International Journal of Physical Education, Sports and Health

Husnul Hinayah
Department of Sports Coaching Education, Faculty of Sport and Health Sciences, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

Abdul Alim
Department of Sports Coaching Education, Faculty of Sport and Health Sciences, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

Danardono
Department of Sports Coaching Education, Faculty of Sport and Health Sciences, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

Endang Rini Sukamti
Department of Sports Coaching Education, Faculty of Sport and Health Sciences, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

Innovation of scoring board for the android-based assessment of karate kata

Husnul Hinayah, Abdul Alim, Danardono and Endang Rini Sukamti

DOI: https://doi.org/10.22271/kheljournal.2024.v11.i2b.3258

Abstract
The objective of this research is to produce an Android-based karate kata scoring board assessment media which aims to assist the jury and administrative team in recapping and assessing karate kata. The research method used a quantitative approach conducted through 5 stages according to ADDIE: the analysis stage, design stage, development stage, implementation stage, and evaluation stage. The research sampling used purposive sampling. The product trials were conducted in two stages: small group trials towards the UNY administration team and large group trials on match referees/judges. The data selection methods and instruments used a questionnaire consisted of several statements and item values to be answered. Steps for developing a scoring board for Android-based karate kata assessment using the ADDIE method, which included 5 steps: Analysis, Design, Development, Implementation and Evaluation stages.

Conclusion: The scoring board for Android-based karate kata assessment from material validation data shows that the content validity results from material experts using the Gregory formula are at 0.71 so it can be concluded that it meets the content validity criteria and is declared valid. The results of the media validation data show that the content validity results from media experts using the Gregory formula are at 0.76 so it can be concluded that it meets the content validity criteria and it is declared valid. The reliability test was conducted with 20 athletes. The results of the reliability test using SPSS 22 for window show that the material results are at 0.656 and the media results are at 0.858 and it is said to be reliable. The small group field trial is at 93% in the very feasible percentage category and the large group is at 94% in the very feasible percentage category. The results of the effectiveness test were conducted on a scoring board for assessing Android-based karate kata using a 10-person match administration team processed by using SPSS-20 to obtain significance scores. (2-tailed) of 0.000. Because the value 0.000 is smaller than < 0.05, Ha is accepted and Ho is rejected. Hence, it can be concluded that there is an average difference between the results of manual data testing using Excel and data input using an Android-based karate kata scoring board, which means that there is an effect of using an Android-based karate kata scoring board in increasing effectiveness and efficiency in processing data on karate kata assessment results.

Keywords: Development, scoring board, karate kata, android

1. Introduction
The karate genre has its own characteristics with basic techniques that become the foundation that must be mastered by karateka. Basic techniques are ways to shape the body into a powerful and reliable weapon [1]. The main part of the karate technique consists of 3 parts, namely: (1) Kihon, which is the basic techniques of karate such as punching techniques, kicking techniques, and parrying techniques; (2) Kata, which is the practice of karate moves or art movements; (3) Kumite, which is sparring or fighting practice [2]. Kata judging prior to the new rules issued by the World Karate Federation used red and blue flags, where the referees consisted of 5 people each hold one red flag and one blue flag at each corner of the tatami and then judge after the athlete has completed the kata movement. With the assessment carried out using flags allows the referee to make judgements based on the subject. In 2019 the WKF issued new rules. In the 2019 WKF rulebook, kata assessment has changed which now uses 7 or 5 judges in front with scoring using numbers / scores with two lines of assessment, namely technical assessment and athletic assessment [3].

In 2023 the WKF issued the latest rule changes where technical scoring and athletic scoring on the scoring board became one scoring line.

Corresponding Author:
Husnul Hinayah
Department of Sports Coaching Education, Faculty of Sport and Health Sciences, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

Technical scoring is an assessment that covers stance, technique, timing, focus, while athletic scoring is an assessment that covers the athlete's performance, namely strength, speed, and balance [4]. In the sport of karate there are a variety of The martial arts techniques learnt include the dachi stance, tsuki punch, geri kick, and uke parry [5]. Technology plays a role in organising matches absolutely necessary for the smooth running of the match. The development of a match system based on science and technology carried out is to create an android-based assessment application in karate sports matches with the number "kata" In kata matches, the forms and attitudes that must be mastered by the athlete are A karateka is strength, speed, and agility. All three are a form of appreciation in the actual reality of karate.

Competitors choose their Kata based on the round of the competition, quality of opposition and their current training level and which Kata is used must be carefully planned as it can be used only once in a particular competition. Different techniques, jumps, athletic skills and Kata duration should be taken into consideration to maximise chances of victory, making it essential for karateka to choose their Katas tactically [6].

A cheap and practical application that can be accessed quickly in a sports match is needed. The development of the scoring system is based on the latest policies and regulations in the World Karate Federation Rules 2023. This research develops a scoring system application with technical and athletic assessments into one line of assessment according to kata match regulations. In the scoring board application there is a fast scoring input to know the results of the assessment given by the judges to the scoring board panel so that participants and spectators can immediately see the scores obtained from the judges after the athlete demonstrates kata movements. Thus the speed of the score recording officer in processing the value given from the panel of judges can be directly seen by people who are in the competition room to knowing the athlete's ranking in a competition [7].

Based on these things, the authors are interested in conducting research & development research with the title "Inovation of Scoring Board for the Android-Based Assessment of Karate Kata".

2. Materials and Methods
This research is a research and development (Research and Development) with the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model to produce a karate kata scoring application with Android operating system-based scoring, which can then be accessed by match judges and match administrators. This development aims to assist match judges in scoring kata that have been validated by 2 material experts and 2 media experts from the Faculty of Sports Science, Yogyakarta State University.

Population is the overall research subject [8]. The population chosen by the researcher was karate judges, match admin team, and athletes totaling 41 people. The sample is a representative or part of the object that the researcher examines. In this study, researchers applied one of the sampling techniques, namely the purposive sampling technique. Purposive sampling is a data source sampling technique with certain considerations [9]. With the purposive sampling technique, researchers have criteria that must be met by the samples used in this study.

Inclusion criteria in the study included: Registered in FORKI and already at the lowest level DAN I karate. Understand and master the rules of karate games and matches thoroughly. Have a karate match referee/judge training certificate. The exclusion criteria in the study were that the subjects did not or had not mastered the kata in the karate match. Based on the criteria mentioned above, out of a total of 11 karate judges, 10 people were the administration team in the implementation of the tool experiment. The sample of match judges was divided into two groups consisting of small groups and large groups. 10 administrative team people as a test of effectiveness. While 20 athletes as a test of material and media instruments. The field preliminary subject with the strategy of determining the pilot test in this study is purposive sampling as a testing strategy with a certain contemplation. There are special characters in the trial subjects. The trial was conducted with two groups, namely a small group trial of UNY Karate Administration Team, UIN Sunan Kalijaga Karate Administration Team and large group trials on match referees/judges.

The data taken from this study are content validation, namely material experts and media experts where quantitatively in the form of giving assessments and qualitative in the form of suggestions, input, or comments through validation sheets. Secondly on the test subject through an assessment sheet (Questionnaire) in the form of a score or assessment made after using the product. The instrument used to test the feasibility of the product produced is by using an instrument in the form of a material validation sheet, media validation sheet, product assessment sheet (Questionnaire).

There are three steps in conducting data analysis, namely (1) Preparation, (2) Tabulation, and (3) Application of data in accordance with the research approach. Activities carried out in the preparation step include checking the name and completeness of the filler's identity, checking the completeness of the data, and also checking the type of data entry at the tabulation stage, data analysis activities can be in the form of scoring the items that need to be scored [10]. This research scale uses a Likert scale, the Likert scale is used to measure perspectives, insights, or judgements a person or group. The instrument will also be given to three respondents, namely media experts, materials, and test subjects [11].

Regarding the material and media expert approval survey sheet that uses a Likert scale, specifically a psychometric scale commonly used in polls according to Endang Mulyatiningsih [12], specifically:
1. Very Poor
2. Simply
3. Good
4. Very good.

Quantitative descriptive data is "data in the form of numbers from calculations or measurements can be processed by adding up, comparing with the expected amount and obtaining a percentage".
Feasibility Percentage

$$\text{Percentage} = \frac{\text{Total score obtained}}{\text{Total skor maksimal}} \times 100\%$$

Table 1: Likert Scale Categories

No.	Presentation	Flexibility
1.	Very worthy	81%-100%
2.	Worth	61%-80%
3.	Decent Enough	41%-60%
4.	Not Feasible	21%-40%
5.	Very No Worth	0%-20%

The percentage scale above is used to determine the feasibility value of the product that has been produced. The

feasibility value for scoring board development products for assessment android-based karate kata is set to a minimum feasible criterion.

3. Results and Discussions
3.1 Material Expert and Media Expert Validation
Assessment by material experts on the scoring board for android-based karate kata assessment was carried out by 2 experts. The material experts who became validators were Mr Dr Danardono, M. Or who is a karate lecturer at the Faculty of Sport Sciences, Yogyakarta State University and Mr Gunawan Sidi Andana who is a karate coach as well as a referee/judge of the match. Assessment by material experts on the scoring board for android-based karate kata scoring. The validity results of the material experts are described as follows:

Table 2: Material Expert Validity Results

	X1	X2	X3	X4	X5	X6	X7	Total
Expert 1	2	3	2	3	3	3	3	19
Expert 2	4	4	4	4	4	4	4	28

		Expert 1	
		L	K
Expert 2	L	(A) 0	(B)0
	K	(C) 2	(D) 5

According to Table 2 Above, With the results of content validity (content validity) from material experts using the Gregory formula is 0.71 so it can be concluded that it meets the criteria for content validity and is declared high validity.

Assessment by material experts on the scoring board for android-based karate kata scoring was carried out by 2 experts. The media experts who became validators were Mr Dr. Nawan Primasoni, S. Pd. Kor., M. Or who is one of the karate lecturers at the Faculty of Sports Science, Yogyakarta State University and Mr Gunawan Sidi Andana who is one of the karate coaches as well as a referee/judge of the match. Assessment by media experts on the scoring board for android-based karate kata scoring. The validity results from material experts are described as follows:

Table 3: Media Expert Validity Results

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	Total
Expert 1	3	3	3	3	2	2	3	3	3	3	3	3	2	36
Expert 2	4	4	4	3	3	4	4	4	4	3	4	4	4	49

		Expert 1	
		L	K
Expert 2	L	(A) 0	(B) 0
	K	(C) 3	(D) 10

According to Table 2 Above, with the results of the content validity (Content validity) of the media expert using the Gregory formula is 0.76 so that it can be concluded that it fulfils the criteria of content validity and is declared high validity.

4. Validity and Reliability Test
4.1 Media Validity and Reliability Test
Media assessment to athletes on the scoring board for android-based karate kata scoring was conducted by 20 karate athletes using SPSS-20. The validity results are explained as follows:

Table 4: Athlete Media Validity Results

Instrument	R Table	R Count	Description
X1	0,444	0,693	Valid
X2	0,444	0,807	Valid
X3	0,444	0,568	Valid
X4	0,444	0,623	Valid
X5	0,444	0,462	Valid
X6	0,444	0,605	Valid
X7	0,444	0,683	Valid
X8	0,444	0,603	Valid
X9	0,444	0,486	Valid
X10	0,444	0,528	Valid
X11	0,444	0,648	Valid
X12	0,444	0,480	Valid
X13	0,444	0,730	Valid

The reliability test is carried out after and through the validity test stage and declared valid. The reliability test is used to see the consistency of the value of the instrument when used in repeated data collection. The reliability test will be carried out using the Cronbach Alpha formula with SPSS-20. A variable is said to be reliable if it provides a cronbath alpha value> 0.60.

Table 5: Reliability Test Results of Athlete Media

Cronbach's Alpha	N of Items
.858	13

Reliability Statistics
The media reliability test result is $0.858 > 0.60$ then the instrument can be said to be reliable.

4.2 Material Validity and Reliability Test
Material assessment to athletes on the scoring board for android-based karate kata scoring was conducted by 20 karate athletes using SPSS-20. The validity results are explained as follows:

Table 6: Athlete Material Validity Results

Instrument	R Table	R Count	Description
X1	0,444	0,788	Valid
X2	0,444	0,650	Valid
X3	0,444	0,531	Valid
X4	0,444	0,565	Valid
X5	0,444	0,520	Valid
X6	0,444	0,466	Valid
X7	0,444	0,504	Valid

The reliability test is carried out after and through the validity test stage and declared valid. The reliability test is used to see the consistency of the value of the instrument when used in repeated data collection. The reliability test will be carried out using the Cronbach Alpha formula with SPSS-20. A variable is said to be reliable if it provides a cronbath alpha value> 0.60.

Table 7: Reliability Test Results of Athlete Materials

Cronbach's Alpha	N of Items
.656	7

The material reliability test result is $0.656 > 0.60$ then the instrument can be said to be reliable. The results of the assessment of scoring board products for android-based karate kata assessment in the field trial are presented in the following table.

Table 8: Small Group Trial Results

No.	Nama	Sabuk/DAN	Perguruan	Skor yang diperoleh	Skor maksimal	Presentase (%)	Kategori
1.	Kenya Azzahra	Hitam/II	INKAI	51	56	91 %	Sangat Layak
2.	Putra	Hitam/I	INKANAS	49	56	88%	Sangat Layak
3.	Sabilla	Hitam/I	INKAI	56	56	100%	Sangat Layak
4.	Yoga	Hitam/I	GOJUKAI	53	56	95%	Sangat Layak
	SKOR TOTAL			209	224	93%	Sangat Layak

Table 9: Large Group Trial Results

No.	Nama	Sabuk/DAN	Perguruan	Skor yang diperoleh	Skor maksimal	Presentase (%)	Kategori
1.	Kusnadi	Hitam/V	INKAI	55	56	98 %	Sangat Layak
2.	Abdul Azis	Hitam/II	INKAI	48	56	86%	Sangat Layak
3.	Muh. Solikin	Hitam/I	INKAI	56	56	100%	Sangat Layak
4.	Savitri Ika	Hitam/I	INKAI	42	56	75%	Layak
5.	Candra	Hitam/I	INKAI	55	56	98%	Sangat Layak
6.	Lili	Hitam/II	INKANAS	56	56	100%	Sangat Layak
7.	Pupung	Hitam/II	INKANAS	55	56	98%	Sangat Layak
	SKOR TOTAL			367	392	94%	Sangat Layak

The final product produced is a scoring board application for android-based karate kata assessment. The scoring board application product for android-based karate kata assessment that was developed received a "Very Feasible" category from the 93% small group trial and 94% large group test. This application can be utilised by the karate match admin in data collection and assist the referee/judge in giving scores to athletes.

4.3 Effectiveness Test
The subjects of the effectiveness test on the Scoring board for android-based karate kata scoring are coaches and match admin teams totalling 10 people. The subjects were made into one group by conducting two experimental sessions. Session one the subject is asked to input 10 kata assessment data manually in Excel (Pretest) and session two the subject is asked to input the same 10 data as session one (Post test) on the android- based karate kata scoring board.

Table 10: Effectiveness test

Practice test		
No.	Pre test	Post test
1.	10.45	05.25
2.	10.42	05.20
3.	10.35	05.33
4.	10.45	05.20
5.	10.37	05.45
6.	10.51	05.50
7.	10.35	05.35
8.	10.47	05.25
9.	10.46	05.25
10.	10.42	05.20

Before the raw data above is processed using paired sample t-test analysis, the data above needs to be tested for normality as a condition for testing the paired sample t-test. The results of the normality test using SPSS obtained the following results.

Table 11: Normality Test Results

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre_test	.179	10	.200*	.928	10	.425
Post_test	.273	10	.033	.850	10	.057

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the table above, the normality test for pretest and posttest results is normally distributed because the sig. value is more than 0.05. So it can be said to be normally distributed. After that, a paired sample t-test was conducted. The test results using SPSS are as follows.

Table 12: Paired Sample T-test

		Levene's Test for Equality of Variances		Independent Samples Test		
		F	Sig.	t	df	Sig. (2-tailed)
Pre test	Equal variances assumed	5.237	.034	135.207	18	.000
	Equal variances not assumed			135.207	13.266	.000

From the table above, the significance value. (2- tailed) is 0.000. Because the value of 0.000 is smaller than <0.05, Ha is accepted and Ho is rejected. So it can be concluded that there is an average difference between the results of manual data input using excel and data input using an android-based karate kata scoring board, which means that there is an increase in effectiveness and efficiency in processing data on the results of karate athlete kata assessment.

5. Conclusions
Based on the results of the research and the results of the data analysis that has been carried out, the following conclusions are obtained.
1. The steps of developing a scoring board for android-based karate kata assessment using the ADDIE method, which includes 5 steps, namely the Analysis, Design, Development, Implementation, and Evaluation stages.
2. Scoring board for android-based karate kata assessment developed from validation expert data shows that the results of content validity (content validity) from material experts using the Gregory formula are 0.71 so it can be concluded that it meets the criteria for content validity and is declared valid. The results of the media validation data show that the results of content validity (content validity) from media experts using the Gregory formula are 0.76 so it can be concluded that it meets the content validity criteria and is declared valid. The reliability test was conducted with 20 athletes, the results of the reliability test using SPSS 22 for window obtained material results of 0.656 and media results of 0.858 and said to be reliable. The small group field trial was 93% with a very feasible percentage category and a large group of 94% with a very feasible percentage category.
3. The results of the effectiveness test carried out on the scoring board for scoring karate kata numbers based on android using 10 match administration teams processed using SPSS-20 by getting a significance value. (2-tailed) of 0.000. Because the value of 0.000 is smaller than <0.05, then Ha is accepted and Ho is rejected. So it can be concluded that there is an average difference between the results of manual data testing using excel with data

input using an android-based karate kata scoring board, which means that there is an effect of using an android-based karate kata scoring board in increasing effectiveness and efficiency in the scoring board.

5. Acknowledgments

6. References

1. Fajar M. Learn Karate. Bandung: ALFABETA; c2018.
2. Sujoto JB. Techniques Karate. Jakarta: PT. Gramedia Pustaka; c1996.
3. World Karate Federation. Karate Competition Rules Contents. Wkf Rules 2019; c2019.
4. World Karate Federation. Karate Competition Rules Contents. Wkf Rules 2019; c2023.
5. Bermanhot. Latihan dan Melatih Karateka. Yogyakarta: Griya Pustaka; c2014.
6. Augustovicova DC, Argajova J, García MS, Rodríguez MM, Arriaza R. Top-level karate: analysis of frequency and successfulness of Katas in K1 Premiere League. IDO MOVEMENT FOR CULTURE. Journal of Martial Arts Anthropology. 2018;18(4):46–53. doi:10.14589/ido.18.4.6
7. Arikunto S, Aisyah S, Muhtar T, Yudiana Y, Tegar. The Effect of Training Method and Educability on Karate-Kata Skill. Journal of Teaching Physical Education in Elementary School, 2020, 4(1). doi:10.17509/tegar.v4il.26708
8. Sugiyono. Qualitative, Quantitative and R&D Research Methods. Bandung: Alfabeta; c2016.
9. Arikunto S. Research Procedures: A Practical Approach. Jakarta: Rineka Cipta; c2013.
10. Sugiyono. Research Methods for Quantitative Approaches, and R&D. Bandung: Alfabeta; c2012.
11. Puspita FD. Development of Taekwondo Poomsae Taegeuk Book 1 to 8. Scripi. FIKK. UNY; c2018.
12. Ghozali I. Application of Multivariate Analysis with the SPPS Program. Semarang: Diponegoro University Publishing Agency; c2011.