

TennBasTech: A Scientific Approach to Teach Tennis

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Abstract From a curriculum perspective, technology has two meanings; as a tool and as a system. Technology as a tool supports the learning process, and technology as a system is related to the curriculum planning stage. Both curriculum planning and technology are objectives. Appropriate technology in every learning or training during the COVID-19 pandemic is expected to apply effectively and efficiently. The expected situation does not work as well as it should be. Therefore, this study investigates the effectiveness of using Android-based TennBasTech application technology to teach tennis with a scientific approach to young athletes aged 10 to 11 years. This study used an experimental method with a pretest-posttest-one-group design to test TennBasTech application in the scientific approach to teach tennis. The instrument used is the service accuracy test, the Groundstroke Forehand test and the Backhand drive test. The sample consisted of 35 participants of both male and female students. As a result, applying a scientific approach using the TennBasTech Android-based application contributes significantly in supporting young athletes to learn tennis at home. It is due to participants' interest in using some of the features in the application to help participants learn every movement well repeatedly. The limitation in this study lies in the form of evaluation that must be carried out by students not yet listed in the application. So for the following application development, research must include an evaluation model to make it easier for students to control their abilities.

Keywords Android-Based Application, Scientific Approach, Tennbastech, Tennis, Young Athletes

1. Introduction

Amid the COVID-19 pandemic, everyone must continue taking various preventive measures, including always maintaining a healthy lifestyle [1]. It is essential to be able to maintain our body's immunity by exercising regularly [2]. [3] explained that the more we are at home, the more we must be more competent in doing everything because we do not do high mobility on regular days before the pandemic. Therefore, to avoid lack of movement during a pandemic, it is necessary to have programmed and planned activities every day. Lack of movement will lower the body's immunity, so that it increases the risk of being infected with the virus. Physical activity and moderate-intensity exercise can increase the immunity the body needs during the Covid-19 pandemic. However, various sports facilities do not operate as usual. It becomes difficult, especially for beginners who have just entered the world of sports but are constrained by intensive training in the field [4]. The use of technology presents to try to bridge all the difficulties experienced by the community.

The growth of science and technology encourages improvement in the technology used in the learning process. The use of technology has been empowered in the learning process, as it virtually encourages and provides actual learning conditions. [5] explained that the rapid growth of technology also affects people's lifestyles significantly. Moreover, it affects the mode of mass

communication through our daily activities. Besides, another effect is the trend of using high-cost exercise media for particular exercise models. This phenomenon is not sufficient for physical activity. Therefore, children need to be given simulations or examples in each activity [6]. Thus, we need media that can assist in training activities and be well-used in every physical activity. The use of this type of media is expected to boost potential impact to one's self quality in learning particular things [7].

The development of the android operating system; includes the use of gadgets, tablet PC, smartphones, and other applications that have other android operating systems; it can support students to own and use android in their everyday life. The use of smartphones is currently widespread in the world; the same goes for Indonesia. The smartphone can have a considerable impact on human life and provide a lot of convenience in its use [8]. However, most people use smartphones only as a tool for social media. A smartphone to support other purposes, such as teaching and learning, sports activities, and other human work, is not popular. Today there are many applications offered, on the one hand, making it easier to find any information needed. Some of them are android applications that can simplify the fulfillment of human needs. Android is a Linux-based operating system designed for touch screen mobile devices such as smartphones and tablet computers [9].

The developments in digital technology have presented significant new opportunities and challenges for educators and sports coaches. Up until now, however, the main emphasis is on how to grant access. Policymakers still assume that schools will generate automatic benefits, regardless of how the technology is used [10], [11]. Many teachers and trainers resist the intrusion of technology in the classroom or are not even IT literate, often for excellent reasons. They believe that the evidence for how technology improves student achievement is minimal [12].

The definition of multimedia can be various. It depends on from which perspectives it is viewed. In general, multimedia relates to the use of more than one type of media to present information. Multimedia is increasingly being used to deliver computer-based instructions. One cause behind this trend may be the assumption that multimedia information helps people learn. Multimedia learning may help people to learn more information faster than traditional classroom lectures. However, excessive utilization of multimedia does not constantly improve learning. Based on the research conducted by [13], the condition occurs when media is presented to students with low prior knowledge or aptitude in the domain being studied. Nevertheless, there is also empirical support concluding that certain multimedia can help people learn certain types of information.

Multimedia is defined as text, graphics, animation,

images, video, and sound to present information. Since these media can now be integrated using computers, there has been a virtual explosion of computer-based multimedia learning applications [14]. This application covers serious computer-based tutorials for adults to products for kids. This very diverse application seems to share general multimedia information that helps people learn [15]. People enjoy multimedia, prefer multimedia learning materials, and believe that multimedia can positively impact children's learning outcomes. Likewise, in Sport as the field of accomplishment, especially in tennis, using technology is expected to be a supporting medium for athletes during their training to achieve their best performance [16].

In a tennis game, it is necessary to master the basic techniques properly. However, how can these basic techniques be delivered appropriately without making the participants bored while facilitating the needs of their age in current situations? We should remember that they are novice athletes aged 10 to 11 years classified as elementary school-age children. It may be the first time they are involved in tennis. They love to be actively moved around, but they need to learn the importance of positive values in their activities [17]. The statement [18] states a transition in their activities in children aged ten years. Movement education comes as a solution. It emphasizes large muscles, activities by changing direction and tempo of running and playing with opponents to channel the instinct to compete (needs coaching in sportsmanship, collaboration with leadership). Therefore, as this research's initial step, the author tried to apply a shadow training pattern using games to support basic technical skills in doing strokes and footwork abilities [19]. The results of research [20] explain that game-based tennis lessons have a beneficial effect on athletes' physical fitness levels and movement coordination and can better improve their memory. Another research related to indirect teaching tennis utilizing LMS as technology-driven tools has been done successfully.

Beginner-level tennis players need to be given basic tennis training augmented with the sense of a game using technology-based Android applications. The content includes various exercises with game activities: The TennBasTech (Tennis Basic Technique) game. TennBasTech is the author's android design developed from the previous tennis training model for beginners, the GUSTA model. TennBasTech consists of ball handling, forehand, backhand, seven balls drill exercises to practice ground-strokes drill consistency, Mini Tennis Handball for hand-eye coordination, Pick-Put to learn to move quickly in all directions, and so on. If done intensively, the above exercise is ideal for building muscle memory [21], especially if shadow training is started with the warming-up. It will further sharpen the level of accuracy in making strokes [22]. From a side standing position, swing the racket up over your body with your forehand;

then swing away from the body with the backhand. Do shadow drills with a trainer to check for correct footwork and strokes using shadow [23]. All tennis champions have practiced shadow training to improve technique and swing [24].

The TennBasTech has adapted the approach to the 2013 curriculum (K13), the scientific approach. K13 requires teachers to make students the center of teaching and learning activities. According to [25], the learning process at K13 for all levels is carried out using a scientific approach and touches three domains: attitudes, knowledge, and skills. [26] added that the advantages of the scientific approach could encourage students to think critically through a series of activities that require students to be more active in the learning process. The activities include observing, asking, trying, processing, presenting, concluding, and creating. So it is hoped that the application of tennis learning that is adapted to the growth and development of children can provide positive results for the progress of children in the future, both for their cognitive, affective and psychomotor aspects.

Thus far, several previous studies have just investigated issues such as the perception of training loads for beginners tennis players [27], and examining the skill of mental training factor of junior athletes [28], the research on the physical ability capacity of junior tennis athletes [29], the research on collecting devices Bluetooth-based table tennis ball to android phone [30], and 3D reality table tennis game system [31]. For as long as the authors' reading, there has not been any research investigating the involvement of android technology, specifically in applying the scientific approach. Based on the background of the problem above, the authors are concerned to study this gap further, as an effort to provide a different motion learning experience for each tennis learning and practice for beginners. Thus, as a result, the authors offer the TennBasTech Model to use a scientific approach to improve tennis skills for beginners.

2. Theoretical Framework

2.1. Tennis

To become a prodigious tennis player, one should master the basic techniques of the tennis game. These basic techniques are the foundations that are vital assets to step up to become a professional or top player [32]. A player will not improve his game if it is not supported by good mastery of the basic techniques. [33] classified the essential parts in the game of court tennis are as follows:

- (a) Ball feeling; follow the run and the bounce of the ball with the player's eyes while developing the "ball feeling."
- (b) Footwork and body balance; teaching the footsteps, the shoulder rotation, and the movement of the weights from one foot to another. It should be

practiced daily so that the movements will be recorded as an automatic movement, not so different from the reflected movement.

- (c) Ready position; the ready position for the forehand and backhand is the same. The slight difference lies only in the position of the wrist. On the backhand, the racket is tilted diagonally to the left, not straight ahead.
- (d) Grip; The way a tennis player holds a racket influences his playing style, and a grip that feels good is the proper grip. Gripping the forehand is usually done by making the letter "V" shape, which is formed by the base of the thumb and index finger, while the racket's handle is perpendicular to the front.

In addition, the series of forehand and backhand drives in tennis starts with the following things: **Ready position;** (1) To learn forehand drive, hold the racket with the eastern forehand grip in such a way that the racket leaf is in a vertical position pointing straight at the net. (2) To learn backhand drive, hold the racket with the eastern backhand grip. The wrist is straight until the racket leaf is vertical, aiming at the left net post. (3) In the ready position, do not neglect to use your left hand to support the racket neck, and keep the racket leaf in a vertical position, and do not grip the racket grip tightly. (4) the parts that grip the racket's grip are the fingers of the middle, ring, and little hands. The index finger and thumb only support the racket and maintain the racket position's stability [34].

Preparation; after you see the ball being hit by an opponent (coach/friend) across the net, you start preparing for the ball by pivot to the right for the forehand or pivot to the left for the backhand, and swing the racket to the far backswing [35]. **Implementation;** the forward swing of the racket while, at the same time, it turns off the shoulders and hips. It is a step toward the ball with the racket swing—the right foot for the backhand and the left foot for the forehand. The last stage is the follow-through motion. After the racket hits the ball, swing the racket continuously forward and up, that is, in the direction of the desired ball, until the racket gradually stops itself at head level or higher [36].

Besides that, the basic technique that tennis players must master is the stance. Next, practicing typical individual shots such as serve shots, volleys, forehand drives, backhand drives, and smashes [37]. A tennis player will excel if he/she manages to develop a distinctive stroke. This individual stroke can be a forehand drive, backhand drive, hard smash, forehand spin, or sidespin ball stroke. The next step offered by [36] describes the various kinds of ground-strokes that need to be done to master the basic tennis techniques. In another section, the service is one of the essential strokes in a tennis match because the winning point largely depends on service skill.

2.2. TennBasTech Application

TennBasTech is an acronym for Tennis Basic Technique. The training model in this application is a derivative model of the GUSTA Training model for beginners, which the author initially developed in 2016. The GUSTA Training Model is also an acronym for the author's nuclear family name. The following are the exercise characteristics model in the TennBasTech application that the author has developed so that it becomes a differentiator from the previous research, as follows:

- (a) The training models in the TennBasTech application provide ball-handling; forehand; backhand; seven balls drill exercises to practice ground-strokes drill consistency; Mini Tennis; Handball for hand-eye coordination; Pick-Put to learn to move quickly in all directions, and so on. etc.
- (b) The research subjects were systematically introduced to various racket holding methods and their usages (eastern forehand and backhand, western, semi-western, and continental). How stance or standing position is prepared to hit the ball in both open stances, semi-open stance, and close stance until the foot position is used; how to step your feet when you want to chase the ball forward, sideways, or backward both steps and shifts. It is fundamental and must be practiced by beginner tennis players to develop advanced techniques after mastering the basic techniques.
- (c) The subjects of this study were categorized as beginners for their age. In tennis, children aged 10-11 years are categorized as beginners.
- (d) The Android application implements a drilling approach that allows research subjects to repeat each exercise model at home.
- (e) God has given perfection to humans since they are equipped with two arms, right and left arms. Both have the same characteristics, as well as the same opportunity to learn movements. Generally, when students/athletes are introduced to a new sport, the teacher/trainer will use one of their hands to hold the tool. Gradually, it becomes a habit. At TennBasTech, all research subjects are required to use their dominant hand frequently to hit the ball.
- (f) Field tennis requires physical components of arm muscle strength, the ball hitting and running speed, arm power, hip flexibility, and endurance [38]. The training of those physical components was given since the research subjects were introduced to balls, rackets and learn a series of basic tennis techniques.

2.3. Scientific Approach

Learning is a scientific process. Therefore K13 mandates the essence of a scientific approach to learning. In a functional approach or process that meets scientific

criteria, scientists prioritize inductive rather than deductive reasoning. [39] explained that the Scientific approach is a fundamental concept that accommodates, inspires, strengthens, and underlies the thinking about how learning methods are applied based on specific theories. [39] states that the scientific approach is the golden footbridge for development. It develops attitudes (affective domain), skills (psychomotor domain), and knowledge (cognitive domain) of students. The scientific approach is a method used to gain knowledge based on the scientific method [39]. [40] provided its conception that the scientific approach in learning includes observing, asking, reasoning, trying/creating, and presenting/communicating. The scientific method investigates one or more phenomena, acquiring new knowledge or correcting and integrating previous knowledge. To be called scientific, the search method must be based on evidence from observable, empirical, and measurable objects with specific principles of reasoning. The learning process in K13 is carried out using this scientific approach.

The learning process touches three domains: attitudes, knowledge, and skills. In the learning process based on a scientific approach, the attitude domain uses the transformation of the substance or teaching material so that students "know why." The domain of skills uses the transformation of the substance or teaching materials so that students "know-how." The realm of knowledge uses the transformation of the substance or teaching material so that students "know what." The result is an increase and a balance between students' ability to become decent human beings (soft skills) and humans who have the skills and knowledge to live properly (hard skills). It includes aspects of attitude, skills, and knowledge competencies [41]. [42] provided the conception that the scientific approach in learning includes components: observing, asking, trying, processing, presenting, concluding, and creating. These components can appear in every learning practice, but not the learning cycle.

- (a) **Observing;** The observing method prioritizes the meaningfulness of the learning process. This method has certain advantages, such as presenting natural media objects, making students happy and challenged, and is easy to implement. The method of observing is beneficial for fulfilling students' curiosity. So that the learning process has a high degree of meaningfulness; teachers should be widely open-minded and provide varied opportunities for students to observe through seeing, listening, and reading to observe learning activities. The teacher facilitates students to make observations, trains them to pay attention (watching, reading, listening) to the essential things of an object or objects. The competencies expected are those to train commitment and thoroughness in seeking information.

- (b) **Questioning;** Teachers need to guide students to be able to ask questions: questions about the observations from concrete objects to facts, concepts, procedures, or other, more abstract things. Questions that are factual to questions are hypothetical. From situations where students are trained to use questions from the teacher, they still need the teacher's help to ask questions to the level where students can ask questions independently. The second activity resulted in several questions. Through questioning activities, the curiosity of students is developed.
- (c) **Associating;** The activity of "associating/processing information/reasoning" in learning activities is to process the information collected from relatively the result of collecting/experimenting activities and observing and collecting information activities. The information processing collected ranges from those that add to the breadth and the depth of knowledge to those that seek solutions from various sources with different or conflicting opinions. This activity is carried out to find the relationship between and among information and find informational relationship patterns. The expected competencies are to develop an honest, thorough, disciplined, rule-abiding attitude, hard-working, the skill to apply procedures, and the skill to think inductively and deductively. Those can be observed to obtain conclusions in the form of knowledge.
- (d) **Experimenting;** This stage is intended to cover various domains of learning objectives: attitudes, skills, and knowledge. The real-life learning activities are: (1) determining the theme or topic following the essential competencies according to the curriculum demands; (2) learning how to use the tools and materials that are available and must be provided; (3) studying the relevant theoretical basis and the results of previous experiments; (4) conducting and observing experiments; (5) recording phenomena that occur, analyze, and present the data; (6) concluding the results of the experiment; and (7) making reports and communicating experimental results. To ensure that the experiment runs smoothly, some things need to be paid attention to. They are : (1) The teacher should formulate the objectives of the experiment to be carried out by students (2) The teacher and students prepare the equipment used (3) It is necessary to take into account the place and time (4) The teacher provides working papers to direct student activities (5) The teacher discusses the problem that will be used as an experiment (6) The teacher distributes working papers to students (7) Students carry out experiments with teacher guidance, and (8) The teacher collects student work and evaluates it. The evaluation results can be discussed classically, if necessary.
- (e) **Networking;** In the scientific approach, teachers are expected to provide opportunities for students to communicate what they have learned. This activity can be implemented through written and oral forms. The students present what they have found while seeking information, associating, and finding patterns. The teacher presents these results are presented in class and assessed by the teacher as the students' or groups' learning outcomes. The activity analysis of "communicating" in learning activities conveys the results of observing and concluding based on written, oral, or other media forms. The competencies expected in this activity are to develop honesty, thoroughness, tolerance, thinking systematically, expressing opinions briefly and clearly, and developing excellent and appropriate language skills.

3. Materials and Methods

3.1. Research Design

The method used in this research was an experimental method to determine the effectiveness of learning tennis using the TennBasTech android application. The author aimed to investigate and to decide what variables and how the relationship between one another. It determined the effect of the independent variable on the dependent variable [43].

The research was conducted twice: before and after the experiment with a pretest-posttest one-group design. The author used this research design because it fit the title of the research taken. Researchers conducted initial tests on tennis club participants to determine the extent of their ability to play tennis. After the initial test, participants were given treatment by learning several variations of tennis movements using the TennBasTech application, accompanied by parents or peer tutors. In addition, to keep control of every learning activity, the authors maintained several journal notes for each participant so that the data on each individual's ability can be seen clearly and archived.

The research used only one group: members of the tennis club. There were 35 people involved: 10 girls and 25 boys. Meanwhile, the sampling technique used was total sampling: taking the entire population as a sample. The final action taken by the author is to provide a definitive test as a post-test. It aimed to obtain comparison data from the pre-test.

3.2. Procedures

In the first stage, the author identified the children's ability to play tennis ball for two meetings; the activity was conducted face-to-face in several sessions because it

was still in a COVID-19 pandemic condition. The process of identifying the children's ability to play tennis was done by assessing it using the tennis service accuracy test and the Groundstroke Forehand, Backhand (drive) test. The researchers divided the sample into five groups to facilitate class management in implementing observation and assessment of movement skills. After getting the data, the researchers explained the steps for learning tennis using the TennBasTech android application as a tennis learning solution amid the COVID-19 pandemic.

The total variety of movements in the TennBasTech application is 38 movements. The content presented in the android application consists of several categories: (1) Introduction to Racket and Ball (28 contents in 3 categories). They are Introduction to Ball (14 contents), Introduction to Racket (6 contents), and Introduction to Racket and Ball (8 contents). (2) Forehand (5 contents) and backhand (5 contents). Each movement variation has a purpose, the use of the media used, and even a description of the implementation instructions on how to carry out each movement stage. This description makes it easier for children to learn each set of material. In the first stage, movement variations are carried out without the ball or, in other words using shadow exercises. It is to make it easier for children to learn that every movement is done correctly and adequately. The second stage of shadow uses a ball, the third stage uses a racket, and the fourth stage uses a racket and ball. Learning is carried out systematically so that the concept of motion is conveyed well, from the easiest to the most difficult.

3.3. Scientific Approach to Learn Tennis

Contextual understanding of students can be achieved by applying a scientific approach in the learning process according to the demands in K13 (Indonesian's national curriculum). Learning tennis using a scientific approach is divided into five stages: observing, questioning, gathering information/testing, reasoning/associating and communicating [44]. The steps can be seen in Table 1.

Based on table 1, learning using the Scientific Approach in K13 (Indonesian National Curriculum)

consists of 3 main activities: opening, core, and closing. The teacher conveys the competencies and benefits during the opening after studying various ball and racket control movements. The delivery aims that students can solve the difficulties of learning motion by knowing the benefits of the competencies achieved by students. The sample is 35 children aged 10-11 years of elementary school age. They were divided into five groups of 7 children, and each lesson was made into five sessions. It is done to facilitate the observation process in online teaching and learning activities. Observation activities are carried out through the zoom application. Although the learning conditions were carried out online, the classroom management in each session ran in a conducive manner. Participants were allowed to study TennBasTech material a few days before the online learning began.

After students were introduced to the application, the teacher tried to provide opportunities for students to ask questions during the learning process, especially about the TennBasTech material. In trying activities, the teacher guided students to practice exercises according to what had been observed in the TennBasTech material as initial information. Furthermore, students do the practice according to what has been observed and asked. In reasoning activities, the teacher guided students to connect the information that has been obtained by students so that they carry out movements in PE learning repeatedly so that it becomes complete information or to make conclusions from the knowledge that students have acquired. The teacher guides students by asking questions to connect the information that has been received. The teacher presents specific information; then the teacher provokes students by asking questions to make general conclusions. In the reasoning activities, the teacher used inductive reasoning. They provided feedback on the learning process reinforcement to students about the material that has been studied. They also reinforced students to ask questions about the material that has been studied. While the closing activity was conveying the lesson plan at the next meeting, the goal is to prepare or learn the material studied at the next meeting.

Table 1. Steps of Learning Tennis Using Scientific Approach

No	Indicators	Descriptions
1.	OPENING	
	The teacher creates a pleasant learning atmosphere.	The teacher accompanies the students to pray together; the teacher greets and asks how the students are doing; the teacher motivates students in learning PE; warms up in their respective places with the concept of playing; students explore their ability during warming-up.
	The teacher discusses the competencies that have been previously studied and relate them to the competencies that will be learned and developed.	The teacher conveys the learning theme.
	The teacher conveys the competencies to be achieved and the benefits obtained.	The teacher presents the benefits of learning the theme for students' everyday life.
	The teacher conveys the outline and scope of the material and activities to be carried out.	The teacher outlines the material to be taught according to the theme and sub-theme of learning.
	The teacher communicates the scope and assessment techniques to be used.	The teacher conveys what abilities will be assessed, including knowledge, attitudes, and skills.
2.	CORE ACTIVITIES	
	Observing: The teacher facilitates students to carry out the process of observing. Students observe with the senses (reading, hearing, listening, seeing, watching, and so on) with tools.	The teacher invites students to observe pictures, videos in the TennBasTech application. Teachers demonstrate the variation in ball, racket, forehand, and backhand recognition movements, followed by students. Students observe pictures, videos in the TennBasTech application.
	Asking: The teacher facilitates students to carry out the questioning process.	The teacher guides the students to make questions based on pictures and things in the application. The teacher teaches the students to ask questions when the teacher and students demonstrate variations of ball, racket, forehand, and backhand recognition movements.
	Students create and ask questions, discuss the current information or additional information they want to know or clarify.	Students create and ask questions, discuss existing information or additional information they want to know or clarify.
	Trying: The teacher facilitates students to carry out the process of collecting information.	The teacher guides students individually and in groups about learning variations of ball, racket, forehand, and backhand recognition movements, as the teacher re-demonstrates the implementation of the learning correctly.
	Students explore, try, discuss, demonstrate, imitate shapes/movements, conduct experiments, read sources other than textbooks, collect data through interviews, and modify/add/develop.	Students practice PE learning through the TennBasTech application individually or in groups with variations in learning based on teacher guidance.
	Reasoning/associating: The teacher facilitates students to carry out the process of reasoning/associating.	The teacher guides by asking students to do PE learning repeatedly and asking questions about basic steps/techniques and mistakes students make to fix their errors.
	Students process the information collected, analyze the data in categories, associate or connect related phenomena/information to find a pattern, and conclude.	Students perform the movement repeatedly under the guidance of the teacher.
	Communicating: The teacher facilitates students to carry out the process of communicating.	The teacher asks the students to explain the equipment used and the basic steps/techniques with the teacher's guidance.
	Students present the reports in individual written journals about tennis learning achievements through the TennBasTech application and orally present reports covering the process, results, and conclusions.	Some students explain online in front of their friends about the equipment used and the steps for learning tennis with the teacher's guidance.
3.	CLOSING	
	The teacher and the learners make a summary/conclusion of the lesson.	Teachers and students make a summary of the material being studied.
	The teacher and students reflect on the activities that have been carried out.	Ask questions about the material that has been studied.
	The teacher and students provide feedback on the learning process and results.	After the question and answer, the teacher reinforces the material that has been studied.
	The teacher makes an assessment.	Teachers assess students from aspects of attitudes, knowledge, and skills.
	The teacher plans follow-up activities in remedial learning, enrichment programs, counseling services and/or assign individual and group assignments according to students' learning outcomes.	Teachers conduct remedial and enrichment but do not use an assessment format.
	The teacher conveys the lesson plan for the next meeting.	The lesson for the next meeting is to learn other variations of the movement in the TennBasTech application.

3.4. Research Instrument

The research data were generated from tests conducted by the tennis club participants. The test instruments used are the tennis service accuracy test and the Groundstroke Forehand, Backhand drive test [45]. This test is conducted to determine the level of service, forehand and backhand ground-stroke skills for male and female beginners. The service test begins with the testee standing on the backline between the Center Mark and the single sidelines alternately after serving five times, moving to his left or right side. They are holding the racket and position, ready to hit the ball. Then the testee is on the other side of the field observing the tester's execution of serving. Before being given the test, the tester is given the opportunity to try to hit five balls either into the right or left service box. After finishing trying, the testee serves flat five balls from the right and five from the left. The ball that falls in the area that has been determined is recorded as the score. If it is outside the box, the value is 0, and it crosses the dividing line. If the ball falls right on the line between the two scores, the highest score is calculated. After all the testees have finished doing the forehand test, they will continue with the backhand test in the same way. The validity test score on the service test is 0.93, and the reliability is 0.94. While the score for the validity test on the forehand test is 0.57, and

the reliability is 0.75, while the validity for the backhand test is 0.52, and the reliability is 0.78.

4. Result

4.1. Data Descriptions

After getting the data through the test, the next step was to process and analyze to test hypotheses. The average value and standard deviation on the forehand, backhand, and service tests were processed using the SPSS series 19 application. The result can be seen in Table 2.

Based on table 2, the pre-test data in the sample group of 35 children have been obtained: the average value of the forehand test results was 49.0121 with the standard deviation value of 0.90121. Meanwhile, the average value of the backhand test results is 49.5326, with a standard deviation of 0.9052. The average value of the service test results is 50.1325, with a standard deviation of 0.9342. For the pre-test data, the average value of the forehand test results is 52.2536, and the standard deviation is 1.1103. Meanwhile, the average value of the backhand test results is 52.4312, with a standard deviation of 1.0079. Further, the average value of the service test results is 53.6721, with a standard deviation of 1.2438.

Table 2. Data Description

Group		Pre-test		Post-test		
		Statistic	Std. Error	Statistic	Std. Error	
Forehand	Mean		49.0121	.29641	52.2536	.12432
	95% Confidence Interval for Mean	Lower Bound	49.2302		53.5532	
		Upper Bound	50.2122		54.1152	
	Std. Deviation		.90121		1.1103	
Backhand	Mean		49.5326	.25370	52.4312	.13112
	95% Confidence Interval for Mean	Lower Bound	49.0013		52.1176	
		Upper Bound	50.4327		54.3672	
	Std. Deviation		.9052		1.0079	
Service	Mean		50.1325	.26387	53.6721	.18376
	95% Confidence Interval for Mean	Lower Bound	49.4352		52.0035	
		Upper Bound	50.3256		55.4278	
	Std. Deviation		.9342		1.2438	

4.2. Normality Test Data

The obtained data were analyzed to check the normality. The normality test determines the next stage of testing. If the data are normal, proceed with the parametric test, but if the data are not normal, proceed with the non-parametric test. The normality test used Kolmogorov Smirnov with the help of the SPSS 19 for Windows. The data for the normality test can be seen in Table 3.

Table 3. Normality Test

	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
<i>Tes Forehand</i>	0,203	35	0,062
<i>Tes Backhand</i>	0,218	35	0,125
Service	0,267	35	0,152

The data in table 3 show that the results of the Kolmogorov-Smirnov test with the Asymp.Sig (2-Tailed). The scores are 0.062 for the forehand test, 0.125 for the backhand test, and 0.152 for the service test. Because the data an Asymp.Sig is higher than 0.05, the data are normally distributed, so it is feasible to conduct further analysis using parametric statistics.

4.3. Results of Hypothesis Testing Using T-test

After the data were tested and normally distributed, a parametric test with an average difference and the t-test (one-sample t-test method) was employed. The results of the one-sample t-test can be seen in table 4.

Based on Table 4, the calculation results of the average difference in the pre-test and post-test data for tennis skills (forehand, backhand, service) obtained a P-value of 0.000. It is less than 0.05. It means that H_0 is rejected. So it proves that there is a difference between the average value in the pre-test and the post-test value. It can be concluded that tennis learning using the TennBasTech application with a scientific approach has a significant positive effect on the ability to play tennis for children in the 10-11 year age group.

5. Discussion

Technology is the result of the development of science, which occurs in the world of education. Therefore, education itself should also use technology to assist the implementation of learning. Based on reference [46], digital technology has now begun to be utilized in educational institutions to support education, either as an information tool or as a means of supporting learning activities and assignments. The birth of the Android-based TennBastech learning technology aims to help children or novice athletes learn tennis quickly and understand how to systematically learn tennis suitable for beginners using a scientific approach according to K13 (Indonesian National Curriculum).

K13 learning is oriented to prepare the coveted golden generation. Generations with competence: a set of attitudes, knowledge, and skills must be possessed, internalized, and mastered by students after studying a learning content, completing a program, or completing a particular educational unit [47]. A scientific approach is an approach that uses steps and scientific rules in the learning process. Learning in K13 uses a scientific or process-based approach and can use several strategies such as contextual learning [48]. It is intended to provide students with knowledge, understanding, and practice of studying scientifically. Therefore, the learning process is taught to seek knowledge from various sources through observing, asking, trying, processing, presenting, concluding, and creating for all subjects [49]. Through a scientific approach in K13, tennis learning becomes more focused, effective, and fun. PE learning indeed expects every student to have the ability to move in harmony according to the needs of the anatomy of the body. Reference [50] explained that, through the Scientific approach, students are motivated to do PE. Since the scientific approach provides in detail how to develop lesson plans, implement practical and fun learning toward teacher performance, and PE learning activities and outcomes.

Table 4. One-Sample T-test Result

One-Sample T-test						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Pretest	56.421	34	.000	18.25376	18.2311	20.1023
Posttest	61.236	34	.000	17.17754	13.2203	14.2311

The scientific approach will also encourage and inspire students to understand, apply, and develop rational thinking patterns to respond to learning materials [51]. In PE, argumentative reasoning is formed to learn to express opinions and ideas on the teaching materials presented by the lecturer. The teacher must facilitate students' ideas to understand the concepts, theories quickly, and facts clarified through cases.

The application of a scientific learning approach can improve students' abilities. Based on this, this research is in line with the view of [52], that learning is a process of constructing meaning from new information using a conceptual framework. The implementation stage of learning in accordance with teacher performance and student activities through a scientific approach has increased from time to time. This is due to the critical attitude and creativity of the learning subject in the warm-up, core, and closing stages [53]. PE learning outcomes in each cycle have increased through a scientific approach because students gain insight into various basic movement skills games, increase skills and improve attitudes and behavior in daily speech and behavior [54].

Improved attitudes and behavior and students' abilities result from applying the scientific approach [55]. It is in line with the opinion [56] that scientific learning in PE involves insight into the curiosity why (attitude), interest how (skills), and what curiosity (cognitive). The overall competencies are affective, psychomotor, and effective. The advantage of applying the scientific approach is that this approach uses a variety of media. This is in line with the opinion [57] that rational learning media and students' needs will form students' independence and autonomy and help them develop themselves. Moreover, students can activate their metacognition skills as long life-learners. In this study, the use of various information as an Android-based TennBasTech media focuses on understanding the concept of motion presented in each child's cellphone so that they can study well at home through the guidance of peers or parents.

6. Conclusions

This study illustrates that learning tennis using the TennBasTech android application with a scientific approach has proven effective in helping novice athletes learn tennis skills during the COVID-19 pandemic. It utilizes the digital-based for PE learning. It is hoped that it can develop very widely, of course, supported by good facilities and infrastructure in the future. It is needed to help physical education learning continue to run effectively and efficiently during the COVID-19 pandemic.

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