EFFECTIVENESS OF A TASK-PROGRESSION LEARNING MODEL ON UNIVERSITY STUDENTS' FOREHAND AND BACKHAND SKILLS IN TABLE TENNIS: A QUASI-EXPERIMENTAL STUDY

Rohmad [1*]
[1] Universitas Doktor Nugroho Magetan, Indonesia
*Corresponding Author: fahriiqbalkc@gmail.com

ABSTRACT
Low mastery of table tennis forehand and backhand strokes among university students is often linked to instruction that is insufficiently structured and does not match learners' skill levels. Task-progression-based learning is designed to sequence practice tasks from simple to complex, enabling gradual and systematic motor-skill acquisition. This study examined the effectiveness of a task-progression learning model in improving students' forehand and backhand stroke skills in table tennis. A quantitative quasi-experimental design was employed, involving an experimental group receiving task-progression instruction and a control group receiving conventional instruction. Skill performance was measured using standardized forehand and backhand stroke tests administered before and after the intervention. Inferential statistics (including prerequisite tests and a t-test) were used to compare skill gains between groups. Results indicated that both groups improved, but the experimental group achieved substantially higher post-test performance and improvement. The experimental group's mean score increased from 62.45 to 82.30 (gain = 19.85), while the control group increased from 63.10 to 71.25 (gain = 8.15), with the difference in gains statistically significant. These findings suggest that progressively sequenced practice tasks facilitate more effective learning of fundamental table tennis techniques and support incremental improvement in movement quality. The study concludes that task-progression-based learning is effective and recommended for table tennis instruction in higher education. Future research should test longer interventions, examine retention and transfer to game performance, and apply task progression to other sport skills and learner profiles.

Keywords: Forehand; Higher education; Quasi-experimental design; Table tennis; Task progression.

INTRODUCTION

Physical education learning in the university environment has a strategic function in improving physical fitness, movement skills, and the formation of sportsmanship attitudes in students. The implementation of sports learning is not solely oriented towards achieving the final result in the form of achievements or performance, but also emphasizes mastery of basic techniques developed through a planned, systematic, and continuous training process (Zhang, 2021). The success of the sports skills learning process is highly dependent on the alignment between the learning model applied with the characteristics of the teaching material and the level of ability of the students. Selecting the appropriate learning model can provide a meaningful learning experience and encourage students to actively participate in learning activities. Therefore, lecturers are required to implement a learning approach that is able to develop students' potential gradually and sustainably. In this context, systematically designed learning is an important need so that the skills provided can be mastered effectively. Without careful learning planning, the implementation of exercises tends not to run optimally. This condition confirms the importance of developing and innovating learning models in physical education at the university level (Gossard, 2024).

Table tennis is one of the sports that is widely applied in college learning because it has an active, dynamic, and relatively easy game character to learn and access. This sport requires the ability to coordinate movements, precise technique, response speed, and adequate mastery of basic skills. Among the various basic skills of table tennis, forehand and backhand hitting techniques have a very crucial role because they are the main foundation in attacking and defensive activities. The level of mastery of the two techniques has a great influence on the quality of student play as a whole. However, the learning process of basic table tennis techniques often faces a number of obstacles, especially when students are not able to accurately align hand movements, body posture, and the direction of the ball bounce. This condition shows the need

to implement learning strategies that are able to help students master techniques gradually and systematically. Without the use of the right learning approach, students tend to have difficulty in developing table tennis skills optimally (Schaefer, 2022).

In the practice of learning table tennis, there are still students who show mastery of forehand and backhand techniques that have not been maximized. These problems are often caused by the use of learning models that are less varied and have not been arranged based on the stages of skill mastery. Learning that is carried out directly on complex techniques without going through the basic stages can hinder students' understanding of the principles of correct movement. As a result, engineering errors tend to be repetitive and difficult to fix (Schaefer, 2020). In addition, the application of a monotonous learning model tends to have an impact on decreasing student learning motivation in participating in the training process. This situation indicates that learning table tennis requires a more systematic and adaptive approach. Therefore, a learning model is needed that is able to accommodate students' initial abilities while directing them to master more complex skills. Learning approaches that ignore the principle of progressivity risk hindering the achievement of the learning objectives that have been set (Kulkarni, 2021).

The problem of low mastery of basic techniques in table tennis indicates that the learning process needs to be directed at systematic and gradual skill development. The right learning model must be able to adapt the level of difficulty of the activity to the student's capacity. The disharmony between the demands of learning tasks and the ability of students has the potential to hinder the effectiveness of the learning process. Therefore, sports skills learning needs to be arranged by paying attention to the learning sequence and the level of complexity of movements. The progressive approach allows students to master basic techniques optimally before moving on to more complex stages. Through this approach, students have the opportunity to correct mistakes while continuously improving the quality of movement. This is crucial in learning motor skills which demands repetitive exercises and consistency. Without clear planning and learning structures, the achievement of sports skills learning outcomes tends to be not optimal (W. Li, 2023).

Tennis is one of the sports whose skill learning characteristics are considered appropriate when using a learning model based on Task Progression. This learning model focuses on the systematic and gradual assignment of learning tasks, starting from simple activities to continuing to tasks with a higher level of complexity. Each stage of the assignment is arranged to help students master skills gradually and systematically. In the context of table tennis learning, this model allows students to understand the basic techniques of forehand and backhand shots in more depth. Progressive assignment preparation provides an opportunity for students to adjust to the demands of movement at each stage of learning. Thus, the learning process becomes more directed and controlled. This learning model also helps lecturers in monitoring the development of student skills on an ongoing basis. Therefore, task progression is seen as a relevant approach to increase the effectiveness of table tennis learning (Sanusi, 2021).

The application of a task progression-based learning model is believed to improve the quality of learning table tennis skills in higher education. Through clear task stages, students can learn forehand and backhand techniques more systematically. The practice process that starts from basic movements to the application of techniques in game situations allows students to develop their skills optimally. In addition, this model can increase students' confidence in hitting shots because each stage of practice is adjusted to the skills that have been mastered (Wang, 2021). Progressive learning also helps students in reducing technical errors that often occur. Thus, the quality of student movement can improve gradually and continuously. This shows that the task progression model has great potential in supporting the achievement of table tennis learning goals. The application of this model is expected to be able to provide a more effective learning experience for students (Wang, 2020).

Based on these conditions, the research Huang, (2021) Departing from The main problem faced is the lack of optimal mastery of table tennis forehand and backhand hitting skills in students. One of these conditions is caused by the implementation of a learning model that has not been designed systematically and gradually according to the level of students' skill ability. A learning model based on Task Progression It is considered appropriate because it emphasizes the arrangement of learning activities in order, starting from simple tasks to more complex tasks. This approach is believed to help students understand and master basic table tennis techniques more effectively. Based on this, this study aims to analyze the level of effectiveness of a learning model based on Task Progression in improving the forehand and backhand tennis

skills of table tennis in students. The results of this research are expected to contribute to the development of physical education learning in the university environment, as well as become reference material for lecturers in determining the appropriate and appropriate learning model.

Several previous studies have examined table tennis learning with different approaches. The first study examined the effect of drill practice methods on improving table tennis basic hitting skills, which placed more emphasis on repetition of movements without a clear task stage. The second study examines the application of cooperative learning models in table tennis learning, focusing on the aspects of cooperation and social interaction of students. The third study examined the approach of play in table tennis learning that is oriented towards increasing learning motivation. The difference in this study compared to the three previous studies lies in the application of a learning model based on Task Progression which focuses on the preparation of task stages gradually and continuously. In addition, the study specifically focused on punching skills forehand and Backhand as an essential basic technique. Therefore, this research contributes to novelty, both in terms of the learning approach used and from the focus of the skills studied (Liu, 2021).

METHOD

This study applies a quantitative approach with the aim of obtaining an objective measurement of the effect of the application of a learning model based on Task Progression on the forehand and backhand hitting skills of table tennis in students. The quantitative approach was chosen because it allows the collection of data in the form of numbers that are then statistically analyzed to assess the level of effectiveness of the treatment applied in the learning process (Fritsch, 2022). The research design applied in this study was a pseudo-experiment (Quasi-experimental design), which allowed researchers to compare learning outcomes between the treatment group and the indirect treatment comparison group. The selection of this design is considered relevant to the characteristics of research in the field of education which generally does not allow the application of full subject randomization. However, through the use of pseudo-experiments, researchers were still able to control the main variables that were the focus of the study. Therefore, the impact of the application of the learning model on student skills can be analyzed systematically, objectively, and measurably (Fritsch, 2022).

The subjects of this study are students enrolled in table tennis courses, which are then grouped into two categories, namely the experimental group and the control group. The experimental group gained table tennis learning through the application of a learning model based on Task Progression, while the control group underwent the learning process using conventional learning models that have been commonly applied (L. Li, 2021). The division of groups was carried out by considering the equality of initial abilities so that the difference in results obtained could be attributed to the treatment given. During the learning process, the experimental group received treatment in the form of learning tasks arranged in stages from simple to complex levels. Meanwhile, the control group followed learning without progressive task stages. Treatment is given within a certain period of time according to the learning plan that has been prepared.

The data collection technique in this study was carried out using a test of forehand and backhand hitting skills in table tennis games. The test instrument is designed to assess students' ability to master both basic techniques objectively and measurably. The test was carried out at the beginning and end of learning to identify changes in skill levels in each group. Data from the initial test was used to determine students' basic abilities, while the results of the final test were used as an indicator of skill improvement after participating in the learning treatment (Vincze, 2023). The use of skill tests was chosen because it was able to describe the level of mastery of the technique directly through the student's movement performance. Thus, the data obtained can accurately represent the influence of the learning model on table tennis skills (Lee, 2023).

The data analysis in this study applied an inferential statistical method to identify differences in the improvement of forehand and backhand stroke skills between the experimental group and the control group. The collected data is first analyzed through prerequisite testing, including normality tests and homogeneity tests, before proceeding to the hypothesis testing stage. Furthermore, appropriate statistical test techniques were used to assess the significance of the differences in learning outcomes obtained by the two groups. The findings from the statistical analysis are used as a basis for drawing conclusions about the effectiveness of the implementation of the based learning model Task Progression. Through this inferential analysis

approach, the research is expected to present strong empirical evidence regarding the influence of learning models on improving basic table tennis technique skills in students (He, 2021).

RESULTS AND DISCUSSION

The results of this study are presented to explain the impact of the application of *the task progression-based* learning model on the forehand and backhand hitting skills of table tennis in students. The research data was collected through skill measurements conducted before and after treatment in the experimental group as well as the control group. The presentation of results was structured to show the difference in skill improvement between the two groups. The main analysis focused on changes in the value of forehand and backhand hitting skills as indicators of mastery of basic table tennis techniques. Therefore, the results of this study are expected to provide empirical evidence regarding the effectiveness of the applied learning model. Each finding is presented based on the results of measurements that have been statistically analyzed. The presentation of data was carried out objectively to strengthen the interpretation of the research results.

The results of this study were compiled to answer the research objectives that have been set, namely to analyze the effectiveness of the application of *the task progression-based learning model* in improving students' table tennis skills. The conclusion of the study was based on a comparison of learning outcomes between the experimental group and the control group. The analysis process was carried out by paying attention to the average score, the magnitude of the increase that occurred, and the level of significance of the difference in results between groups. Through this approach, this study is able to illustrate the extent to which the treatment provided contributes to improving students' skills. The research data is presented in the form of tables and descriptive explanations to make it easier for readers to understand. In addition, the form of presentation aims to strengthen the validity and sharpness of research findings academically.

Overall, the study findings showed a variation in the improvement of forehand and backhand hitting skills between the experimental group and the control group. Participants in the experimental group who followed the learning with *a task progression* approach showed more prominent skill development compared to the control group who obtained conventional learning. These results confirm that the design of learning assignments that are arranged gradually contributes positively to the mastery of basic techniques of table tennis games. The results of the statistical test also showed a significant difference between the two treatment groups. Therefore, this study provides initial empirical support for the effectiveness of the learning model used. All of these findings are then explained in more depth through the presentation of quantitative data.

Table 1. Average Score of Forehand and Backhand Stroke Skills of the Experimental and Control Group

Groups	Initial Tests	Final Test	Improvement
Experimental Group	62,45	82,30	19,85
Control Group	63,10	71,25	8,15

Based on the data in the table presented, it can be seen that the experimental group showed a greater increase in skill scores compared to the control group. The average score of the initial test in the experimental group showed a level of initial ability that was relatively equivalent to that of the control group. However, after receiving treatment in the form of the application of *task progression-based* learning, the results of the final test of the experimental group experienced a significant increase. These findings indicate that the learning model used is effective in improving the mastery of *forehand* and *backhand* punching techniques. The difference in score improvement between the two groups showed the influence of treatment on student learning outcomes. Therefore, the data in the table further strengthens the assumption that *the task progression* model makes a positive contribution to table tennis learning.

On the other hand, the control group showed an improvement in skill scores, although the achievement of such improvements was lower when compared to the experimental group. This condition indicates that the application of conventional learning still contributes to the mastery of students' skills, but its effectiveness has not been maximized in encouraging significant improvement of abilities. The difference in the amount of score increase between the two groups became the basis for inferential statistical analysis. Based on the results of the t-test, evidence was obtained of a significant difference in the mean value between the experimental group and the control group. These findings confirm that task progression-based

learning models have a higher level of effectiveness compared to conventional learning models. Therefore, the data presented in the table supports the achievement of the research objectives that have been set.

The results of the evaluation of forehand strike skills showed that students in the experimental group experienced a progressive improvement in the quality of technique. The application of a series of practice tasks designed from the simplest movements to the more complex stages contributes to students' understanding of the basic principles of forehand punches. Students show better ability to improve their body posture, hand swing patterns, and the accuracy of the direction of the stroke continuously. When compared to the control group, students in the experimental group showed a more consistent and steady level of mastery of forehand techniques. This condition is reflected in the acquisition of final test scores which have increased significantly. Thus, the results indicate that the task progression-based learning model is effective in improving forehand hitting skills in table tennis games.

The results of the measurement of backhand stroke skills in the experimental group also showed a trend of improvement in line with that. After participating in task progression-based learning, students show the ability to coordinate between hand movements and more optimal body position adjustment. The presentation of the exercises gradually and continuously makes it easier for students to understand backhand techniques that were previously perceived as difficult skills. In contrast, the control group still showed repeated technical errors. These differences in achievement show that the systematic preparation of task stages has a significant role in mastering backhand skills. Therefore, the application of this learning model has been proven to make a positive contribution to improving the mastery of basic table tennis techniques.

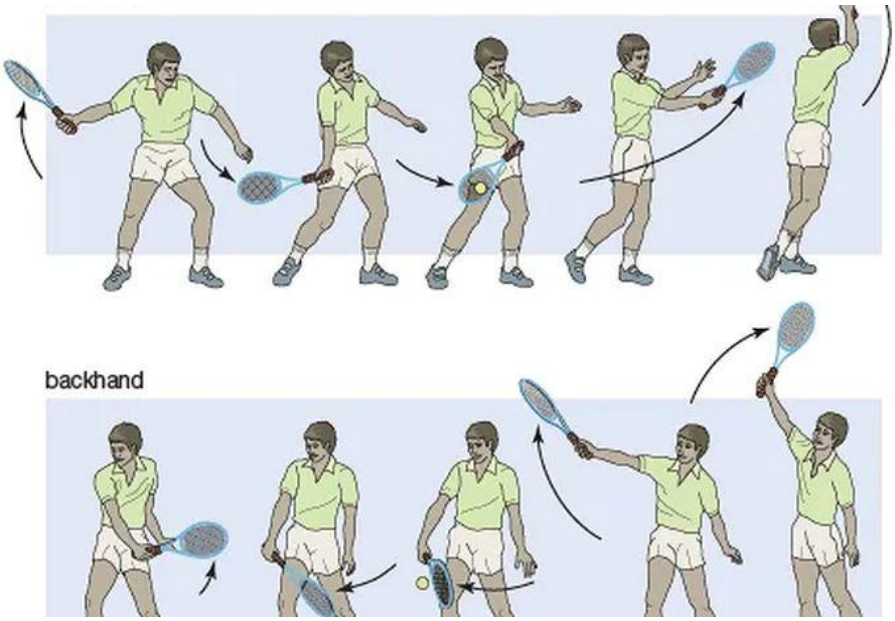

Figure 1. Step-by-Step Forehand and Backhand Stroke Technique

Documentation of the implementation of forehand and backhand punch skills tests is presented in the form of photos to support the research results. The photos show student activities when conducting skill tests according to the instruments that have been set. This visual documentation is used to strengthen the validity of the test and show the involvement of students in the research process. The existence of such documentation also helps to describe the real conditions when skill measurements are carried out. Thus, the results of the skills test are not only supported by quantitative data, but also by visual evidence of the conduct of the research.

In general, the findings of the study revealed that the application of *the task progression-based* learning model had a significant effect on improving the forehand and backhand hitting skills of table tennis in students. Students who were members of the experimental group and participated in learning with stages of tasks arranged in stages showed more optimal learning outcomes compared to the control group. These results confirm that structured and continuous learning design has a crucial role in improving the quality of

mastery of basic techniques. Therefore, the learning model can be declared effective to be applied in the table tennis learning process.

Statistical analysis through the t-test showed a significant difference between the mean values of the experimental group and the control group. These findings indicate that the treatment applied has a positive effect on improving students' skills. The results of this study are consistent with the theory of motor skills learning which emphasizes the importance of training that is carried out gradually and continuously. Thus, task progression-based learning has been proven to be more effective in optimizing the process Based on the findings of the research, it can be emphasized that the task progression-based learning model is considered feasible to be implemented in table tennis learning at the university level, especially when compared to conventional learning approaches. The application of this model has been proven to be able to improve students' forehand and backhand hitting skills, while facilitating a gradual and structured understanding of game techniques. The results of this research are expected to be used as a basis for the development of more effective and innovative physical education learning strategies. In addition, the findings also have the potential to be a reference for further research focusing on the assessment and development of sports skills learning models.

This study reveals that the implementation of a learning model based on *Task Progression* has a significant effect in improving the forehand and backhand skills of table tennis in students. These results show that learning that is structured in stages is more effective in helping students master basic techniques compared to conventional learning approaches (Basiri, 2020). The preparation of assignments starting from simple to complex movements provides opportunities for students to learn the basic principles of movement in depth. This systematic learning process allows students to gradually reduce technical errors. Thus, the quality of student movement can be improved continuously. These findings are in line with the principles of motor skills learning that emphasize the importance of a structured sequence of exercises. Therefore, the task progression model has proven to be effective in supporting the process of mastering table tennis skills (Ye, 2023).

A more significant skill improvement in the experimental group showed that clear task stages played an important role in the student learning process. Students who participate in task progression-based learning get a more targeted learning experience because each assignment is designed according to the level of skill mastery. This helps students build an understanding of engineering gradually before moving on to more complex stages. This process allows for the strengthening of basic skills that are the foundation for mastering advanced techniques. With this approach, students not only memorize movements, but also understand the concept of correct movements. This condition has an impact on improving the quality of forehand and backhand shots significantly. Therefore, this learning model makes a real contribution to the effectiveness of table tennis learning (Cao, 2020).

The results of this study indicate that the application of learning based on *Task Progression* effective in improving the coordination of movement and stability of students' punches. The design of assignments that are arranged in stages allows students to do repetitive exercises with a systematically increasing level of complexity. An exercise process like this helps students develop more optimal movement control and stroke accuracy. Compared to conventional learning, this approach is better able to adapt the demands of the task to the student's abilities. This makes students better prepared to face more complex training stages. Thus, the improvement in the quality of movement that occurs is not temporary, but develops continuously. These findings reinforce the effectiveness of the task progression model in sports skills learning (Tawfik, 2020).

In addition to contributing to the improvement of technical skills, the application of a learning model based on *Task Progression* It also has a positive influence on the motivation and level of student involvement in the learning process. The preparation of assignments in stages helps students build confidence in following each stage of the exercise. Success in completing assignments in each phase encourages students to continue to develop their abilities in the next stage. This condition encourages the creation of a more active and participatory learning

atmosphere. This situation has implications for the increasing frequency of training and the quality of engineering implementation. With a more optimal level of engagement, students gain a more in-depth and meaningful learning experience. Thus, the model *Task Progression* not only has an impact on the skill aspect, but also on the entire learning process (Gu, 2021).

The results of this study support the view that sports skill learning needs to be designed based on the principle of progressivity and systematicism. Learning that directly requires mastery of complex techniques without clear stages has the potential to hinder the student learning process. On the other hand, the gradual preparation of assignments allows students to adjust to the demands of learning optimally (Song, 2024). These findings confirm that the success of table tennis learning is greatly influenced by the suitability of the learning model with the characteristics of the material and students. With the task progression approach, lecturers can control the development of student skills more effectively. This makes learning more directed and measurable. Therefore, this model is worth considering as an alternative to learning table tennis in college (Faber, 2020).

In general, the results of this study indicate that the application of a learning model based on *Task Progression* Effective in improving the forehand and backhand hitting skills of table tennis in college students. The design of learning assignments that are structured and staged has been proven to facilitate students' understanding of basic techniques more optimally and encourage progressive improvement in the quality of movement (Martin, 2021). These findings have practical implications for physical education lecturers in developing learning strategies that are more systematic and responsive to student needs. In addition, the results of this study also provide a theoretical contribution to the development of sports skills learning models. Therefore, the learning model is based on *Task Progression* deserves to be recommended as one of the learning approaches in table tennis courses in college (Bhatia, 2022).

CONCLUSION

Based on the findings of the research that has been carried out, it can be stated that the application of the task progression-based learning model has a significant effect on improving the forehand and backhand skills of table tennis in students. This model is effective in helping students understand basic techniques more systematically through task stages that are designed sequentially and continuously. The improvement in ability demonstrated by the experimental group indicates that the progressive learning approach is superior to conventional learning methods. The results of this study confirm that the alignment between the learning model and the characteristics of the learning material has an important role in supporting the success of sports skill mastery. Therefore, the task progression model has been proven to be able to optimize the quality of mastery of basic table tennis techniques. This conclusion is strengthened by the results of data analysis which shows a significant difference in skill improvement between the research groups.

In addition, the application of a task progression-based learning model has proven to be effective in improving the quality of student movement gradually and continuously. The design of assignments arranged from low to high difficulty levels provides space for students to make structural correction of technical errors. This learning pattern encourages the formation of a deeper understanding of movements and improves students' consistency in executing forehand and backhand shots. Improving the quality of movement is not only reflected in mastering techniques, but also in the readiness of students to apply these skills in the context of games. These findings indicate that task progression-based learning is able to provide a more effective and meaningful learning experience. Thus, this learning model makes a significant contribution to improving the process and outcomes of table tennis learning in college.

Based on the overall research results, the task progression-based learning model is worthy of being recommended to be implemented in table tennis learning in college. The model has been proven to be able to optimally improve students' mastery of basic technical skills, especially in the aspects of forehand and backhand punches. The implementation of this model is expected to facilitate lecturers in developing learning that is more systematic, adaptive, and in line with the level of student ability. In addition, the findings of this study can be used as a reference in the development of learning strategies in other sports

skill branches. Therefore, the application of a task progression-based learning model has a significant opportunity in encouraging continuous improvement of the quality of physical education learning.Based on the findings of the research that has been carried out, it can be stated that the application of the task progression-based learning model has a significant effect on improving the forehand and backhand skills of table tennis in students. This model is effective in helping students understand basic techniques more systematically through task stages that are designed sequentially and continuously. The improvement in ability demonstrated by the experimental group indicates that the progressive learning approach is superior to conventional learning methods. The results of this study confirm that the alignment between the learning model and the characteristics of the learning material has an important role in supporting the success of sports skill mastery. Therefore, the task progression model has been proven to be able to optimize the quality of mastery of basic table tennis techniques. This conclusion is strengthened by the results of data analysis which shows a significant difference in skill improvement between the research groups.

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