



An Application of Dynamic Layer Teaching Program to Enhance a Learning Outcome in Basic Badminton Course for College Students

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Abstract

Background and Aims: Currently, physical education teachers should shift their teaching methods towards “paying more attention to the individual difference among the students” according to the concepts of “student-centered” and “individual difference”. Therefore, the objective of this research was to develop a dynamic layered teaching program to enhance badminton learning outcomes in college students on badminton skills and techniques, knowledge, attitude, social development, physical fitness, and mental fitness.

Materials and Methods: The population of this study was 240 students of the academic year 2023 students at Guangzhou Sport University who take badminton as an elective course. This research randomly sampled two male classes with 64 students to serve as the experimental group and the control group, and each group consists of 32 male students, divided into two groups by systematic method based on badminton skills tests. The experimental group taught with a dynamic layered teaching program and the control group taught with a traditional teaching program. The research instrument was the dynamic layered teaching program in badminton which has been quality checked by trying out with 3 students, 9 students, and 30 students to find the efficiency of the program ($E1/E2 = 70/70$). The total duration of the experiment was 8 weeks, 3 sessions a week, and 2 hours a session. The subjects in the experimental group were divided into low-skill, medium-skill, and high-skill based on badminton skills tests. The data were analyzed with paired t-tests, independent t-tests, and descriptive statistics.

Results: The dynamic layered teaching program in badminton had more significant advantages than the traditional teaching program in enhancing badminton skills and techniques, knowledge, attitude, social development, and mental health. However, there were no significant differences observed in physical fitness.

Conclusion: The dynamic layered teaching program in badminton can enhance badminton learning outcomes in college students and provide an effective approach for personalized instruction and targeted training. However, there were no significant differences observed in physical fitness indicators. These findings support the promotion and application of dynamic layered teaching programs in physical education.

Keywords: Dynamic Layered Teaching Program; Badminton; College Student; Learning Outcome

Introduction

Modern teaching concentrates on student-centered, active learning, and cares about the individual differences among the students. Amer E. (2015) stated “It’s important to recognize that “fairness” in education doesn’t mean that all children are taught in the same way. Instead, it means accounting for the needs of individual students and adjusting the curriculum accordingly. Differentiation allows you to provide individualized instruction by changing the pace, level, or style of teaching to engage students’ strengths and interests. Students with mental health and learning disorders are not the only children who benefit from this instructional philosophy all children in your classroom can achieve at higher levels when you are conscientious about providing instruction that fits how they learn best. Kubat, U. (2018) found that individual differences are important for determining the learning styles of students. Half of the teachers emphasized that students identify their differences with the help of tests, homework, and activities during the teaching and learning process. Tan, S. (2022), Wang, G. (2022), and Ly, Y. (2023) applied the dynamic layered teaching method, by believing that it was feasible and could effectively





improve students' basic specialized skills, which was conducive to stimulating students' enthusiasm for participating in sports. Hou, L. (2018) believed that implementing dynamic layered education helps to teach students according to their aptitude, fully mobilizes learners' subjective enthusiasm, facilitates teachers to better choose teaching contents, and helps establish a relaxed, equal, and harmonious classroom atmosphere. Tomlinson, C.A. (2014) emphasized multi-dimensional evaluation of students based on dynamic stratification, and the results showed a significant improvement in student performance, indicating that this teaching method is effective.

Zhang, Q. (2022) summarized the advantages of layered teaching methods in school physical education curricula that the principle of individualized teaching could stimulate students' subjective enthusiasm and interest in reading, thereby promoting the development of students' learning abilities. Müller, F. H., & Louw, J. (2004) effectively solved the problems of students' lack of interest in track and field classes and varying abilities through the use of a dynamic layered teaching method. The differences between students cannot be eliminated, and teachers need to guide students to stimulate their potential and unleash their nature based on their characteristics. Park V., Datnow, A. J. (2017) applied the dynamic layered teaching method in hurdle teaching, which can cultivate students' teamwork awareness through inter-group adjustment, while effectively avoiding dull and tedious problems in the teaching process, and improving students' thinking and logical cognitive abilities. Duan, T. (2023) showed in his research that the dynamic layered teaching method had a more significant improvement in students' learning interest and self-directed exploration.

The dynamic layered teaching method is a progressive approach used predominantly in areas such as computer science, and it has been shown to bring promising benefits across diverse student groups. This teaching strategy involves the construction of specific requirements, teaching content, and methods that cater to students' individual characteristics and learning stages. By doing so, it offers each student an opportunity to achieve their optimal performance, irrespective of their individual abilities. Furthermore, the dynamic layered teaching method addresses the issue of classroom polarization, fuels enthusiasm for learning, and fosters personalized development. Importantly, it cultivates a conducive learning atmosphere that encourages unity, collaboration, and collective problem-solving among students

According to the effectiveness of the dynamic layers teaching techniques (Park, V., & Datnow, 2017), the researcher considered the advantage of badminton courses in college students by applying the dynamic layer teaching technique to develop teaching programs for them and observing, comparing a learning outcome between the student group which taught by dynamic layers teaching program and taught by traditional teaching technique program. This comparative analysis led the badminton teachers, and coaches to choose the better teaching method or coaching methods to enhance the students' or athletes' outcomes.

Objective

To develop a dynamic layered teaching program to enhance badminton learning outcomes for college students

Literature Review

Education needs to be not only fair but also differentiated according to the individual needs of students. This can be achieved by capitalizing on students' learning styles (such as visual, auditory, and tactile learning), incorporating multiple intelligences into the curriculum, and integrating students' interests into classroom teaching. Collaboratively setting educational goals with students, and utilizing computerized instructional methods, can further enhance student participation and interest. Effectively grouping students allows them to showcase their strengths and learn from their peers. For children with special needs, considering training and counseling outside the regular classroom with the assistance of school specialists is also vital. Overall, these strategies emphasize a student-centered approach, individual differences, and personalized instruction, and take into account the comprehensive needs and strengths of the students (Amer E, 2015). Moreover, under the premise of classroom teaching in universities, based on the diverse characteristics of students, teaching should be stratified, and individualized, and corresponding teaching methods should be selected to adapt to the curriculum and teaching methods of students at different stages.

According to the data review, most of the research on dynamic layered teaching methods in Chinese universities remained in the theoretical and imaginative stage, with research on dynamic



layered teaching mostly concentrated in primary and secondary schools, with the main research and development direction being the “backbone” discipline. With the deepening of interdisciplinary development, dynamic layered teaching was also widely used in the field of physical education.

In the badminton teaching aspect, through precise control and repetitive practice, coaches and athletes could learn from each other and improve together. Systematic skill training could also effectively enhance an athlete’s performance, as shown in the study by Williyanto, S. et al. (2018). Through systematic, phased training, athletes' basic skills and match performance were significantly improved. This emphasizes that even in high-level competitions, the mastery of basic skills directly affects match outcomes, reflecting the importance of foundational training in badminton teaching.

Yang, S. (2020) stated that to achieve significant results in the dynamic layered teaching method, teachers need to tailor their teaching methods to different students in the same course and set specific requirements, teaching content, and methods based on the students' different stages so that students at each stage can achieve the most effective performance and experience the joy of success. Teachers themselves also need to strengthen their learning.

He, H., & Xiang, H. (2020) believe that dynamic layered teaching methods can make teaching content more diverse and help students solve the problems that arise during the learning process. For students with relatively poor foundations, targeted guidance could be provided to complete teaching tasks and enhance their skill levels. Chai, X. (2022) conducted data analysis on the teaching effectiveness of the "dynamic layered teaching method" in university basic table tennis elective courses to break through the traditional educational status quo. The survey results showed that: The dynamic layered teaching method had more advantages than traditional teaching methods in adapting to the characteristics of quality education, and could adapt to cultivating students' group cooperation ability and the spirit of unity and mutual aid dedication.

Hou, L. (2018) believed that implementing dynamic layered education can help to teach students according to their aptitude, fully mobilize learners' subjective enthusiasm, facilitate teachers to better choose teaching contents, and also help establish a relaxed, equal, and harmonious classroom atmosphere. Liu, M. (2018) conducted eight weeks of experimental teaching based on the characteristics of the school's badminton curriculum, evaluated and analyzed the students in two classes, and demonstrated whether it was more conducive to the improvement of students in all aspects. The results showed that: Students' mastery of badminton specialized techniques improved under the intervention of two teaching methods, but the experimental group had a higher effect on the specialized physical fitness scores than the control group.

Kubat, U. (2018) emphasized the multi-dimensional evaluation of students based on dynamic stratification, and the results showed a significant improvement in student performance, indicating that this teaching method is effective.

Summary of Review Literature and Research

The dynamic layered teaching method is a progressive approach used predominantly in areas such as computer science, and it has been shown to bring promising benefits across diverse student groups. This teaching strategy involves the construction of specific requirements, teaching content, and methods that cater to students' individual characteristics and learning stages. By doing so, it offers each student an opportunity to achieve their optimal performance, irrespective of their individual abilities. Furthermore, the dynamic layered teaching method addresses the issue of classroom polarization, fuels enthusiasm for learning, and fosters personalized development. Importantly, it cultivates a conducive learning atmosphere that encourages unity, collaboration, and collective problem-solving among students.

Despite these benefits, the dynamic layered teaching method is not without its challenges. It places high demands on educators, requiring them to adapt their teaching methods to meet the unique needs of individual students. The complexity of executing this method can be daunting, necessitating the establishment of layered goals, comprehensive analysis of learning situations, and selection of suitable independent learning practices. Besides, it calls for effective strategies to manage the inherent physical and mental diversity among students, further adding to its complexity.

Although existing studies have demonstrated the benefits of the dynamic layered teaching method, there is a noticeable gap in its application in certain disciplines, such as badminton instruction. In many ways, this reflects a significant opportunity for future research. Applying the dynamic layered teaching method in badminton instruction would provide valuable insights into its effectiveness in a



new context, potentially expanding its application scope. Moreover, it could contribute to refining teaching strategies in badminton, thereby enhancing student engagement and learning outcomes in this particular field.

By addressing these challenges and expanding the method's use to unexplored areas, the dynamic layered teaching method could revolutionize teaching methodologies and significantly contribute to the overall improvement of the educational landscape. This compelling potential underscores the need for my proposed research into the application of the dynamic layered teaching method in badminton instruction.

Conceptual Framework

The conceptual framework for this research was as follows:

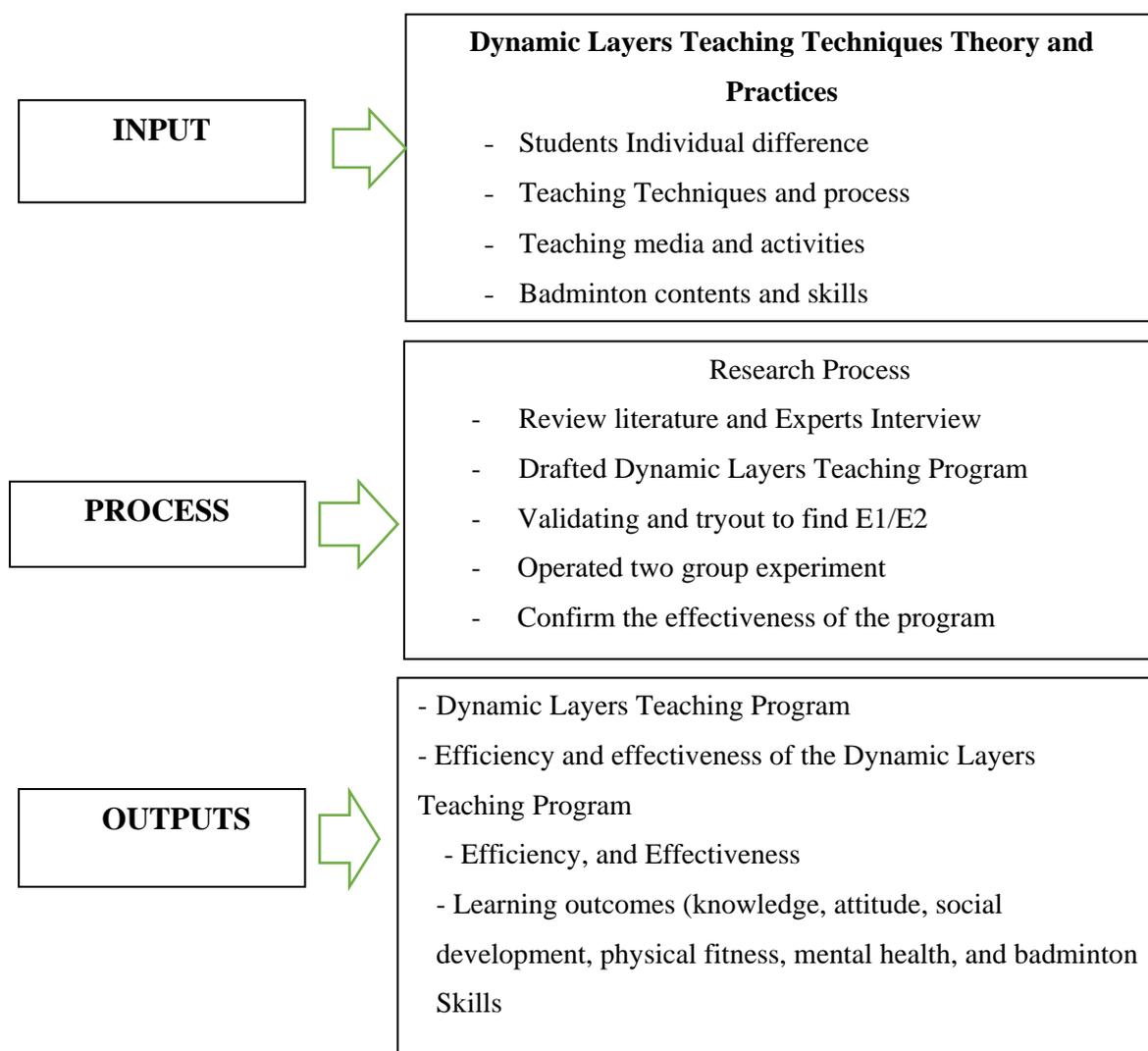


Figure 1: Conceptual Framework

Methodology

1. Population and Sample

The population of this study was 240 students of 8 classes who took badminton as an elective course in the academic year of 2023 at Guangzhou Sport University. They were random sampling two male classes with 64 students to be the subjects of this research. The subjects were tested badminton



with high clear skills, then the results scored ranked descending and divided into two groups by systematic sampling method, and drawn into an experimental group and control group, with 32 students in each group.

2. Research Tools

This research was experimental. The research instrument was the dynamic layered teaching program in badminton, which was developed by the researcher, and has been quality checked by trying out with 3 students, 9 students, and 30 students to find the efficiency of the program ($E1/E2 = 70/70$) and IOC of 5 experts was .90 (.80-1.00). The research design was a two-group pretest-posttest with the experimental group being taught with a dynamic layered teaching program in badminton and the control group being taught with the traditional teaching program in badminton. The total duration of the experiment was 8 weeks, 3 sessions a week, and 2 hours a session. The research operated on Monday, Wednesday, and Friday between 3.00-5.00 pm. In university badminton gymnasium.

3. Data Collection and Analysis

3.1 The method of a questionnaire survey: This study used the questionnaire survey method, with the core purpose of comprehensively understanding the changes in students' interest in badminton learning in dynamic layered teaching and traditional teaching methods through questionnaires.

3.2 Formulate of Badminton Dynamic Layers Teaching Program: drafted a badminton dynamic layers teaching program based on theories, survey data, and expert interviews. Validate the Index of Items Objective Congruence (IOC) with 5 experts was .90 (.80-1.00). Try out with 3 students, 9 students, and 30 students with the students who were not the subjects of this research to find the efficiency of the program. The efficiency criteria of the program were $E1/E2 = 74.50/76.80$, which met the criteria at 70/70.

3.3 The Method of Experiment: Two groups of pretest and posttest designs were used in this research. The experimental group will teach with a dynamic layered teaching program in badminton, the control group will teach with a traditional teaching program in badminton. The duration of the experiment is 8 weeks, 3 sessions a week, and 2 hours a session. The subjects in the experimental groups were grouped into low, medium, and high skills of badminton before executing the research. The teaching applied peer assist techniques, demonstration, games assignments, and tests to upgrade and move from low to medium, and from medium to high skill groups.

3.4 The pre-test and post-test results will be analyzed by using descriptive statistics. A paired t-test was used to compare the pre-test and post-test scores within the same group (both the control group and the experimental group). An independent samples t-test was used to compare the post-test scores between the control group and the experimental group

3.5 The entire process utilized Excel software to collect raw baseline data, and SPSS 22.0 software will be used for data analysis.

Research Results

1. Badminton Skill: After 8 weeks of the experiment, the experimental group performed better on all badminton skills tests than the control group on the high clear, long serves, short serves, dribbling, and foot works at the .05 level of significance (see table 1)

Table 1: Comparative analysis of post-test results of badminton-specific motor skill tests between the experimental group and the control group

Test Event	groups	\bar{x}	S.D.	SE	95% confidence interval		t	df.	Sig.
					lower	Your honorific			
High clears	Exp. Group	77.13	11.34	2.00	9.29	20.46	5.33	62.00	0.01*
	Cont. Group	62.25	10.99	1.94					



Test Event	groups	\bar{x}	S.D.	SE	95% confidence interval		t	df.	Sig.
					lower	Your honorific			
Long Serves	Exp. Group	70.41	13.76	2.43	0.23	13.33	2.07	62.00	0.04*
	Cont. Group	63.63	12.43	2.20					
Short Serves	Exp. Group	70.34	11.42	2.02	1.50	13.31	2.51	62.00	0.01*
	Cont. group	62.94	12.21	2.16					
Dribbling	Exp. Group	72.69	14.83	2.62	3.48	16.96	3.03	62.00	0.01*
	Cont. Group	62.47	11.99	2.12					
Foot works	Exp. Group	74.5	11.16	1.97	0.10	12.08	2.03	62.00	0.05*
	Cont. Group	68.41	12.76	2.26					

*P<.05

2. Physical fitness: After the experiment, there were no differences in the physical fitness tests on the 10M sprint, standing long jump, and reaction time test **had no difference** between the experimental group and the control group at a .05 level of significance. (see table 2)

Table 2: Comparative analysis of post-test results of badminton-specific physical fitness test between the experimental group and the control group

Test Events	Groups	\bar{x}	S.D.	SE	95% confidence interval		t	df	Sig.
					lower	Your honorific			
10M	Exp. Group	1.95	0.07	0.01	-0.05	0.01	-1.11	62	0.27
	Cont. group	1.97	0.05	0.01					
SBJ	Exp. Group	2.6	0.14	0.02	-0.1	0.05	-0.72	62	0.47
	Cont. group	2.63	0.16	0.03					
Reaction time	Exp. Group	0.29	0.03	0.01	-0.01	0.02	0.77	62	0.44
	Cont. group	0.29	0.03	0					

3. Specialized Theoretical Knowledge: Both the experimental and control groups showed improvement in specialized theoretical knowledge test scores after 8 weeks of teaching intervention. However, the experimental group exhibited a significantly greater improvement than the control group at a .05 level of significance. (see table 3)

Table 3: Comparative analysis of post-test results of the badminton-specific theoretical knowledge test between the experimental group and the control group

Group	\bar{x}	S.D.	SE	95% confidence interval		t	df	Sig.
				lower	Your honorific			
Exp. Group	85.63	6.57	1.16	1.35	9.9	2.63	62.00	0.01*
Cont. Group	80.00	10.16	1.80					

*P< .05





4. Mental Health: After 8 weeks of teaching experiment, the experimental group test scores in mental health were better at 0.05 with significant differences than the control group in the obsessive-compulsive symptoms, interpersonal sensitivity, anxiety, hostility, depression, and paranoia. These showed that taught by dynamic layers teaching methods was more advantageous than taught by traditional teaching methods. (See table 4)

Table 4: Comparative analysis of post-test results of mental health test between the experimental group and the control group

Test Event	Group	\bar{x}	S.D.	SE	95% confidence interval		t	df	Sig.
					lower	Your honorific			
Somatization	Exp. Group	13.88	1.24	0.22					
	Cont. Group	14.94	1.78	0.31	-1.83	-0.3	-2.78	62.00	0.01
Obsessive-compulsive disorder	Exp. Group	11.91	1.15	0.20					
	Cont. Group	14.16	2.11	0.37	-3.1	-1.4	-5.3	62.00	0.01*
Interpersonal sensitivity	Exp. Group	10.47	1.14	0.20					
	Cont. Group	13.53	2.38	0.42	-4.00	-2.13	-6.56	62.00	0.01*
Despondent	Exp. Group	14.72	1.46	0.26					
	Cont. Group	16.81	2.02	0.36	-2.98	-1.21	-4.74	62.00	0.01*
Apprehensive	Exp. Group	11.13	1.16	0.2					
	Cont. Group	12.19	1.6	0.28	-1.76	-0.37	-3.05	62.00	0.01*
Combative	Exp. Group	7.16	0.68	0.12					
	Cont. Group	7.97	1.23	0.22	-1.31	-0.32	-3.27	62.00	0.01*
Frightening	Exp. Group	8.00	0.67	0.12					
	Cont. Group	9.25	1.46	0.26	-1.82	-0.68	-4.4	62.00	0.01*
Paranoia	Exp. Group	7.84	1.25	0.22					
	Cont. Group	8.72	1.53	0.27	-1.57	-0.18	-2.51	62.00	0.01*
Psychotic	Exp. Group	11.81	1.23	0.22					
	Cont. Group	12.88	1.54	0.27	-1.76	-0.37	-3.05	62.00	0.01*
(sth.orsb.) else	Exp. Group	8.63	1.48	0.26					
	Cont. Group	9.56	1.39	0.25	-1.65	-0.22	-2.62	62.00	0.01*

*P<.05

5. Social development: After the experiment, the experimental group was better improved at a .05 level of significance than the control group on the social adaptability tests in dealing with peers, self-management, obedience skills, and skills of expressing willingness, but there had no difference on the learning skills. (See table 5)

Table 5: Comparative analysis of post-test results of the social development test between the experimental group and the control group

Test Event	Group	\bar{x}	S.D.	SE	95% confidence interval		t	df.	Sig.
					lower	Your honorific			
Handling of peers	Exp. Group	4.75	1.95	0.34					
	Cont. Group	3.31	2.47	0.44	0.33	2.55	2.58	62.00	0.01*



Test Event	Group	\bar{x}	S.D.	SE	95% confidence interval		t	df.	Sig.
					lower	Your honorific			
Self-management	Exp. Group	4.75	2.53	0.45	0.28	2.47	2.51	62.00	0.01*
	Cont. Group	3.38	1.79	0.32					
Study Skills	Exp. Group	3.88	2.54	0.45	-0.37	1.75	1.30	62.00	0.20
	Cont. Group	3.19	1.60	0.28					
Obedience skill	Exp. Group	4.13	2.27	0.40	0.14	2.23	2.27	62.00	0.03*
	Cont. Group	2.94	1.90	0.34					
Expression of Interest Skills	Exp. Group	4.81	2.09	0.37	0.25	2.37	2.48	62.00	0.02*
	Cont. Group	3.50	2.16	0.38					

*P < .05

6. Attitude: After 8 weeks of experiment. both the experimental and control groups showed significant improvement in their attitudes. The experimental group exhibited a significantly greater improvement in all attitude indicators than the control group at a .05 level of significance. Those attitudes were behavioral cognition and subjective criteria, target attitude, behavioral intention, emotional experience, and sense of behavioral control. (see table 6)

Table 6: Comparative analysis of post-test results of physical education learning attitude test between the experimental group and the control group

Test Event	Group	\bar{x}	S.D.	SE	95% confidence interval		t	df	Sig.
					lower	Your honorific			
Attitude	Exp. Group	33.59	6.34	1.12	3.57	9.55	4.38	62.00	0.01*
	Cont. Group	27.03	5.61	0.99					
Behavioral cognition	Exp. Group	44.28	7.65	1.35	2.00	11.24	2.87	62.00	0.01*
	Cont. Group	37.66	10.6	1.87					
Behavior	Exp. Group	28.19	5.02	0.89	3.43	8.70	4.60	62.00	0.01*
	Cont. Group	22.13	5.52	0.98					
Behavioral intention	Exp. Group	43.34	3.98	0.70	4.73	9.95	5.62	62.00	0.01*
	Cont. Group	36.00	6.22	1.10					
Emotional experience	Exp. Group	34.53	3.96	0.70	1.59	7.03	3.17	62.00	0.01*
	Cont. Group	30.22	6.59	1.17					
Sense of Behavioral Control	Exp. Group	40.13	6.05	1.07	0.61	8.89	2.29	62.00	0.03*
	Cont. Group	35.38	10.03	1.77					
Subjective criteria	Exp. Group	32.81	5.44	0.96	0.19	6.31	2.12	62.00	0.04*
	Cont. Group	29.56	6.74	1.19					
	Exp. Group	28.81	4.28	0.76	3.04	8.09	4.4	62.00	0.01*
	Cont. Group	23.25	5.72	1.01					

*P < .05





Conclusion

The result showed that after 8 weeks of teaching badminton with a dynamic layered teaching program in the experimental group and teaching badminton with a traditional teaching program in the control group, the results are as follows:

1. Badminton skills and techniques: the experimental group demonstrated superior abilities in high clears, net shots, forehand and backhand drop shots, and footwork techniques compared to the control group.

2. Knowledge: both groups of students showed significant improvement in their specialized theoretical knowledge test scores. Specifically, the experimental group showed a 7.966-point increase compared to the control group, indicating that the experimental group had a certain advantage over the control group in terms of specialized theoretical knowledge.

3. Attitude: both groups of students showed significant improvement in their attitudes towards physical education learning. However, the experimental group exhibited significant positive effects on all aspects of attitudes toward physical education learning, while the control group did not show a significant impact on behavioral attitudes, behavioral habits, behavioral intentions, and behavior control. Therefore, the experimental group had a certain advantage over the control group in influencing students' attitudes toward physical education learning.

4. Social development: both groups of students showed significant improvement in their social development test scores of social adaptation abilities for both groups. However, the experimental group exhibited significant positive effects on all social adaptation indicators, while the control group did not show a significant impact on obedience skills. Therefore, the experimental group had a certain advantage over the control group in enhancing students' social adaptation abilities.

5. Physical fitness: there were no significant differences between the experimental group and control groups in terms of physical fitness indicators (including reaction time, 10-meter run, and standing jump).

6. Mental Health: both groups of students showed significant improvement in their mental health test scores. However, the experimental group had a significant positive impact on all indicators of mental health, while the control group did not show significant effects on somatization, interpersonal sensitivity, and psychoticism. Therefore, the experimental group has a certain advantage over the control group in improving students' mental health.

Conclusion: According to research results It showed that the Dynamic Layered Teaching Program in Badminton could improve the learning outcome of university students on knowledge, badminton skills, attitude, social development, and mental health as shown in the diagram below.

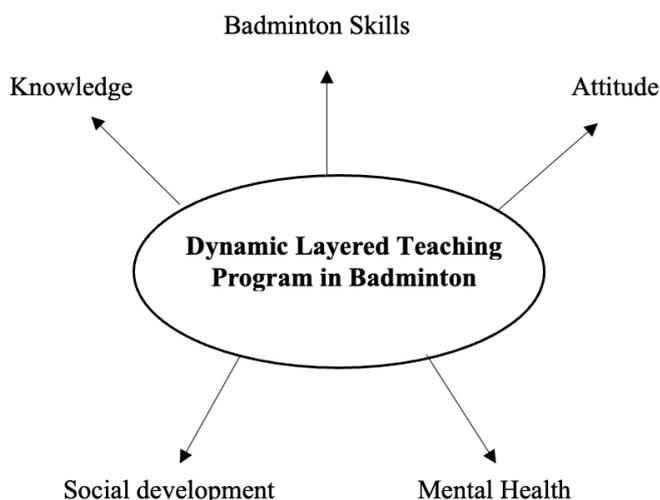


Figure 2: The diagram of dynamic layered teaching program in badminton could affect the student's learning outcomes



Therefore, from the above results and Figure 2, it was found that a dynamic layered teaching program in badminton could improve learning outcomes in college students, and be useful to apply in university badminton teaching programs.

Discussion

The results of the research demonstrate that a dynamic layered teaching program in badminton has significant advantages in enhancing badminton skills and techniques, knowledge, attitude, social development, and mental fitness. The dynamic layered teaching program in badminton provides an effective approach to personalized instruction and targeted training. However, there were no significant differences observed in physical fitness indicators. These findings support the promotion and application of dynamic layered teaching programs in physical education.

1. Specialized Skills

This study aimed to compare the differences in student skill development between layered badminton instruction and traditional badminton instruction. According to research results, we observed that the experimental group using a dynamic layered teaching program can enhance the specialized skills of students, such as high clears, net shots, forehand and backhand drop shots, and footwork techniques compared to the control group. This finding consists of the research results of Tan, S. (2022), Wang, G. (2022), and Ly, Y. (2023), which applied the dynamic layered teaching method, believing that it is feasible and can effectively improve students' basic specialized skills, which is conducive to stimulating students' enthusiasm for participating in sports.

2. Theoretical Knowledge

By analyzing the test scores of specialized theoretical knowledges between the experimental and control groups after the experiment, it was found that both groups showed varying degrees of improvement. After 8 weeks of training, both groups of students showed significant improvement in their specialized theoretical knowledge test scores. However, the results indicated that the experimental group had a certain advantage over the control group in terms of specialized theoretical knowledge. This finding consists of the research results of He, H., & Xiang, H. (2020) believe that dynamic layered teaching methods can make teaching content more diverse and help students solve problems that arise during the learning process. For students with relatively poor foundations, targeted guidance can be provided to complete teaching tasks and enhance their skill levels.

The implementation of dynamic layered teaching methods in the badminton elective course has greatly assisted students in learning specialized theoretical knowledge of badminton. Specialized theoretical knowledge in badminton aims to help students understand and master the principles of badminton skills, rules, and referee regulations, providing theoretical support for students to excel in badminton-specific sports skills

3. Mental Health

By analyzing the test scores of students' mental health in the experimental and control groups after the experiment, it was found that both groups showed varying degrees of improvement. According to Table 3-12, after 8 weeks of instructional training, both groups of students showed significant improvement in their mental health test scores. However, the experimental group had a significant positive impact on all indicators of mental health. This finding consists of the research results of Hou, L. (2018) which believes that implementing dynamic layered teaching methods helps to teach students according to their aptitude, fully mobilize learners' subjective enthusiasm, facilitate teachers to better choose teaching content, and also help establish a relaxed, equal, and harmonious classroom atmosphere.

4. Social Development

An analysis of the test scores on social development abilities between the experimental and control groups after the experiment revealed that both groups showed varying degrees of improvement in social development. After 8 weeks of training, there was a significant improvement in the test scores of social development abilities for both groups. However, the experimental group exhibited significant positive effects on all social development indicators. This is consistent with Chai, X. (2022) research result, the survey results showed that the dynamic layered teaching method has more advantages than



traditional teaching methods in adapting to the characteristics of quality education and can adapt to cultivating students' group cooperation ability and the spirit of unity and mutual aid dedication.

5. Attitudes

An analysis of the test scores on attitudes toward physical education learning between the experimental and control groups after the experiment revealed that both groups showed varying degrees of improvement. After 8 weeks of badminton training, there was a significant improvement in the attitudes toward physical education learning for both groups, but the experimental group had a certain advantage over the control group in influencing students' attitudes toward physical education learning. This is consistent with the research result of Tomlinson, C.A. (2014) which believe that dynamic layered teaching can not only improve skills, but also change students' attitudes towards sports, improve classroom forms, extend teaching beyond the classroom, and promote the improvement of teachers' teaching level.

6. Physical Fitness

The research result showed that there were no significant differences between the experimental and control groups in terms of physical fitness indicators (including reaction time, 10-meter run, and standing jump). This research's findings contradict the research result of Liu, M. (2018), who conducted eight weeks of experimental teaching based on the characteristics of the school's badminton curriculum, evaluated, and analyzed the students in two classes, and demonstrated whether it is more conducive to the improvement of students in all aspects. The results showed that: Students' mastery of badminton specialized techniques improved under the intervention of two teaching methods, but the experimental group had a higher effect on the specialized physical fitness scores than the control group.

Recommendations

Application of this research results

1. The dynamic layered teaching methods strictly adheres to the teaching principle of teachers' guides and students' learner. It provides targeted differentiated teaching guidance based on students' differences, allowing students to truly understand and master the theoretical knowledge taught by teachers within their respective levels. Consequently, it improves the effectiveness of the badminton classroom instruction.

2. This study employed a short-term experimental design, which cannot comprehensively evaluate the long-term effects of dynamic layered teaching methods on students' badminton skill development. Further long-term research would be valuable in revealing the sustained effects of this teaching approach.

3. This research sample was limited to specific schools or regions, so cultural backgrounds, and educational environments should be taken into account when promoting this teaching approach.

Future research recommendation

Future research can further explore the mechanisms and effects of dynamic layered teaching methods and compare the learning outcomes of students from different age groups, skill levels, and sports types.

Remark:

This research's ethical approval has been granted by the Bangkokthonburi University ethical committee certificate no.109/2566.

References

- Amer, E. (2015). *Effective Teaching Strategies That Mind Individual Differences*. LinkedIn. Retrieved from: <https://www.linkedin.com/pulse/effective-teaching-strategies-mind-individual-amer-emran>.
- Chai, X. (2022). *An experimental study on the use of "layered asynchronous" teaching method in the teaching of small basketball*. Master's thesis, Soochow University.



- Duan, T. (2023). *Experimental research on dynamic layered teaching mode in aerobics teaching in sports colleges and universities*. Master Thesis, Xi'an Institute of Physical Education and Sports.
- He, H., & Xiang, H. (2020). Exploration and practice research on university sports hierarchical teaching. *Sports goods and science and technology*, 8,154-155.
- Hou, L. (2018). Discussion on the practical application of university sports hierarchical teaching. *Contemporary Sports Science and Technology*, 5, 90-91.
- Kubat, U. (2018) Identifying the Individual Differences Among Students During Learning and Teaching Process by Science Teachers. *International Journal of Research in Education and Science*, 4(1), 30-38
- Liu, M. (2018). *Research on hierarchical teaching methods to promote the improvement of college students' badminton technical movements*. Sports World.
- Ly, Y. (2023). *Experimental Research on Dynamic Layered Teaching Method in the Teaching of Volleyball Specialized Classes for Sports Training Majors in Sports Colleges and Universities*. Master Thesis, Xi'an Institute of Physical Education and Sports.
- Müller, F. H., & Louw, J. (2004). Learning Environment, Motivation, and Interest: Perspectives on Self-Determination Theory. *South African Journal of Psychology*, 34, 169-190. <https://doi.org/10.1177/008124630403400201>
- Park, V., & Datnow, A.J. (2017). Ability grouping and differentiated instruction in an era of data-driven decision-making. *American Journal of Education*, 123(2), 281-306, DOI:10.1086/689930
- Tan, S. (2022). *An experimental study of hierarchical cooperative teaching mode in table tennis elective course in general colleges and universities*. Master's Thesis, Harbin Institute of Physical Education and Sports.
- Tomlinson, C.A. (2014). *The Differentiated Classroom: Responding to the Needs of All Learners*. 2nd Edition, ASCD, Alexandria.
- Wang, G., (2022). *Research on the construction of a basketball competition system of "school and community" for youth in Sichuan Province*. Master thesis, Chengdu University.
- Williyanto, S., Nasuka, N., & Kusuma, D. W. Y. (2018). The Development of Badminton Skills Test Instruments for Athletes in Age of Children, Cub, Teenager and Youth. *Journal of Physical Education and Sports*, 7(1), 50-54.
- Yang, S. (2020) Exploration and practice of university physical education hierarchical teaching mode. *Journal of Physical Education*, 4, 117-120. doi:10.16237/j.cnki.cn44-1404/g8.2020.04.013.
- Zhang, Q. (2022). *An experimental study of dynamic hierarchical teaching method in the teaching of spacer net confrontational item group in sports colleges and universities*. Master Thesis, Xi'an Institute of Physical Education and Sports.