:

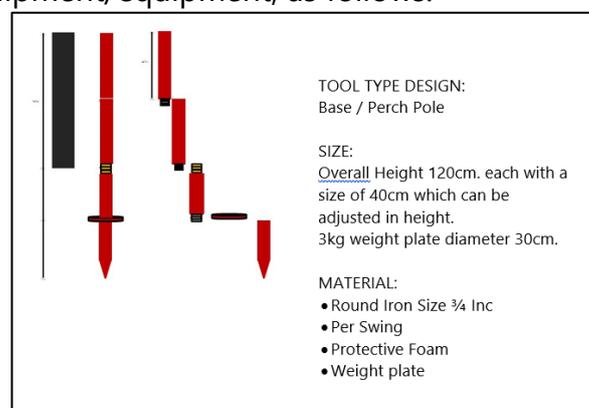


Figure 2. Design and Specifications for Baseball Game Base

(3) Planning (expert validation): The purpose of this first stage evaluation is to determine the suitability of the model to be produced and developed. This first stage of evaluation consists of; (1) review and analysis from experts, which include small ball game material experts who function to provide information and assessments about the suitability of the tool model with the baseball game learning resources. Expert validation used by lecturers for small ball (kasti) courses at the Jamani Education Study Program IKIP PGRI Pontianak, Mr. Arisman, M.Pd, lecturer at UNIKA Santo Agustinus Hipo Ngabang Landak district, and from PJOK teacher Rudi Kurniadi, S.Pd SDN 01 teacher Jelimpo Landak District.

The results of the product trial assessment from baseball game experts include several aspects of assessment, including equipment used for baseball games, display material that is displayed is easy to use, the language used in the material manual book is easy to understand, the material presented is clear, the design of the tools is practical, level of efficiency, and reliability of the tool. The following describes the results of the study as follows:

Table 2. Assessment of Product Trials by Material Experts for Baseball Games from Lecturers on Small Ball (Basketball Games).

No	Aspects assessed	Score obtained	Maximum Score	Persentase (%)	Category
1	Material suitability	13	16	81,25 %	Very worth it
2	Interesting product	26	32	81,25%	Very worth it
3	Effectiveness of the use of equipment	10	12	83,33%	Very worth it
Total score		54	60		
Average				81,94%	Very worth it

Based on the validation carried out by material experts from 3 aspects of the assessment, as follows: (1) the suitability aspect of the material; (2) product attractiveness aspect; and (3) the effectiveness aspect of the use of the equipment obtained an average of 81.94% in the "Very feasible" category.

In addition to providing an assessment of the tools being developed, the validator also provides comments and input to improve the quality of the tools being developed. The comments and suggestions given include; the product being developed focuses

more on the development of the base/perch pole, of course, providing a manual book on the use of the tool which is equipped with rules and how to play baseball.

Table 3. Assessment of Product Trials by Material Experts for Baseball Game from PJOK Teachers.

No	Aspects assessed	Score obtained	Maximum Score	Persentase (%)	Category
1	Material suitability	10	12	83,3 %	Very worth it
2	Interesting product	7	8	87,5 %	Very worth it
3	Effectiveness of the use of equipment	11	12	91,7%	Very worth it
Total score		28	32		
Average				87,5 %	Very worth it

Based on the validation carried out by material experts from 3 aspects of the assessment, as follows: (1) the suitability aspect of the material; (2) the product attractiveness aspect; and (3) the aspect of the effectiveness of the use of the equipment obtained an average of 87.5% in the "Very feasible" category.

Then to see the suitability of the tool being developed from the physical form of the tool being developed. Media expert validation was carried out with the specifications of media experts used to understand sports biomechanics. The purpose of this validation is to provide advice and accurately estimate the suitability of the developed tool so that it is more effective and efficient in its use. The expert validation assessment of the media used was taken from a lecturer in Sports Biomechanics, Physical Education Study Program, Strata I IKIP PGRI Pontianak, Dr. Muhammad Suhairi, M.Pd who has taught courses for at least 10 years. Media assessment includes several aspects of assessment including: physical aspects, design aspects, and user aspects. The following describes the results of the study as follows:

Table 4. Media Expert Validation Data "Development of Baseball Game Equipment" in the form of bats and perches/base.

No	Aspects assessed	Score obtained	Maximum Score	Persentase (%)	Category
1	Material suitability	15	16	87,5 %	Very worth it
2	Interesting product	29	32	90,625%	Very worth it
3	Effectiveness of the use of equipment	11	12	91,7%	Very worth it
Total score		54	60		
Average				90 %	Very worth it

ased on the validation carried out by media experts from 3 aspects of the assessment, as follows: (1) the suitability aspect of the material; (2) product attractiveness aspect; and (3) aspects of the effectiveness of the use of equipment,



obtained an average of 90% with the "Very feasible" category. In addition to providing an assessment of the product being developed, the validator also provides suggestions and input to improve the quality of the tool being developed. As for input from media experts including; From the aspect of the size of the base/perch, several connections should be made, so that in use it can be adjusted according to the user, the position of the spring should be reconsidered, including the swing power when receiving encouragement from the user. For the bat, it is better to consider the material used, because it will affect the weight of the bat, the diameter and length of the bat should be widened without changing the shape of the baseball bat. After changing some of the perch / base pole framework in accordance with the opinions and suggestions of several experts and adjustments to the baseball bat. From the results of product trials through material experts from small ball subject lecturers, material experts from sports biomechanics lecturers, and media experts it was stated that they could proceed to the next stage, namely small-scale testing.

(4) Small scale test: Then a small group test was carried out. The small group test was carried out on June 5 2023 at SD Negeri 07 Tubang Raeng, Jelimpo District, Landak Regency. The research subjects were taken from class V with a total of 12 students who had participated in baseball learning. Small-scale test results of 7 aspects of the assessment include; developed media practicality, practical and portable design, safe use of media, flexible and non-hazardous media tools, easy-to-operate media, and fun media. Obtained an average score of 93% with a decent/appropriate performance result. With these results the development of the baseball game equipment media was declared feasible to proceed to the next stage, namely large group trials.

Table 5. Test data for small group product development media equipment Baseball Game.

No	Aspects assessed	Score obtained	Maximum Score	Persentase (%)	Category
1	The media (batter and perch) are used for baseball games.	115	120	96 %	Very worth it
2	The perch pole media can be practically disassembled.	112	120	93 %	Very worth it
3	The design of the tool is practical, and portable.	115	120	96 %	Very worth it
4	The perch pole media is safe to use.	114	120	95 %	Very worth it
5	The perch media is flexible and non-hazardous.	112	120	93%	Very worth it
6	The media pole perch is easy to operate.	115	120	96 %	Very worth it



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7	Media pole perch fun	95	120	79 %	Very worth it
Total score		778	840		
Average				93 %	Very worth it

(5) Large Scale Test: After conducting a small-scale test, then a large-group test was carried out. The large group test used 2 (two) different schools, with a total of 60 students as research subjects. 30 research subjects were taken from students of SD Negeri 07 Tubang Raeng, Jelimpo District, Landak Regency, and 30 subjects were taken from MI Dirosatuul Ihsan, Ngabang Landak District. The research subjects were taken from class V with the specifications of students who had participated in baseball game learning. Large-scale test results from 3 aspects of the assessment include; developed media practicality, practical and portable design, safe use of media, flexible and non-hazardous media tools, easy-to-operate media, and fun media. Obtained an average score of 93% with the performance results Very Decent / Very Appropriate. The description of the data on the results of the assessment is described in Table 5. The following:

Table 6. Table 5. Product Trial Rating of Media Equipment Development Group Baseball Game.

No	Aspects assessed	Score obtained	Maximum Score	Persentase	Category
1	The media (batter and perch) are used for baseball games.	230	240	96 %	Very worth it
2	The perch pole media can be practically disassembled.	224	240	93 %	Very worth it
3	The design of the tool is practical, and portable.	230	240	96 %	Very worth it
4	The perch pole media is safe to use.	228	240	95 %	Very worth it
5	The perch media is flexible and non-hazardous.	224	240	93 %	Very worth it
6	The media pole perch is easy to operate.	230	240	96 %	Very worth it
7	Media pole perch fun	190	240	79 %	Very worth it
Total score		1556	1680		
Average				93 %	Very worth it

6) Product Revision: The product revision stage is the stage of product improvement after passing a wider test. So that the product developed is already a validated operational model design. In the development of baseball equipment that was developed after passing the large-scale test stage, no complaints or problems were



found in the field test. So it can be concluded that the product is feasible to proceed to the final product stage.

(7) Final Products: After going through several stages for the manufacture of baseball game equipment products starting from preliminary studies, expert validation, and small and large scale tests from several schools as proof that the product being developed is feasible for mass use. At this stage, the researcher checked the equipment and equipment for beating, perching poles, the smoothness and tidiness of the product, the paint coating, and practicality in the form of packaging. Final improvements are made to the products developed for the final product.

DISCUSSION

Physical education is the cultivation of formal knowledge and values through physical activity. Physical education is an integral part of education, namely educational processes or activities using physical activity media for motor improvement (Zheng et al., 2021). The baseball game is a game that can improve children's motor skills (Widodo et al., 2023). Because in the game there are activities of hitting, throwing with various forms of throwing, and activities of catching the ball with different catching activities depending on the shape of the ball that comes (Riyanto, 2017). The development that children need to grow is their motor skills so that it makes it easier for children to deal with future motion plans (Hasanah, 2016). Baseball game is material in physical education in which physical activity includes hitting, throwing and catching activities with high movement activity in the game (Pelu, 2020).

The game of baseball requires facilities and infrastructure in the game, starting from the field, small ball, bat, and base posts. The availability of adequate facilities is an effort that contributes to the achievement of learning objectives (Stefanus et al., 2022). In addition to the availability of game media, safe, comfortable facilities and infrastructure are needed, remembering that in a baseball game, children run as fast as possible to immediately go to the perch pole. It is necessary to be careful in determining the perch pole considering that the pole used utilizes the existing poles around the schoolyard to avoid injury in the game as a result of collisions when perched. Consideration of safety and health factors is very important and must be



prioritized in Physical Education learning activities in schools (Maksum; et al., 2022). So that children can carry out motion activities safely and comfortably. Physical activity that is carried out regularly both in training and in the form of games, in addition to increasing children's motor skills, will also improve fitness (Nurhasan et al., 2020). In addition to improving fitness and motor skills, baseball games provide direct experience related to teamwork, as well as the intelligence ability to think quickly to avoid throws from opponents when heading for perched poles. As where stated (Ashadi Cahyadi et al., 2022) that thinking intelligence can be increased through traditional games that use equipment in the game. The ability to throw and catch the ball is getting better and will be more skilled if elementary school students often play baseball games (Rahandi, 2021).

CONCLUSION

Based on the results of research that has been carried out through product development research in the form of baseball game equipment in the form of; beater that is adjusted from the size, and weight; perch/base, has gone through several stages of research in accordance with the stages of development of Brogh and Gall. The product has gone through the stages of preliminary studies, planning, expert validation, small-scale tests, small-scale tests and revisions before the final product. The developed baseball game equipment makes an effective and efficient impact in baseball games. Elementary school students can swing their punches more freely by using lighter bats and slightly shorter lengths. The students did not hesitate to stop at the perch from high speed, considering that the perch used was covered with a protective barrier and was slightly flexible. The third was getting encouragement from the players. The product being developed at this time is basic research with the hope that it can provide inspiration for other researchers, especially private researchers, to consider and continue to innovate all tools, especially in existing elementary schools to give birth to new innovations with a wider level of large-scale testing. Considering target users, effectiveness, efficiency and especially user safety in developing a product.



CONFLICT OF INTEREST

The constraints in this study are related to time and cost. The research was conducted independently without any outside funding. So that the research subjects were only a few elementary schools in Ngabang, Landak District, West Kalimantan Province, not yet representing a national scale test.

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APPENDIX

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