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The application of hand-eye coordination test guidelines for table tennis using audio visual media

Dennis Dwi Kurniawan[1], Alfonsus Maria Bandi Utama[2], Rizki Mulyawan[3]

[123] *Faculty of Sport Science, Universitas Negeri Yogyakarta, Jl. Colombo Yogyakarta No.1, Karang Malang, Caturtunggal, Kec. Depok, Kabupaten Sleman, Daerah Istimewa Yogyakarta, 55281, Indonesia*

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Abstract

Distance learning in the field of sport education, particularly at the university level, is well suited to independent and structured learning. In the table tennis course, it is necessary to identify the initial ability of PJKR FIK UNY students' hand-eye coordination through the use of audio visual based test guidelines. The method for administering the test is provided during distance learning. This test guideline's application includes experimental research using the pretest-posttest design method. The sample consists of PJKR FIK UNY table tennis students drawn at random from a class of up to 40 students. This study was conducted from February to April 2021. The analysis results of the Paired Sample Test data obtained a value of sig = 0.000 <0.05, the conclusion from the test results is that there is a difference in the effect of hand-eye coordination abilities in table tennis games between before and after being given test guidelines using audio visual media. The conclusion from the application of test guidelines using audio visual media can improve the results of the hand-eye coordination test for PJKR FIK UNY students.

Keywords: Table Tennis, Hand-eye Coordination, Audio Visual Media, Distance Learning.

INTRODUCTION

The government expects students to study from home during the COVID-19 pandemic, according to Circular Letter Number 4 of 2020 concerning the Implementation of Education Policies in the Emergency Period for the Spread of Corona Virus Disease (COVID-19). Learning from home is the best temporary solution, but there must be some weak points in this new learning system that become deficiencies in the learning process, beginning with the socialization system between students and teachers, summative and normative assessment systems, practical learning systems, and many other weaknesses of this new learning system. The education system perspective now prioritizes distance

Correspondence author: Dennis Dwi Kurniawan, Yogyakarta State University, Indonesia.
Email: dwikurniawan@uny.ac.id

education as the most effective system in the 21st century (Lenar, Artur, Ullubi, & Nailya, 2014).

During the online or distance learning period, innovations that can improve optimal learning outcomes independently are needed. (Abidah, Hidaayatullaah, Simamora, Fehabutar, & Mutakinati, 2020) stated that there are both advantages and disadvantages in distance learning due to the covid-19 pandemic. The example of the advantage is that it will adjust us to the development of industry 4.0 in the distance learning system. Whereas for the disadvantage, it focuses on the social aspects and students' personality values which cannot be clearly and obviously seen in their development. The same thing was conveyed by (Coman, Țîru, Meseșan-Schmitz, Stanciu, & Bularca, 2020) regarding the results of their research in Romania that higher education institutions in Romania are not prepared for online learning exclusively. Thus, the advantages of online learning identified in other studies appear to be diminishing in value, while the disadvantages become more stand out. The condition of physical education learning in Korea during the COVID-19 pandemic also has several essential problems that resulting in physical education learning which is not being able to run properly, including limited and monotonous physical education practices, lack of teachers and students ability in technology operations in online learning, very limited online evaluation guidelines especially on practical learning (Jeong & So, 2020).

The learning process in the sports field is categorized as low, with 68 percent of students reporting that they are bored and 32 percent reporting that they are not bored (Septian Raibowo & Yahya Eko Nopiyanto, 2020). Sports students face numerous limitations, such as limited infrastructure, the implementation of practical learning without lecturer supervision, the evaluation of learning outcomes that are not optimal due to online learning processes, and systems that are still manual and lack of clear guidelines. These outcomes are also seen in the table tennis game practice course. (Hariyanto, 2020) who stated about the popularity of the table tennis game which has become one of the various

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branches of easy, inexpensive, and recreational game sports and is widely played by all people in the world. This is also proven in sports education field, where the option of table tennis game course is chosen by more than 50% of the 2019 batch of students in the PJKR FIK UNY major and is divided into 2 classes.

Technical, physical and psychological principles have become a guideline in table tennis game. The technique of grip, ball control, stroke, and footwork shown in table tennis game need to be mastered as a technical principle. (Geske & Mueller, 2017) conveyed that "We do not play table tennis to demonstrate technique in textbooks, but to win, and to win we requires good technique. However in our opinion, many coaches place too much emphasis on perfecting hitting techniques rather than showing how and when they can be used to win points" Mastery of technique in the sport field requires regular, measurable and sustainable training and guide by experts such as coaches or sport teachers who master a sporting specification in this case is table tennis game in order to become a quality player (Hariyanto, 2020).

The main components of playing table tennis are arm skills and visual sense abilities, although they are not the only aspects, table tennis attracts significantly on the coordination ability or motor skills of players (Limoochi, 2012). Motor skills have an important role for optimal results and forehand topspin accuracy between those who follow mass training and distributed training also have significantly different results with those who have higher and lower hand-eye coordination (Kane, Mishra, & Dutta, 2016). Table tennis players need to develop extraordinary technique or skills, the ability to switch quickly to adjust the stroke technique, flexible and fast footwork, the ability to anticipate or hand-eye response, proper positioning, and control (Akpinar, Devrilmez, & Kirazci, 2012). In the implementation of table tennis learning, it is also necessary to identify basic abilities that must be identified at the beginning of learning to determine initial abilities so that the material can be given appropriately. Each test given both at the beginning and at the end of the

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activity aims to obtain information. The data or information can be obtained through instruments. Trainers, lecturers or teachers then can take measurement to the respondents (Pasaribu, 2015).

The application of the blended learning method among university students has become an easy thing because the knowledge level of students has entered the analysis stage to be creative. In the sport department there are still many weaknesses, on the research results that have been submitted it is conveyed that sports educators only implement some of the existing learning designs, the assessment based on the collection of assignments and exams is 100%, while those who say that online learning assessments are not effective are 83.3%, and 50% students have difficulty accessing the internet in online sport education learning (Putra, 2020). The research above illustrates that innovation in online learning is needed, one of which is using the Blended Learning method which can increase creativity and critical thinking in distance and face-to-face learning systems (Kashefi, Ismail, & Yusof, 2012). Google classroom is an effective application and the assignment system using multiple choice questions becomes an efficient and easy-to-understand system during distance learning, but obstacles occur in the practical aspect of assignments that are not effective in their respective implementations (Sutapa, 2020). Learning media that can guide students independently in the sport characteristics of the psychomotor sector is still being a problem during this online learning period, so it is important to provide the best solution related to that main problem.

Statements of research findings about learning to use audio-visual media can help people understand more effectively. Each learning media has its own characteristics, so when selecting media, it is important to consider the learning outcomes, limitations, and conditions that will be encountered. Media refers to the system used to present instructions, such as book-based media, video-based media or computer-based media (Gambari, Yaki, Gana, & Ughovwa, 2014). Reciprocal learning outcomes through audio-visual media about deepening the shot put technique have

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an optimal impact on learning outcomes, so that many students are able to carry out the technique with better results (Kok, Komen, van Capelleveen, & van der Kamp, 2020). Distance learning that supports learning outcomes requires appropriate learning media, one of which uses an online model (e-learning) and the use of technology for the implementation of learning activities (Othman, Mohamad, Yusuf, Yusof, & Suhaimi, 2012). One of the benefits from using media in learning is as a medium to make the learning process becomes more interesting, clearer and optimal in understanding, efficient, so that the quality of student learning will increase (Rumahorbo, 2020).

Based on the results of the research above and the results of observations of table tennis practice learning in the PJKR FIK UNY study program which has several weaknesses from the perspective of lecturers and students, including there is no data on students' initial ability to play table tennis, there are no table tennis skills test results in terms of supporting biomotor components, table tennis playing skills as a standard for improving students' skills in table tennis game courses and do not have practical learning guidelines yet and an online-based evaluation system through social media such as youtube which can be accessed by students at any time to anticipate distance learning conditions. Therefore, the researcher tried to apply audio-visual media-based test guidelines for the table tennis game hand-eye coordination test which was carried out by PJKR FIK UNY students independently as an alternative solution to one of the problems contained in the table tennis game course of the PJKR FIK UNY study program. The purpose of this study was to determine the differences in the results of the table tennis game hand-eye coordination test obtained by students after applying the audio-visual and print media test guidelines.

METHOD

This research applies an experimental method with a quantitative approach, as well as a pretest-posttest design. The pretest was held in the second week of February 2021, and online learning was carried out in 16

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meetings using the Google Classroom and Google Meet applications for assignments and discussion of material, both theoretical and independent practice results. The posttest was carried out in the third week of April 2021 during the lecture mid-test, where the pretest and posttest data were collected by giving handling to the table tennis game hand-eye coordination test, which type of test used part of the basic table tennis techniques, namely forehand and backhand strokes that is carried out with a throw and catch system the same as hand-eye coordination test. During the pretest only written media was used and at the posttest additional audio-visual media were given as a guide for the table tennis game hand-eye coordination test. There were 40 students who were taken using a random sampling system with the distribution of 20 male students and 20 female students. The anthropometric details of the test participants were 20 men and 20 women with an average height of 162 cm for male participants and 62 kg in weight. While the female participants with an average height of 151 cm and a weight of 49 kg.

The procedure for implementing the table tennis eye-hand coordination test for PJKR FIK UNY students independently requires detailed guidelines, both in writing for the rules and movement techniques, the audio-visual media will focus on technical rules and the appropriate flow of motion according to the type of test. The following will provide a summary of the explanation regarding the written test guidelines:

Test Execution Instruction.

1. The timing of using the table tennis game hand-eye coordination test instrument was carried out at the beginning before the lecture started to determine the participants' abilities as a learning evaluation material. It is also carried out at the end of the lecture as a form of increased reliability participants' hand-eye coordination ability after participating in table tennis game learning.
2. The assessment subject was carried out on PJKR students who took part in table tennis lectures in semester 4 as many as 40 students and carried out online or induvidually in their learning environment.

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3. The test execution instruction is using a video tutorial guide sent by researcher to students, then participants prepare facilities or infrastructure according to the standards that have been delivered in the video tutorial, the scoring system uses 2 main items, namely the success rate of throwing and catching for 30 seconds of implementation and movement skills.
4. The flow of the Test Execution is by preparing the facilities first, then preparing the measurement of the test place as shown in Figure 1. Test participants are allowed to try out to learn the way or technique of the hand-eye coordination test for this table tennis game. After all the test instruments are ready and the facilities are adequate, then the test is carried out by paying attention to the tester as a guide for the implementation of the test. The allocation time for the Test is 30 seconds, then the number or total of successful throws is taken, the test is repeated 2 times by each participant, which is taken as the test result is the best result.
5. The results of the test documentation video must appropriate with the established rules, such as the accuracy of the angle of the documentation taking, the documentation flow, and a clear evaluation system on the video that has been made.

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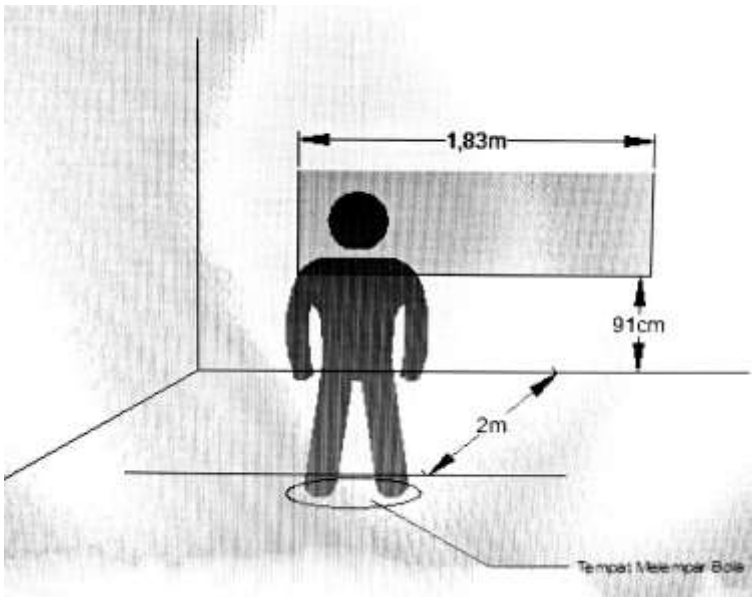

Figure 1. The Design of the medium for the Implementation of the Table Tennis Game Hand-eye Coordination Test (Faber, Oosterveld, & Nijhuis-Van Der Sanden, 2014)

Summary of test execution guidelines:

1. Place of the test is shown as the figure above.
2. Instruments used: consist of 3 table tennis balls, scoring rubric, stop watch.
3. The test taker is standing just behind the line, during the implementation it is not allowed to cross the boundary line.
4. Using one hand to do throw catch, the other available ball is placed on the side of the court.
5. The duration of the test is 30 seconds, the tester gives a starting signal as the beginning of the test, the throwing technique uses a forehand or backhand technique.
6. During the test, the ball must bounce on the available target area, both on the wall and on the floor in front of the standing boundary line.
7. Obtaining 1 score is calculated starting from the throw that is appropriate to the correct hitting technique until it re-caught by the same hand.

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8. The ball that ia failed to be caught should be left and it is beter take the spare ball on the closer side of the court.
9. The final results obtained from successful throws for 30 seconds are added up and become the final score for the table tennis game of hand-eye coordination test.

Table Tennis Game Hand Eye Coordination Test Flow

1. Learn The Test Guidelines and Video Tutorials.
2. Prepare Places, Facilities, Test Officers and Test Instruments.
3. Do a try out.
4. Test Execution.
5. Rubric Filling and Test Legality.
6. Make sure the Documentation Video has been recorded.
7. Send the test data (Rubric and Video).

Meanwhile, the test guidelines that use audio-visual media provide many examples of technical movements for test participants to throw and catch motions, for an understanding from the point of view of motion judgment. An explanation of the general test rules and the flow of the test is only given as an outline. Here's a link to access the test guidelines using audio-visual media https://www.youtube.com/watch?v=mQ8lAkaYYKg, this video can be accessed on YouTube's social media online.

RESULT

The results of the initial test and final test are taken independently according to the guidelines provided, the initial test uses only written media and the final test uses written media and audio-visual media. The number of participants was 40 students, with an average successful throw of 15 pretest and 17 posttest. Before the pretest, a written test guide was given in the form of a written sheet and before the posttest, additional test guidelines were given in the form of a video tutorial test (audio visual).

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Table 1. Result data of the table tennis game hand-eye coordination test

n	Pretest (mean)	Media Audio Visual	Posttest (mean)
40	15	X	17

Table 2. Result data of the one-sample kolmogorov-smirnov

		Pretest	*Posttest*
N		40	40
Normal Parameters[a,b]	Mean	15.1500	16.9000
	Std. Deviation	2.7414	2.6390
Asymp. Sig. (2-tailed)		.096[c]	.049[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

Based on the results of the Kolmogorov-Smirnov one-sample test, the sig value> 0.05 was obtained, so it could be concluded that the data were normally distributed.

Table 3. Result data from the statistical analysis of paired samples test

		Mean	Std. Deviation	t	df	Sig (2-tailed)
Pair 1	Pretest - Posttest	-175.000	.58835	-18.812	39	.000

Based on the results of the Paired Samples Test, the value of sig = 0.000 <0.05, so it can be concluded that there is a difference in the effect of hand-eye coordination in table tennis games between before and after being handling on test guidelines through audio-visual media.

DISCUSSION

The results of the initial test (pretest) in terms of successful throws by 40 students were obtained an average of 15 successful throws and the results of the final test (posttest) were 17 successful throws. The duration of the test is 30 seconds. The purpose of this study was to determine the application of the hand-eye coordination test guidelines for table tennis games using audio visual media which were carried out independently by PJKR FIK UNY students during distance learning.

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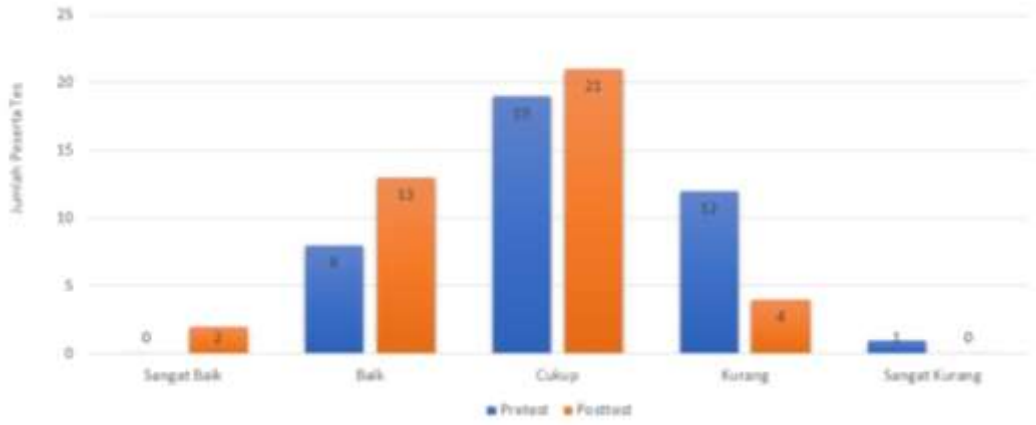

Figure 2. Results diagram of the Table Tennis Game Hand-Eye Coordination Test (Pretest and Posttest)

Table tennis requires hand-eye coordination to improve the ability to control the ball, agility, speed, and reaction to the ball according to the branch's specifications (Vandorpe et al., 2012). From the number of 40 students, assessed from the success rate of throwing eye-hand coordination tests on the pretest assessment as many as 0 students in the very good category with a percentage of 0%, in the good category as many as 8 students with a percentage of 20%, in the sufficient category as many as 19 students with a percentage of 47, 5%, in the less category as many as 12 students with a percentage of 30%, and in the very poor category as many as 1 student with a percentage of 2.5%. While the results of the hand-eye coordination test on the final test or posttest are in the very good category as many as 2 students with a percentage of 5%, in the good category as many as 13 students with a percentage of 32.5%, in the sufficient category as many as 21 students with a percentage of 52.5%, in the less category as many as 4 students with a percentage of 10%, and in the very poor category as many as 0 students with a percentage of 0%. In this study, the test guidelines used different media during the pretest and posttest, so that the difference in test results was seen that increased after applying audio-visual media to the posttest results regarding the ability of hand-eye coordination of the table tennis game of PJKR FIK UNY students.

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The purpose of this study was to determine the results of the application of the hand-eye coordination test guidelines for table tennis game using audio-visual media for PJKR FIK UNY students. The result obtained is that the table tennis game students' of the PJKR FIK UNY hand-eye coordination ability increased after using audio-visual media-based test guidelines in the final test. This is in line with the results of proprietary research (Kok et al., 2020) that learning outcomes through audio-visual media about deepening the shot put technique have an optimal impact on learning outcomes, so that many students are able to perform the technique with better results. Physical education learning objectives in terms of motor skills are easier achieved with the use of targeted aids (Ste-Marie, Carter, Law, Vertes, & Smith, 2016).

Motor identification tests in racket sports must have guidelines that match the specifications as well as the appropriate instruments in order to achieve branching qualifications effectively (Ackerman, 2014). The table tennis game hand-eye coordination test in this study has a test guideline that uses audio-visual media that focuses on motion analysis so that test participants, who are PJKR FIK UNY students, can follow the understanding of movement skills. The qualitative description resulted in many students being able to follow every flow of motion carried out by the demonstration in the video tutorials that were already provided at the posttest. By doing so, technically the movement skills of the test implementation, students have been helped apart from the fact that students have mastered the rules of the test and gained initial experience during the pretest on test implementation strategies in order to get more optimal results at the time of the posttest (Morillo-Baro, Reigal, & Hernández-Mendo, 2015; Potdevin et al., 2018). The results of this study are in accordance with research which states that it is easier for students to understand the material using media according to their characteristics such as the use of technology as a learning medium (Puspitarini & Hanif, 2019).

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The ability of hand-eye coordination is very necessary as an identification of the basic skills of playing table tennis, in addition to the coordination test that has been adjusted to the specifications of one of the basic techniques of playing table tennis, hand-eye coordination is indeed one of the most important components, namely focusing on the accuracy of throwing at the target and catching the ball at its best timings. This is also in accordance with the idea that to measure potential one does not have to assess certain sport skill on their own to limit the influence of training or learning experiences (Klarich, 2015). It is hoped that students who have obtained the test results will know their basic abilities and later when the learning begins, students can practice their coordination skills and learn all the basic techniques of playing table tennis game to get more optimal learning outcomes.

Obstacles to distance learning implementation, such as independent practice tests, continue to occur; many educators persist to underestimate the implementation of distance learning and believe that distance learning is easier than traditional learning (Coman et al., 2020; Semradova & Hubackova, 2016). Following the development of industry 4.0 and the development of learning media during the pandemic, the sport education field should also create many innovative works, particularly for learning services to students that are effective, efficient, and of high use value, and teachers who continue to develop their abilities to be creative and innovative with learning technology (Simbolon, 2014; Yusnilita, 2020). The limitation of this study is that there is no direct supervision of the subject so that the results of the increase during the test are feared to be influenced by other factors. This research is only limited to PJKR FIK UNY students in the table tennis course, it is hoped that it can be developed and applied outside the field of education as a basis for the basic abilities of table tennis players widely.

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CONCLUSION

The application of hand-eye coordination test guidelines in table tennis game based on audio-visual media for PJKR FIK UNY students independently resulted in an increase in the results of the table tennis game hand-eye coordination ability. Even though face-to-face learning is definitely needed in the sport education field, with a higher percentage of meetings that use psychomotor aspects or physical movement analysis, the teacher needs to create more innovation in the online learning or distance learning period so that students as learners can get maximum benefits and the learning outcomes are also optimal.

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