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Improving students' cricket hitting skills using digital test

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Abstract

This study aims to find out the level of students' hitting skills and student responses after using ball-hitting skills. This type of research is a mixed method with an explanatory model. The sampling technique used was purposive sampling with a sample of 30 students who were active and contracted in the cricket courses. Before collecting data, the researcher tested the instrument using reliability and validity tests. Then, data analysis was conducted using quantitative data analysis in the form of linear regression and qualitative data analysis used Miles and Huberman's method. The findings obtained in the field show that students have the skill to hit the ball and respond well. Other findings also show that there is an effect of student responses to the observations made. This means that there is an influence of the tools used on students' ball-hitting skills.

Keywords: Student hitting skills, ball-hitting skill gauge, cricket.

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1. Introduction

1.1. Conceptual and Theoretical Framework

Education with all its characteristics has developed into several objects of study that have their own uniqueness (Astalini et al., 2021; Muslim et al., 2021). Education in the field of sports itself is quite unique in that the object of study is mostly about skills and knowledge, which are supporting aspects. This is certainly different from other fields of education which must have strengthening in the aspect of knowledge. However, not much different from other fields, the study of sports education also requires technology to assist in the implementation of its activities.

Technology in the 21st century has progressed and developed very rapidly (Bervell & Umar, 2017; Lase, 2019; Ong et al., 2020; Weng et al., 2019). The use of technology in education is valued because the use of time is very effective and also optimal (Dzombak et al, 2020; Radhy, 2019; Wang et al, 2020). Technology in the field of sports education today is not only centred on theory, but also on how to use skills and other things (Buchanan et al., 2019; Budiman, 2017; Raja & Nagasubramani, 2018). The use of technology in the field of sports education plays a role in helping the delivery of information, as well as measuring how a person's skill level in a sport is (Ratten, 2020; Sinelinikov, 2012).

Starting an athlete's career or exercising as usual, of course, requires a monitor and manager of sports development from beginning to end. In this digital and flexible era, a monitor can be applied in several ways, one of which is assisted by digital tools (Crowther et al., 2020; Ghai & Zipp, 2020). The supporting tool in question is a sports skill test tool. This test tool measures how a person's skills are in playing a sport. The measurement is digital-based, and whose object of study is a sport that is considered to be still developing in Indonesia, and that sport is cricket.

Cricket is a sport that is considered to be still developing and needs to be reinvigorated in its distribution in the community. The official cricket championship in Indonesia was first competed in 2019 at the National Student Sports Week (POMNAS) in Jakarta. Apart from being one of the newly developed sports in Indonesia, literacy related to this sport is also still very minimal, especially regarding the development of test tools for measuring basic cricket, skills such as batting, bowling and fielding (Cooper et al., 2019; Powis, 2018). Such conditions are one of the inhibiting factors in the development of sports achievement and make the sport increasingly difficult to develop, especially in terms of science (Connor et al., 2019).

1.2. Related research

This research is basically a complement to previous studies that have investigated similar topics, but there are slight differences in several aspects. Research by Kapadia et al. (2020) determined the similarity in sports, and the tool developed is based on the analysis of data results. Then, research by Bishop et al. (2021) explains the ability of soccer players in comparison to that of cricket athletes. The research by Jowit et al. (2020) examined the microsensor in bowlers. The research described basically discusses cricket, but the research conducted by the researchers focused on seeing the effect of the developed tools on students' ball-hitting skill.

1.3. Purpose of the study

One solution to overcome this is to conduct skills training, especially for basic skills, namely batting. Therefore, based on this, the objectives of this research are as follows:

1. To find out students' responses regarding bowling skill-measuring devices;
2. To find out students' batting skills at Jambi University;
3. To find out the effect of students' responses on students' accuracy in hitting the ball.

2. Method and material

2.1. Research model

This study uses a mixed method explanatory model approach and the research variables used are students' responses and ball-hitting skills. According to several experts (Creswell, 1999; Cote-Leclerc et al., 2017; Tanti et al., 2021), the mixed method explanatory research is a combination of research methods with quantitative and qualitative research.

2.2. Participants

The study used the purposive sampling technique. Purposive sampling according to some experts (Etikan, 2016; Sharma, 2017) is a technique used to obtain a representative sample in accordance with predefined criteria. Purposive sampling is used because some of the samples studied do not all have criteria that are in accordance with those studied. This study used a sample of 30 college students who contracted in the cricket game course in Universitas Negeri Padang, Indonesia.

2.3. Data collection

Broadly speaking, the research has two stages, namely quantitative data collection and qualitative data collection. The quantitative data used two variables, one of which is an observation questionnaire. The instrument grid for the observation questionnaire can be seen in Table 1.

Table 1. Instrument grid of student observation questionnaire.

Rating indicator	Rated aspect
Starting position	Grip: the knuckles of both hands are in a line
	Both hands holding the bat are around the sides of the ear
	Back elbow pulled back to open
	The position of the bat tilts about 45 degree
	Standing with two legs apart
	Knees slightly bent and relaxed
	Weight on hind legs
When hitting	The front foot steps, the back foot rotates
	Hips rotate about 90 degrees
	Forearm moves to pull the beater
	Both arms and wrists are straight when the bat hits the ball
Advanced motion	Wrist twist
	The swing of the bat continues over the shoulder
	The hips move with the pull of the bat's movement

Hitting motion	Harmony of the whole range of hitting motion

A 5-point Likert scale was used to measure the observation sheet instrument, with 5 = very good, 4 = good, 3 = enough, 2 = bad and 1 = very bad. The scoring range can be seen in Table 2.

Table 2. Students' observation range.

No	Score interval	Student observation level
1	63.01–75.00	Very good
2	51.01–63.00	Good
3	39.01–51.00	Enough
4	27.01–39.00	Bad
5.	15.00–27.00	Very bad

The second quantitative data used in this research are data on student ball-hitting skills. The instrument grid for students' responses to the questionnaires can be seen in Table 3.

Table 3. Grid of Students' Responses

No	Rated aspect	Statement
1	Appearance	1, 2, 3, 4
2	Language	5, 6
3	Benefits	7, 8, 9, 10

A 5-point Likert scale was used to measure the observation sheet instrument, with 5 = very good, 4 = good, 3 = enough, 2 = bad and 1 = very bad. The scoring range can be seen in Table 4.

Table 4. Students' response range

No	Score interval	Students response level
1	42.01–50.00	Very good
2	34.01–42.00	Good
3	26.01–34.00	Enough
4	18.01–26.00	Bad
5.	10.00–18.00	Very bad

The qualitative data used were data from interviews from one of the students. The instrument grid for the interview sheet is shown in Table 5.

Table 5. Instrument grid of the questionnaire interview sheet.

No	Indicator	Statement

1	Appearance	1, 2
2	Convenience	3
3	Usefulness	4, 5

2.4. Data collection process

The data collection procedure begins with the initial activity carried out in this study, namely providing a product, after which the researchers distributed the observation questionnaires to obtain students' responses. After completing the questionnaire, the researcher analysed the data using SPSS 25. The quantitative data presented used descriptive statistics and inferential statistics, while the qualitative data used Miles and Huberman's method, which in general were data reduction, data presentation and conclusion drawing. Data collection procedures briefly can be seen in the diagram below.

2.5. Data analysis

There are two data analysis techniques used, namely for quantitative and qualitative data analyses. Quantitative data were analysed using descriptive statistics and inferential statistics. Descriptive statistics are mostly presented with mean, median, mode and standard deviation values (Goos & Meintrup, 2015; Selvamuthu & Das, 2018). For qualitative data collection, interviews were used to complement and strengthen quantitative data. Qualitative data were analysed using Miles and Huberman's method, namely data reduction, data presentation and conclusion drawing. For inferential statistics, hypothesis testing is carried out, one of which is often used, namely parametric statistics in the form of linear regression (Sahu et al., 2015; Sari et al., 2017). Before testing the hypothesis, the data obtained were tested for prerequisites, namely linearity and normality tests. The data will be homogeneous and linear if the Sig value obtained is more than 0.05. After conducting the prerequisite test, the data were then obtained by linear regression. According to some experts (Darmaji et al., 2020; McCormick & Salcedo, 2015; Theobald et al., 2019), the regression test has criteria where Ho is accepted if $-t_{table}$ $t_{arithmetic}$ t_{table} and Ho is rejected if $t_{arithmetic}$ t_{table} or $t_{arithmetic}$ t_{table}, where t_{table} obtained from 5%: 2 = 2, 5% (two-tailed test) with 28−1−1 = 26, and the obtained value of t_{table} amounts to 2.05553, while $t_{arithmetic}$ was obtained from processing the data using SPSS. After knowing that there is an influence between variables, the researcher then analysed how big the influence was by using the calculation of the coefficient of determination. If Ho: Pxy = 0, then there is no effect of students' responses on ball-hitting skills; conversely, if Ha: Pxy = 0, then there is an effect of students' responses on ball-hitting skills (Cronk, 2018; Darlington & Hayes, 2017; Judd et al., 2017).

3. Result

Before taking the research data, the researchers first tested the validity and reliability of each instrument used. The instrument used was valid according to the Padang State University Research Institute. The instrument was then tested for reliability and validity. The results for the 40 test subjects can be seen in Table 6.

Table 6. Results of reliability test.

Variable	Cronbach's Alpha	N of item
Students' responses of ball-hitting skill gauge	0.432	13
Students' observations	0.505	17

To test the validity of each statement, the researcher used a validity test. The results are shown in Table 7.

Table 7. Validity test result.

Variable	Statement number	*r*-arithmetic	*r*-table	Description
Students' observation	1	0.405	0.361	Valid
	2	0.443	0.361	Valid
	3	0.510	0.361	Valid
	4	0.384	0.361	Valid
	5	0.376	0.361	Valid
	6	0.343	0.361	Invalid
	7	0.523	0.361	Valid
	8	0.477	0.361	Valid
	9	0.501	0.361	Valid
	10	0.323	0.361	Invalid
	11	0.643	0.361	Valid
	12	0.532	0.361	Valid
	13	0.643	0.361	Valid
	14	0.454	0.361	Valid
	15	0.433	0.361	Valid
	16	0.601	0.361	Valid
	17	0.374	0.361	Valid
Students' responses to ball-hitting skill gauge	1	0.453	0.361	Valid
	2	0.645	0.361	Valid
	3	0.323	0.361	Invalid
	4	0.465	0.361	Valid
	5	0.377	0.361	Valid
	6	0.466	0.361	Valid
	7	0.532	0.361	Valid
	8	0.587	0.361	Valid
	9	0.212	0.361	Invalid
	10	0.602	0.361	Valid
	11	0.365	0.361	Valid

	12	0.712	0.361	Valid
	13	0.124	0.361	Invalid

From Table 7, it can be seen that from the 17 student observation statements tested, there are 2 statements that are invalid. As for the students' response variable, there are 10 valid statements out of a total of 13 statements tested. After the instrument is valid, the next step is to collect data. The results of students' response to ball-hitting skill gauge can be seen in Table 8.

Table 8. Data results' description of students' response of ball-hitting skill gauge.

Interval	*F*	%	Category	Mean	Median	Mo	Max	Min
42.01–50.00	1	3.33	Very good					
34.01–42.00	12	40	Good					
26.01–34.00	17	56.67	Enough	34.5	32.5	34	43	28
18.01–26.00	0	0	Bad					
10.00–18.00	0	0	Very bad					

From Table 8, based on the results of descriptive statistics on students' responses to cricket batting skill gauge, the average value (mean) is 34.5, the median value is 32.5 and the mode is 34; the maximum and minimum values are 43 and 28, respectively.

After analysing the statistical descriptions of students' response, the researchers conducted a descriptive statistical analysis with the second variable, namely students' observation of cricket batting skill gauge. The statistical descriptive results of students' observation of cricket batting skill gauge can be seen in Table 9.

Table 9. Statistical data of descriptive results of students' observation.

Interval	*F*	%	Category	Mean	Median	Mo	Max	Min
63.01–75.00	3	10	Very good					
51.01–63.00	15	50	Good					
39.01–51.00	12	40	Enough	51.5	54.5	47	64	41
27.01–39.00	0	0	Bad					
15.00–27.00	0	0	Very bad					

From Table 9, based on the results of descriptive statistics on students' response cricket batting skill gauge, the average value (mean) is 51.5, the median value is 54.5 and the mode is 47; the maximum and minimum values are 64 and 41, respectively.

After the test variables used descriptive statistics, the researchers conducted a test prerequisite to test for normality and linearity. This normality test was carried out to see whether the data are normally distributed or not. The results of the normality test and linearity test can be seen in Table 10.

Table 10. Assumption test results.

Variable	Normality test	Linearity test
Observation	0.200	-
Student response	0.123	-
Student response*observation	-	0.434

After testing the assumptions, the researchers conducted a hypothesis test, namely the linear regression test, which aimed to find out whether there was an effect on students' responses to the observations made. The results obtained can be seen in Table 11.

Table 11. Linear regression test results.

Unstandardised coefficients		Standardised coefficients	*T*	Sig.
B	Std. error	Beta		
48.916	6.032		8.110	0.000
0.016	0.077	0.041	0.212	0.034

From the linear regression test results in Table 11, a significant value (Sig) of 0.034 was obtained, and this result is smaller than 0.05. This means that Ho is rejected. This means that there is a significant influence on students' responses of their observation. In addition, the results of the analysis also show that there is a substantial influence between students' response and observation towards digital test in cricket game. Thus, the effect of the variable relationship can be described by a simple linear regression equation as follows:

$\hat{Y} = a + bx$

$\hat{Y} = 48.916 + 0.016x$

where:

$\hat{Y}$ = students observation;

b = Students' response.

Table 12. Calculation results of the coefficient of determination.

R	*R* square	Adjusted square	*R* Std. error of the estimate
0.812	0.659	0.663	4.71

Based on Table 12, the correlation value (*R*) is 0.812 and the coefficient of determination is obtained from the *R*-square value. From the output displayed on SPSS, the coefficient of determination is 0.659, which means that the influence of the response variable on students' ball-hitting skills is 65.9% and the remaining 34.1% is influenced by other variables.

After conducting the linear regression test on the variables used, the researchers conducted quantitative data analysis. The results obtained during the interview were mostly positive for various reasons. The following are the results of the interview recap with one of the students:

1. Q: How does the measuring instrument for students' ball-hitting skills look like?

   A: In simple terms but pleasing to the eye.

2. Q: Is the appearance of the tool made good and attractive?

   A: As far as you can see, it's pretty good, just a little bit more.

3. Q: Is the reading from the instrument very clear?

   A: Self-explanatory.

4. Q: Are the tools made really helpful for students in improving their ball-hitting skills?

   A: Very helpful because I can see how I perform when I hit the ball.

5. Q: Is this tool suitable for use in cricket?

   A: Very suitable.

4. Discussion

Based on Table 8 regarding descriptive statistics of students' response to cricket batting skill gauge, it was found that 1 student had a very good response level, 12 students had a good response level and 17 students had enough response level. Positive and negative responses of students are a common phenomenon in universities (Eksteen & Reitsma, 2015). Positive responses cause students to feel satisfied with the learning used, especially in the use of media, because it is important to understand student responses in order to know about their way of thinking (Hasan & Bao, 2020; Kamid et al., 2021; Rajabalee & Santally, 2021). For the mean, median, mode, maximum and minimum, the values observed are 34.5, 32.5, 34, 43 and 28, respectively. The results of this response level are also supported by qualitative data in the form of interviews, where most students have a positive comment for cricket batting skill gauge.

From Table 9, based on the statistical descriptive level of students' observation of cricket batting skill gauge, it was found that 3 students had a very good response level, 15 students had a good response level and 12 students had enough response level. From the descriptive statistical table, the mean is 51.5, the median is 54.5 and the mode is 47; the maximum and minimum are 64 and 41, respectively. By improving the ball-hitting skills, students are expected to be able to open their careers related to sport (Suryawati & Osman, 2018; Toma & Greca, 2018).

The first thing is to find out the effect between variables by using a prerequisite test. The prerequisite test is carried out by conducting a normality test and a linearity test. The normality test is a very important test in parametric statistics (Darlington & Hayes, 2017; Siebert & Siebert, 2018), which serves to determine whether the data are normally distributed or not. The normality tests can be conducted using the Kolmogorov–Smirnov condition that if the significance value is >0.05, then the data are normally distributed (Ghasemi & Zahediasl, 2012; Razali et al., 2012). The linearity test is used to see if the data are linear or not. A data item will be liner if the significance value (Sig) deviation of linearity is greater than 0.05. Based on the results obtained, the normality test scores for each variable, namely students' response and observation, are 0.123 and 0.200. As for the linearity test, the significance value of the deviation of linearity was 0.434. With the normality and linearity tests and sig

values greater than the requirement, namely 0.05, it can be concluded that the data are normally and linearly distributed. After the prerequisite test is met, the data are processed using statistical and inferential statistics, namely linear regression and coefficient of determination.

Analysis of linear regression in SPSS can be carried out by pressing the menu Analyse > Regression > Linear (Janie, 2012; Pfister et al., 2013). The linear regression table shows the regression coefficients, regression equations and their significance; the significance value will be better if it is smaller or the inequality is written as sig < 0.05 (Wagner, 2015). If the significance value is less than 0.05, it can be said that there is an effect of students' responses on students' ball-hitting skills as indicated by field observations. The coefficient of determination is used to conclude how much influence the variables tested have, which are presented in percentage terms (Ozer, 1985; Schneider et al., 2010). Based on Table 11, the significance value is smaller than 0.05, which is 0.034, which means that there is an influence between the variables of student response of students' observation. Then, for the large percentage, it can be seen in Table 12 that the *R*-square value obtained is 0.659, which means the effect of students' responses on observation is 65.9% and the remaining 34.1% is the influence of other variables.

This research is basically a complement to previous studies that have investigated similar topics, but there are slight differences in several aspects. Research by Kapadia et al. (2020) determined the similarity in sports, and the tool developed is based on the analysis of data results. Then, research by Bishop et al. (2021) explains the ability of soccer players in comparison to that of cricket athletes. The research by Jowit et al. (2020) examined the microsensor in bowlers. The research described basically discusses cricket, but the research conducted by the researchers focused on seeing the effect of the developed tools on students' ball-hitting skill.

The implications of this research are certainly very useful for various parties, especially for students. For students, research and tools that are made can be a help in improving their hitting skills (Pardiwala et al., 2018). In addition, this tool can also be used as a student progress monitor and find out what are the weaknesses when playing cricket (Powis, 2019; Rahman et al., 2019). For lecturers, this tool certainly makes it easier in terms of obtaining the value of cricket; lecturers can also monitor and provide advice on what students should improve in order to better master cricket, especially the skill of hitting the ball.

5. Conclusion

The use of technology in the field of sports is very important for the development of athletes in various types of sports. This study shows that the role of technology is very influential on the process of forming skills of students, especially cricket. The results obtained indicate the influence of technology which is indicated by the students' responses to the formation of the skill to hit the ball in cricket. This also indicates that technology plays a strong role in the process of forming students' skills to become professional athletes.

6. Recommendation

This research basically has several weaknesses which only focus on examining how the influence of the use of these tools on students' ball-hitting skills. This study also only took a sample of 30 students and also the application of this tool was limited to only 1 meeting. So, the researchers suggest further research that the data should be varied again with not just one meeting in the research. The researchers also suggest that the tools they have been made be made even smaller. In addition, it

would be very good if further research compares students who use these tools with students who do not use these tools.

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