



# ***Tarung Derajat* Instrumentation Development (Implementation of Learning Digitalization)**

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**Abstract.** Motor learning, the truth value is determined by the quality of the movement. Likewise, the results of the referee's decision in assessing a fighting match are the determining factor for the athlete's victory. However, the problem that often occurs is the non-objectivity of the jury in giving points. One of the reasons is that the scoring system used is still conventional. This scoring system often causes commotion, even fights due to the dissatisfaction of one of the athletes with the results of the jury's assessment. Therefore, there is a need for new innovations to the existing assessment system so that the assessment is more transparent, objective and accurate. The purpose of this study was to develop a technology-based design of a grading scoring system. The concept of development in this study is to transfer the performance of the referee conventionally to the Digital Board which can be witnessed by the entire audience. This type of research is development research that adopts the borg and gall model with 10 stages of research. The target of this research is to design the Digital Board assessment system design with stages 1) analysis of potential problems, 2) data analysis, 3) initial digital board design, 4) expert review, 5) design revision, 6) design finalization. At the end of the research, it is hoped that there will be a Digital Board assessment system that has been empirically tested with the stages of work 1) small group labor trials, 2) design revisions, 3) large group labor trials, 4) design revisions, 5) field trials, 6) Finalization of the scoring system. Data collection techniques with expert validation and design reliability testing. The experts involved in this research are instrumentation experts, test and measurement experts, combat experts and Information Technology experts. Based on the results of data analysis, it can be seen that the instrument developed shows a percentage value of 86% and is classified as very feasible. Thus, it can be concluded that the digital board design can be used as a scoring system in fighting degrees.

**Keywords:** Digital Board · Tarung Derajat · Scoring System

## **1 Introduction**

*Tarung Derajat* is one of the achievement sports that are gaining popularity among the community and the world. This is marked by the rapid development of the exercise unit which has entered the Regencies/Cities of all provinces in Indonesia, and has been included in all Southeast Asian countries, namely the Sea Games since 2011 in Jakarta

(1). The sport created by a native Indonesian people, *Guru H. Achmad Derajat*, is commonly called “Mortal Ghada”. As a sport of achievement, *tarung derajat* competed in two numbers, namely the fighting number and the art number. As a sport, it is one of the fields that has developed rapidly in all levels of Indonesian society and also in other countries, regardless of religion, age, country or political flow. Sport is no longer just a function to lead a physically healthy life, but now sport has become one of the promising professions and can be a livelihood for an accomplished sportsman. Achieving achievements in sports is not an easy job, it takes maximum effort to achieve these achievements.

Each number, the winner’s decision is determined by the judgment of the referee and the jury. Especially the number of *tarung*, each jury gives an assessment of every attack that enters the target area. The jury fills out the form that has been provided. At the end of the round, the judges determine the victory of one fighter and the assessment is done behind closed doors. This scoring system often causes commotion and even fights due to the dissatisfaction of one of the athletes from the jury’s assessment. In simple terms, this scoring system is still conventional. This is because in the assessment, they have not utilized a digital-based assessment system (2). So that this problem also causes the problem of fighting degrees to be accepted at higher events (Asean Games and Olympics). Therefore, it is necessary to innovate related to the scoring system in *tarung derajat*.

It can concluded that, the assessment principle that will be developed does not change the rules that have been set. In this research, an assessment mechanism will be developed that utilizes technology, from the conventional assessment system (paper/form) to the digital board. Where the mechanism of action is to digitize the conventional work of the jury. The working concept is to replace paper with a scoring board that is connected to a monitor system that can be witnessed by every audience, so that the assessment is more transparent, more objective and more accurate.

*Tarung Derajat* is a sport that has a Full Body Contact fighting character that requires physical, mental, and intelligence in managing emotions well to face opponents [3]. The most important thing that fighters must possess is the basic technique for fighting. To produce a reliable fighter, of course, must be supported by adequate basic technical skills and good emotional control. Emotional intelligence and basic techniques are assets that a person must have to become a good fighter, of course a fighter will fall from the expected achievements [4]. In achieving the achievement, a fighting athlete must master all the elements in the fighting degree itself such as punches, kicks, parries, and various basic techniques. Technique is one of the elements most often used by athletes both in martial arts and in other types of *tarung derajat* competitions.

Broadly speaking, in a *tarung derajat* match there are several provisions regarding the victory obtained by the fighter including winning by points, winning because the opponent resigns, winning because the referee stopped the fight, winning because the opponent was disqualified, and winning because he collapsed [3]. The fighting grade scoring system has several provisions for the men’s free fighting number, including attacks using the feet towards the face or head are given a value of 3, foot attacks to the body are given a value of 2, attacks with legs until the opponent collapses are given a value of 4. Attacks using a hand aimed at the head will be given a value of 2, a hand

attack on the body will be given a value of 1, and an attack using a hand aimed at the opponent until it collapses will be given a value of 3. A special rating will be given to high Aggressiveness and Sportsmanship [4, 11].

In relation to an achievement sport, in general there are 4 elements in achievement, namely physical, technical, tactical and mental conditions [5]. In addition, another factor that affects achievement is the utilization of existing technological advances [6, 7]. Nurhasan stated that the obstacles in the coaching and training system that must be followed are not in accordance with the ideal coaching pattern and have not utilized technology optimally [8, 9]. One of these weaknesses occurs in fighting degrees. Where in the match, the scoring system used is still conventional. In this case, the jury gives an assessment based on observations which are then written on the assessment form. This blank is only seen by the referee board after the match is finished in the third round, so it is very possible that the jury will make an error in giving an assessment without any improvement, which in the end the referee's decision becomes less accurate. To minimize errors and mistakes in the assessment, there is a need for an innovation by utilizing a technology-based assessment system, namely an assessment system using the Digital Board (10, 11). The working concept in this development is to transfer the work of the jury conventionally to a digital board that can be witnessed by all audiences, so that it is more transparent, objective and accurate.

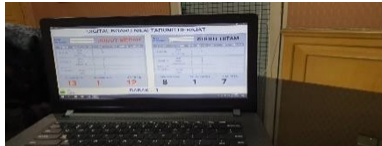
The development of a Digital Board-based assessment system is the first time that has been carried out in a degree competition, because so far there has never been a technology-based assessment system development. So, it has a high novelty value. This is the first step that is believed to be able to elevate *tarung derajat* sports go International. In addition to the use of technology, achievement in *tarung derajat* is determined by many other factors (11, 13).

## 2 Method

This research is research designed in three stages. The first stage is the design projection stage and the development of the shape of the tool and the characterization of the tool. The second stage is testing and refining tools on a labor scale, while the third stage is refining and field testing. The approach in this development research adopts the steps developed by Borg and Gall, they were 10 the stages of product development research consist of: (1) Conducting research and gathering information (2) Planning (3) Developing the initial product form (4) conducting initial field testing (using 6–12 subjects) (5) revising the main product (6) conducting main field testing (7) revising the product (based on suggestions and results of main field trials) (8) Large group field test (9) final product revision and (10) product finalization. The first year consists of initial research, initial product design and tool characterization. While the second year starts from testing and perfecting the tool to limited field trials [13]. In accordance with the research objectives, the implementation of this activity involves 3 scientific disciplines, namely the field of sports science (fighting degrees), the field of sports instrumentation and the field of Computer Information Technology/media (ICT). Each implementer has its own duties and functions.



**Fig. 1.** Mechanical Design Data input board.



**Fig. 2.** Fighter Point display.

### 3 Finding and Discussion

In accordance with the purpose of this study, the results that will be presented in this study are expert validation of the design of the digital competition board system for *tarung derajat* competition on sparring category. The following is the validation of each expert.

#### 3.1 *Tarung Derajat* Expert

The final result of the *tarung derajat* digital-board system design display can be seen in the Fig. 1.

The mechanical design of the control center consists of several buttons/panels that function as information providers. Information in the form of values or points obtained by the fighter. The buttons as data information providers are in accordance with the regulations that apply to fighting degrees. The control board is controlled by the judges who judge the fighters (Fig. 2).

The output of providing information through the control board is in the form of numbers presented in a special layer that is designed and adapted to the *tarung derajat* rules. The screen will provide information in the form of numbers entered by the jury through the control board. The control screen consists of 3 parts. The display screen is located on the jury which will control all the activities of the jury. So hopefully, the jury will give an objective assessment as possible.

There are 3 experts involved in this validation. Table 1 are the results of an expert review of the designs developed.

Based on the Table 1, the *tarung derajat* sports expert stated that the design of the digital fighting board system for the competition category developed by this researcher would be in accordance with the actual assessment conditions. so that it can be used in the assessment of the *tarung derajat* competition in the sparring category. The results of the validity test of *tarung derajat* sports experts obtained a percentage of 87.3%, it can be interpreted that the design of the kick speed instrument with digital-based dynamic targets has the “Decent” category.

**Table 1.** Expert Validation

No	Expert	P	N	%
1	First	50	44	88
2	Second	50	42	84
3	Third	50	45	90
				87,33333

**Table 2.** ICT/Media Expert Validation

No	Expert	P	N	%
1	First	60	57	95
2	Second	60	58	96,6667
3	Third	60	58	96,6667
				96,11111

### 3.2 ICT/Media Expert

There are 3 experts involved in this validation. Table 2 are the results of an expert review of the designs developed.

Based on Table 2, the ICT/Media expert stated that the digital system design of the competitive level fighting board system developed by this researcher would already be in accordance with the rules of media application that are easy to use and can be applied in the *tarung derajat* rating system in sparring category. The results of the ICT/Media Validity test obtained an average percentage of 96.1%, it can be interpreted that the design of the kick speed instrument with digital-based dynamic targets has the “Decent” category.

### 3.3 IT Expert

There are 3 experts involved in this validation. Table 3 are the results of an expert review of the designs developed.

Based on Table 3, the IT expert stated that the design of the *tarung derajat* digital-board system in sparring category developed by researcher would be appropriate to represent the elements of a digital-based instrument. Besides, being easy to operate, the components are in accordance with the needs. The instrument has several revisions in terms of sensor utilization. The results of the test. The validity of the expert test and measurement of Sports is an average percentage of 90%, it can be interpreted that the design of the kick speed instrument with digital-based dynamic targets has the “Decent” category.

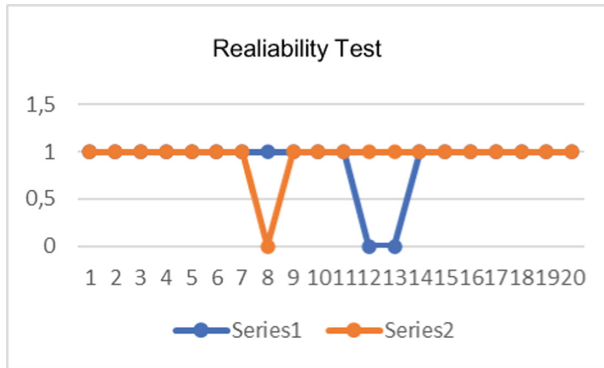
Furthermore, to see the reliability of the developed program, an analysis was carried out using the test and re-test method. Where, the calculated data is the input data of 20

**Table 3.** IT Expert Validation

No	Expert	P	N	%
1	First	50	44	88
2	Second	50	44	88
3	Third	50	47	94
				90

**Table 4.** Reliability Program

Data Count	Trial 1	Trial 2
20	Readable 18	Readable 19
Readable Percentage	90%	95%



**Fig. 3.** Reliability Test

data which is repeated 2 times. An indication of good reliability is the legibility of the information provided by the jury by the developed program. The higher the readability level, the more reliable it is. The greater the data error, the program is not reliable. Table 4 is a tabulation of the reliability test data (Fig. 3).

Based on the tests, for the first test there were 2 error data, namely inputs 12 and 13, while for the second test it was input data 8. The conclusion from this reliability test was that the program developed had high reliability, which was 92.5%.

Furthermore, to test the effectiveness of the developed program is the parallel test. Here, the researcher collects data by observing a match. In these matches, will be judged manually and by digital means. The information that will be used as data analysis is the sum of the values of each observation. The observations were made by 3 manual judges and 3 digital judges. The number of matches that are protected are 10 matches consisting of various numbers and classes. Table 5 is the data obtained.

**Table 5.** Data Table

No	Manual		Digital		Winning	Conclusion
	Red	Black	Red	Black		
1	11	8	11	7	M M	No differences
2	15	17	12	15	H M	No differences
3	9	4	9	6	M M	No differences
4	16	15	14	13	M M	No differences
5	15	12	13	12	H M	No differences
6	13	13	13	10	0	No differences
7	12	16	14	16	H M	No differences
8	11	14	10	14	H M	No differences
9	15	12	12	10	M M	No differences
10	17	20	17	22	H M	No differences

Based on these data, it is known that from 10 observations made, 9 observations/judging decide the victory at the same angle. There is one observer who gives a different decision. It is necessary to understand that there may be differences in the judgments made by the jury due to different perceptions of legal and unlawful attacks. So, it's very possible. However, when viewed from the percentage, the suitability of the assessment reaches 90%. And from all assessments, there were no program errors. In terms of program effectiveness, it can be concluded that the program can be used in *tarung derajat* competitions of all numbers and classes.

## 4 Conclusion

Based on the results of data processing and analysis of research data that has been carried out, regarding the development of a digital system design for *tarung derajat* digital-board system in sparring category, it is concluded that the *tarung derajat* digital-board system can be said to have high validity so that it is feasible to be developed into one of the a digital-based scoring system that can be used in the assessment of category-level combat with a percentage value of 91.3%.

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