

Web-Based Assessment to Measure Students' Understanding Level in Table Tennis Material

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Abstract. The purpose of this study was to develop a web-based assessment instrument for table tennis courses. The approach used was a qualitative and quantitative approach, using the Borg and Ghall research and development model. The subjects were 30 students in the Physical Education Study Program taking a table tennis course (small trial) and 90 students (large trial). The study was conducted at the Faculty of Sport Science, State University of Medan. Data collection techniques used tests and questionnaires. The results of the study were analyzed through validation tests, small-scale field trials, and large-scale field trials. The expert validation test for the web-based assessment was categorized as very good (84%). The small-scale field trial showed that the web-based assessment was categorized as adequate (85%). The large-scale field trial showed that the web-based assessment was suitable for use (89%). Based on these results, the web-based assessment can be used as an assessment tool to measure students' understanding of table tennis.

Keywords: Assessment, Material, Table Tennis.

1 Introduction

Assessment is the process of collecting, analyzing, and interpreting information from student learning outcomes to determine their development and the effectiveness of learning. In the learning program, assessment is an inseparable part. To measure the success of learning, educators can use various methods, one of which is authentic assessment. Some important indicators in assessment include ensuring the instrument matches the aspect being measured, instrument validity, the assessment process, and the objectivity of the assessor. In general, assessment aims to measure three aspects: attitude, cognition, and skills.

The development of digital technology has greatly influenced the education system in Indonesia. For example, teachers use digital media to deliver learning materials, and also use applications to improve efficiency and effectiveness in assessment. Ideally, Physical Education lecturers should also integrate digital technology into their teaching, including assessments. By doing so, assessments become more efficient. Field observations show that teachers who still rely on manual assessments, such as paper-based quizzes and tests, face challenges: (a) teachers become fatigued when checking many students' answers, reducing assessment objectivity, (b) grading takes a long time, and gathering large groups of students for exams at the same time is difficult. To overcome these problems, innovative solutions are needed. One effective solution is web-

based test instruments that are efficient for measuring students' understanding in table tennis courses. These instruments can be accessed using smartphones or laptops connected to the internet, making it easier to manage assessments for large classes and allowing more flexible test schedules.

2 Literature

Assessment is a very important process in the stages of learning [1]. In practice-based learning such as physical education, assessment involves affective, cognitive, and psychomotor components through physical activities. Learning assessment is not only an administrative report of students' achievements, but more importantly, it serves as a source of information for educators to design and provide learning that meets students' needs. This way, the results of assessment can be used to deliver differentiated learning [2]. Authentic assessment encourages students to produce, integrate knowledge, and complete tasks that are closely related to the competencies needed in real-life situations.

When assessment is carried out properly, it provides many benefits. One of them is that assessment results can serve as feedback for students, allowing them to reflect on their previous learning experiences [3]. For example, students who obtain unsatisfactory results can, either independently or with guidance from teachers or parents, reflect on which parts of the learning process have not been optimal and what needs to be improved in the future [4]. In preparing assessment instruments, there are seven principles that should be followed:

- a) Objective – Assessment must have clear procedures and criteria, and the assessor should not be influenced by other factors that may reduce the quality of judgment.
- b) Integrated – Assessment should be planned, aligned with learning activities, and carried out continuously.
- c) Economical – Assessment should be efficient and effective in its planning, implementation, and reporting
- d) Transparent – The procedures, criteria, and basis for decision-making in assessment should be accessible to all relevant parties.
- e) Accountable – Assessment must be justifiable, both technically and procedurally, to internal and external stakeholders
- f) Educative – Assessment should encourage and motivate both students and teachers.
- g) Systematic – Assessment should be conducted in a structured manner, step by step, following established procedures.

The techniques and instruments used in authentic assessment include assessments of attitudes, knowledge, and skills [5]. These can be explained as follows:

- a) Assessment of attitudes (a) Observation: Continuous assessment using direct or indirect observation with the senses. (b) Self-assessment: Asking students to identify their own strengths and weaknesses in achieving competencies. (c) Peer assessment: Students evaluate one another's competency achievements. (d) Journal: Teacher notes, both inside and outside the classroom, containing observations of students' strengths and weaknesses related to attitudes and behavior.
- b) Assessment of knowledge (a) Written tests: Multiple-choice questions, fill-in-the-blank, short answers, true-false, matching, and essays. (b) Oral tests: A list of questions asked directly to students. (c) Assignments: Homework or projects completed individually or in groups according to the nature of the task.
- c) Assessment of skills (a) Performance tests: Requiring students to demonstrate skills in carrying out an activity or behavior according to competency demands (b) Projects: Learning

tasks that involve planning, implementation, and reporting either in written or oral form within a certain time frame. (c) Portfolio assessment: Evaluation based on a collection of all student work.

3 Method

This study used the Research and Development (R&D) method (Borg and Gall) [6]. The study was conducted over a six-month period, from April to September 2025, at the Faculty of Sport Science, Medan State University, Indonesia. The subjects were students actively participating in table tennis courses. The data consisted of assessment feasibility data, based on the process and achievement of objectives. The data collection techniques used questionnaires and tests. Data were analyzed using a percentage formula.

4 Result and Discussion

The result of this research is an assessment application to measure students' knowledge in table tennis. This assessment was designed based on the needs analysis but is administered through an application. The design of this research product can be seen on the assessment instrument website developed in this research <https://ujiantenismeja.site/>. The use and description of the contents of this assessment application are carried out by clicking the link, using the email address as the username and their student ID number as the password. The username and password can be changed for security and to make it easier for participants to remember. Then there is an exam room menu where participants can view questions and start the exam. Before the exam begins, participants will receive an exam code, which serves as a key (token) to enter the exam room. The token will be sent through the application system. There are also exam rules and regulations as prerequisites before using the application as an exam medium. To ensure the exam runs smoothly, participants must be aware of things to avoid and pay attention to during the exam. A brief description of how this application is used by students (users) is as follows. First, students log in using the username and password provided by the administrator. After logging in, students will see the instructions and rules for the exam. Then, they proceed by clicking the "Start Exam" menu to begin. The question page will display the exam duration and answer options.

Testing the feasibility of this application was carried out through four stages, namely the expert validation stage, small-scale product trials, small-scale product trials, and effectiveness testing. The first stage of expert trials involved instrument experts and media experts with the aim of conceptually examining the reliability of the instrument in measuring the level of student understanding of the table tennis course material. The analysis results from the instrument validator assessed the web-based table tennis instrument to have a good category of feasibility (92%). And the media expert also assessed the media aspects and functionality of this instrument to be in the good category (88%). Based on the results of the analysis of the two experts, it can be concluded that conceptually the web-based table tennis instrument is worthy of continuing with empirical product testing.

After expert validation, a small-scale field trial was conducted. This trial was conducted to determine the practical level of use of the table tennis instrument by users and the instrument's feasibility as an assessment tool for students in the table tennis course. This trial involved 30 students. The trial procedure began with socialization and preparing the necessary devices such as the availability of the application on students' Android devices/laptops, the availability of an internet connection, scheduling, and ensuring that users are ready to operate the application correctly. This stage is important to ensure smooth implementation and objective assessment

results. After this preparation, students began testing using the application-based instrument developed in this study. At the end of this trial, students, as users of this research product, filled out a questionnaire to obtain responses and provide feedback on the instrument's feasibility. Based on the questionnaire data analysis, the trial subjects responded that the web-based table tennis instrument had a feasibility level of 88% (good). This means that practically, this instrument can be used by students in the table tennis course assessment process without experiencing any obstacles.

After the small-scale trial, a large-scale field trial was conducted. This trial was conducted to determine the practical level of the table tennis instrument for a larger number of users. This trial involved 90 students. The trial procedure began with socialization and preparing the necessary devices such as the availability of the application on students' Android devices/laptops, the availability of an internet connection, scheduling, and ensuring that users are ready to operate the application correctly. After this preparation, students began testing using a web-based application instrument. At the end of this trial, students, as users of this research product, filled out a questionnaire to obtain responses and provide feedback on the instrument's feasibility. Based on data analysis, the trial subjects responded that the web-based table tennis instrument had a feasibility level of 91% (very good). This means that practically this instrument can be used by students in the assessment process for table tennis courses without experiencing difficulties.

Following the large-scale trial, a product effectiveness test was conducted to determine whether the web-based table tennis instrument was superior to the traditional manual instrument used as an assessment tool in table tennis courses. This trial involved 30 students (the experimental group) and 30 students (the control group). The trial procedure followed a one-shot case study, beginning with treatment and continuing with observation. The results of the effectiveness test data analysis are depicted in the following graph.

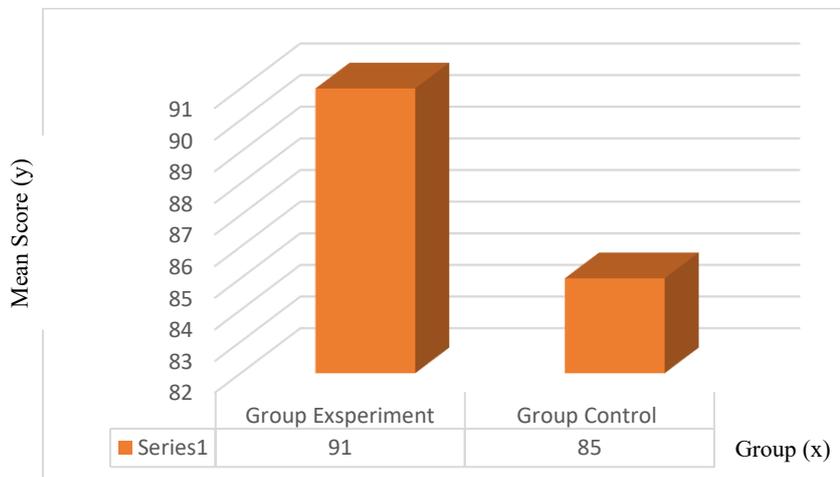


Fig.1 Mean Score of Experimental Group and Control Group

Fig.1 above is a graph consisting of the x-axis (horizontal) of the treatment group and the y-axis (vertical) of the average value. Based on the average value displayed in the graph, it shows that the experimental group obtained an average value of 91 and the control group obtained a value of 85. Based on these values, it can be interpreted that the experimental group was higher than the control group. Thus, it can be stated that the use of a web-based table tennis instrument in

measuring the level of student understanding in the table tennis course is better than manual assessment (written test).

Based on observations and student responses, the experimental group performed better than the control group because the experimental group used a web-based exam. Students taking exams using a web-based app are more transparent and efficient. The level of transparency is seen in the more objective exam results, and scores can be viewed directly in the app [7]. Therefore, with exam conditions like this, students are more motivated to take the exam and also study. This is different from students who take exams using manual instruments (written tests) [8], where scores are not immediately visible, educators must conduct checks that last for weeks, giving rise to various assumptions. Some students even feel they are able to answer the exam questions but their scores are unsatisfactory. From an educator's perspective, the benefits of using app-based instruments can be seen in three aspects. First, in terms of process, it makes it easier for educators to conduct cognitive assessments on a large number of students simultaneously. Second, using apps is more cost-effective and practical in distributing exam questions. Third, analyzing student answer data is more efficient and objective, so that exam results can be provided directly to students after the exam [9]. For students, the benefit of this app is that it simplifies the exam process, because it can be done using an Android device without the need for paper answer sheets [10]. The availability of exam results immediately also increases student motivation to improve their learning. This app-based exam provides a sense of comfort, fun, and flexibility for students.

5 Conclusion

The application-based instrument developed in this study is feasible to be used as a tool to measure students' understanding in the table tennis course. Therefore, it is recommended for educators who wish to assess students' comprehension of table tennis material to make use of this application instrument. However, it should be noted that the content of the questions in the application can be adjusted according to the desired level of achievement.

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