

The Effects of the Teaching Games for Understanding (TGFU) Mode Adopted in A College Basketball Program

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Abstract

Basketball, as one of the most popular sports courses in Chinese colleges and universities, has always been taught in a traditional ball teaching method, which has caused many problems in students' learning effects, such as poor basketball tactics, weaker physical fitness and so on. Therefore, it is imperative to reform the basketball courses in colleges and universities. Accordingly, this paper is aimed to explore the effects of the Teaching Games for Understanding (TGFU) method in basketball courses on male students from the Class of 2023, a university in Shanghai, China, in terms of their basketball tactics and physical fitness. The study sampled 60 students randomly selected from 1850 students who took the optional basketball courses. The selected students were divided into two classes, either with 30 students: the experimental classes taught with the TGFU method and the control class taught with the traditional method. The data were collected from the pre-tests and post-tests of both classes and analyzed by the tool Statistic Package for Social Science (SPSS 24.0). Including the calculation of average values and standard deviation for T-test. It is found that the TGFU adopted in the basketball courses has significantly improved students' basketball tactics and physical fitness, and that this method is advised to apply in college courses for students of all grades.

Keywords: TGFU method, basketball tactics, physical fitness, China

1. Introduction

1.1 Theoretical Background

According to the annual monitoring data on Chinese university students' physical fitness as well as numerous academic reports (Teng, 2021; Li, 2022; Fang, 2022), physical conditions of these students were worryingly poor. For instance, most male students scored 0 in the test item pull-ups, and what is worse, they quit the test voluntarily (He, 2019). Therefore, college students nowadays are in urgent need to enhance their physical fitness. In addition, on the part of teachers, they have paid more attention to guiding students' movement technique than to fostering their competence in competition and tactics. Such imbalance of teaching focus may contribute to students' incompetence in the competition and finally losing the game, which further frustrates their learning motivation and weaken their physical fitness.

Bunker and Thorpe (1982) found that ball game teaching in schools is generally characterized by single technical exercises and monotonous class atmosphere, which may erode students' interest in physical education and acceptance of skill learning. Therefore, in 1986, the two scholars proposed a teaching mode named Teaching Games for Understanding (TGFU) which incorporates theme-related games or competitions in physical education classes to actively engage college students into sports activities and thus improving their active thinking abilities and problem-solving skills.

This model has been studied by Chinese scholars at the theoretical level, and has been named as "Understanding Pedagogy". Wang Runbin (2010) considered the TGFU method as a new teaching method in physical education combing two-way theory construction and cognitive learning, which consists of six aspects: ball game, game watching, tactical understanding, on-field decision-making, skill execution and game performance.

Ismael López and Alba Práxedes (2016) explored the effects of an 8-week TGFU-based basketball program on students' procedural knowledge, technical execution, and tactical level. The results showed that students in the TGFU class had a significantly better understanding of the procedural knowledge than those from the control

class.

Gil, del Villar-Álvarez (2019), a Spanish scholar analyzed the effect of TGFU method on students' decision-making ability in terms of basketball passing and shooting. It is found that students from the TGFU class, are better at such decision making. The TGFU is an instructional mode designed for physical education and athletic coaching to improve students' learning and performance through a deeper understanding of games. The TGFU theory stresses the active experiential learning by engaging students in a real game scenario with an aim to deepen their understanding of game principles and further improve their learning effect and athletic performance.

1.2 Relevant Research

Numerous research has been conducted on the TGFU method across various contexts, including physical education settings, sports coaching, and research laboratories.

Keh, Nyit Chin (2008) discovered that TGFU adopted in physical education has helped improve students' understanding of sports with no significant difference between sexes. Hua Yang (2012) also adopted the TGFU teaching method in a physical education program, which proved that the method enhanced students' learning attitudes, skill acquisition, and game performance.

Stephanou (2020) examined the effect of TGFU on sports game performance by integrating TGFU into an experimental basketball curriculum in a high school. Before and after the intervention, self-report questionnaires were used to measure students' meta-cognition and basketball game performance. The results indicated that students in the TGFU group boasted better meta-cognition in problem analysis and solving and, as well as better skills and game performance.

Liang Xiu (2012), after the detailed analysis of the theoretical structure and connotation of the TGFU method, pointed out that the mode focuses on teaching design, organization, strategy and evaluation, etc. He also integrated TGFU into a college basketball program and evaluated the students' basketball game performance by means of Game Performance Assessment Instrument (GPAI). The results showed that the TGFU mode can remarkably improve game performance, especially in student interaction, skills and tactics.

Shi Liang (2020) conducted a 14-week (14-session) soccer teaching study on seventh grade students, and assess the performance based on the National Standards for Students' Physical Health (2014 revision). It is found that the students in the TGFU class scored remarkably higher in the 50-meter sprint, but were not superior to students in the control class in other test items.

As educators and researchers persist in exploring the application and impact of TGFU in physical education and athletic coaching instruction, relevant research into TGFU has exerted a profound influence.

1.3 Research Background

The Curriculum Standards for Physical Education and Health (2022 revision) stipulates that certain motor skill should be designed and taught on the basis of large units. Large-unit teaching, meaning the systematic and comprehensive teaching of a single sport or sports combinations lasting for more than 18 hours, generally consists of basic technical training of certain sports or sports combination, confrontation practice, teaching competitions and physical exercise. Beside the physical practice, it also compasses theoretical learning such as basic principles, rules and referees, game appreciation and evaluation, and so on. These curriculum standards consist with the education targets in modern colleges and universities to improve students' basketball tactics and physical fitness.

Basketball, as a prevalent and socially influential sport in China, is well received in school education of all stages, with no exception in colleges and universities where basketball courses are popular among college students. However, in college basketball courses, teachers still follow the traditional teaching concepts and methods, which do not adapt to the current educational trend and have caused many problems. Therefore, it is imperative to reform the physical education teaching. Thus study attempts to explore the effect of the TGFU teaching method, by comparing it with the traditional teaching methods, on college students' basketball tactics and physical fitness.

A comprehensive university in Shanghai was selected where approximately 90% of the students, in addition to required physical education classes, were less engaged in physical exercise in their spare time. It is no surprise that their physical conditions are generally poor and basketball tactics vary considerably. The reason lies behind the worrying phenomenon may be that teachers, with the intention to spark students' interest in sport, end up in focusing on their teaching levels instead of students performance. Under such circumstance, both teachers and

students call for new teaching methods to improve teaching and learning.

1.4 Research Problems

The research on TGFU has been carried out in different countries, ages and disciplines, and the researchers have developed their own framework in certain field. However, according to some research, TGFU has not been widely applied in physical education teaching, and it remains a challenge to apply TGFU in practical basketball courses to improve students' physical fitness and basketball tactics. Therefore, this study attempts to explore how the intrinsic mechanism of TGFU mode affects college students' basketball tactics and physical fitness, so as to provide theoretical support for the wide application of TGFU.

1.5 Research Significance

The significance of the study can be summarized into two aspects. For one thing, the study, by applying TGFU to college basketball courses, proved that TGFU is an effective way to improve college students' weak physical conditions which has plagued the society, and to help students grasp basketball techniques, tactics and rules. For another, the study confirmed the effectiveness and feasibility of TGFU in practical teaching, which lays a theoretical foundation for the reform of basketball curriculum.

2. Research Method

2.1 Research Design

The study was designed to analyze two classes: the control class taught by the traditional teaching method, and the experimental class taught by TGFU teaching method. Both classes went through three stages to assess students' physical fitness and basketball tactics: the pre-tests stage, intervention stage and post-test stage. To ensure the accuracy and authenticity of the data, the pre-tests and post-tests of both groups were scheduled at the same time and the same place by the same measurement way.

2.2 Research Participants

The study participants were 60 college students randomly selected among the total 1850 who took basketball optional courses and were from Class of 2023, a university in Shanghai, China. The selected students were further divided into two classes: the experimental class taught with TGFU teaching method, and the control class taught with the traditional teaching method. Both classes were taught for eight weeks, twice a week. The students' basketball tactics (skill level, game performance), physical fitness were assessed in pre-tests and post-tests for further statistic analysis.

2.3 Data Collection Tools and Procedures

In order to compare differences in teaching effectiveness between the two teaching methods, the experimental class were taught with the TGFU teaching method while the control class were taught with the traditional teaching method. Both teaching programs were developed in accordance with a university in Shanghai, China syllabus of general basketball course for undergraduate students who do not major in physical education. During the experiment, both classes were taught according to their respective programs and the data were collected, including basketball tactics (skill level, game performance), and physical fitness.

The basketball tactics were assessed based on the National Youth Campus Basketball Teaching Guidelines (Trial Version) issued by the General Office of the Ministry of Education and the Evaluation Standards for College Students' Basketball Skill Levels (Trial Version). Based on this experiment, two specific items were tested to reflect college students' basic basketball skills: three-point shot and dribble drive.

The students' game performance before and after the class were recorded on video by iPhone11 Pro (model: MWCQ2LL/A) designed by Apple in California, for further assessment. The Game Performance Assessment Instrument (GPAI), developed by Griffin, Mitchell and Oslin (1997) to measure ball game performance in 1995, were applied to measure students' game performance in this study.

The students' physical fitness were assessed based on the National Physical Fitness Standard for College Students (2014 Revision) issued by the Ministry of Education. According to the needs of this experiment, four items were tested: 50-meter sprint (second), 1000-meter running (second), standing long jump (centimeter), and pull-ups (number).

In order to ensure the accuracy of the tests, two national A-level basketball coaches and one national basketball referee were hired as experts to grade and record the results. Each and every test score must be approved by all the three experts.

2.4 Data Analysis

The data were collected in real time before and after the classes, and confirmed on site by the three experts. After deduction by EXCEL 2016 version, the data were further analyzed by using SPSS 24.0 for independent sample T-tests and paired sample T-tests, in order to compare differences between pre-test results and post-test ones.

The literature review, experiment process, questionnaire content (Tang, 2019) were systematic organized and logically reasoned by means of logical analysis. The data from the experimental class and the control class were double compared between pre-test and post-test by means of comparative analysis, in terms of basketball tactics (skill level, game performance GPAI) and physical fitness.

3. Research Results

3.1 Comparative Results of Basketball Tactics in Pre-Tests and Post-Tests in the Experimental Class

At the end of the experiment, the basketball tactics of students in the experimental class were tested. The data in both pre-tests and post-tests were analyzed by the SPSS 24.0 system for paired sample T-test, and the results are shown in Table 1 below.

Table 1. Comparative results of basketball tactics in pre-test and post-test in the experimental class

Test Items	Count	Experiment	M	SD	T	P-Values
Three-point shot	30	pre-test	78.00	16.060	-5.552	0.000
	30	post-test	93.00	9.154		
Dribble drive	30	pre-test	74.00	19.582	-5.188	0.000
	30	post-test	93.00	9.154		
Return restore	30	pre-test	80.00	15.920	-3.372	0.002
	30	post-test	88.67	8.899		
Make the right decision	30	pre-test	64.33	26.384	-4.583	0.000
	30	post-test	85.33	14.259		
Skill showcase	30	pre-test	67.83	8.477	-6.696	0.000
	30	post-test	82.17	9.531		
Game performance	30	pre-test	70.70	12.402	-8.019	0.000
	30	post-test	85.10	6.840		

Note. NB: $P < 0.05$ indicates a significant difference; $P > 0.05$ suggests no significant difference.

According to Table 1, the P-values of three-point shot (score) and dribble drive (score) in the pre-test and post-test were both equal to 0.000, and the combined P value of these two skills was lower than 0.05, which all indicated that there existed significant differences between pre-test and post-test. In terms of return restore (score), make the right decision (score), skill showcase (score), the P values were, respectively, 0.002, 0.000, and 0.000. Additionally, the P value of game performance (score) as overall evaluation, also equaled 0.000, which also indicates significant disparities. Therefore, it is safely concluded that after 8 weeks of TGFU teaching in the experimental class, significant difference can be noticed in the basketball tactical level of college students. To be specific, their performance after the experiment is superior to that before the experiment, which proves that the TGFU teaching method can improve basketball tactics of college students.

3.2 Comparative Results of Physical Fitness in Pre-Tests and Post-Tests in the Experimental Class

The physical fitness of college students in the experimental class were also tested. The data in both pre-tests and post-tests were analyzed by the SPSS 24.0 system for paired sample T-test, and the results are listed in Table 2 below.

Table 2. Comparative Results of Physical fitness in Pre-Tests and Post-Tests in the Experimental Class

Test items	Count	Experiment	M	SD	T	P-V
50-meter sprint	30	pre-test	80.07	8.246	-2.558	0.013
	30	post-test	86.27	10.405		
1000-meter running	30	pre-test	70.87	8.394	-0.980	0.331
	30	post-test	72.97	8.198		
Standing long jump	30	pre-test	76.77	15.210	1.659	0.103
	30	post-test	68.10	24.241		
Pull-up	30	pre-test	18.30	28.146	-0.448	0.656
	30	post-test	21.47	26.569		

Note. NB: $P < 0.05$ indicates a significant difference; $P > 0.05$ suggests no significant difference.

According to Table 2, the P values of 50-meter sprint (score), 1,000-meter running (score), standing long jump (score), and pull-ups (score) in the experimental class were respectively 0.013, 0.331, 0.104, and 0.656, among which three values were above 0.05 suggesting no significant difference while one item, 50-meter sprint was under 0.05 indicating significant difference. Therefore, it can be safely concluded that after 8 weeks of TGFU teaching, performance in 50-meter sprint of the students in the experimental class was superior to that before the experiment, which further proves that TGFU teaching can improve physical fitness of college students.

3.3 Comparative Results of Students' Basketball Tactical Level After the Experiment Between the Control Class and the Experimental Class

After the experiment, the basketball tactical level test (including basketball skill level and game performance) was conducted separately for college students in the experimental class and the control class. Two items of basketball skill level were tested first, and then four items of basketball game performance within either class were tested separately. The data from all six dimensions were analyzed by independent sample T-test, and the results are listed in Table 3 below.

Table 3. Comparative results of college students' basketball tactical level after the experiment between control and experimental classes

Test Items	Count	Class	M	SD	T	P
Three-point shot	30	Control	81.67	15.555	-3.439	0.001
	30	Experiment	93.00	9.154		
Dribble drive	30	Control	83.33	18.998	-1.614	0.112
	30	Experiment	90.33	14.259		
Return restore	30	Control	74.00	18.864	-3.851	0.000
	30	Experiment	88.67	8.899		
Make the right decision	30	Control	73.33	18.998	-2.767	0.008
	30	Experiment	85.33	14.259		
Skill showcase	30	Control	70.33	6.940	-5.498	0.000
	30	Experiment	82.17	9.531		
Game performance	30	Control	72.50	11.655	-5.107	0.000
	30	Experiment	85.10	6.840		

Note. NB: $P < 0.05$ indicates a significant difference; $P > 0.05$ suggests no significant difference.

As to basketball tactics of students in the experimental class after the experiment, the P values of three-point shot (score), dribble drive (score), return restore (score), making the right decision (score), skill showcase, and game performance (score) were respectively 0.001, 0.112, 0.000, 0.008, 0.000 and 0.000, all of which were under 0.05 indicating significant differences.

To be specific, in terms of the test item "three-point shot, the average score of the experimental class is 12.67 points higher than that of the control class. As to the item "dribble drive", the average score of the experimental class was 7 points higher than that of the control class. In the control class using traditional teaching method, a large amount of time was spent on the teaching and practice of movement techniques, so naturally students' techniques are enhanced. By contrast, in the TGFU class, the majority of the lesson time was spent on understanding games and competitions. Although the technical training serves as a supplement to the tactics and skills used in competitions, technical ability are not dismissed in the TGFU mode. When it comes to items "return restore" and "skill showcase", the average score of the experimental class were respectively 14.67 and 11.84 points higher than that of the control class.

Based on the results above, the TGFU teaching method can promote students' application of basketball tactics and ensure their correct movement techniques. In addition, during the TGFU course, students can constantly reflect on themselves to identify their technical weaknesses and overcome the deficiency through targeted exercises. To sum up, the test item "dribble drive" in this study demonstrated no statistical significance because the two teaching methods achieved basically the same effect in improving technique performance. Nevertheless, the dramatic disparities between two classes in average scores of "return restore", "making the right decision" and "skill showcase" suggested that basketball is a comprehensive sport which demands complex technical and tactical training, flexible arrangement and fierce rivalry. If we are to measure college students' learning effects of technical movements, we may not simply rely on the speed of task completion or final performance. Instead, we should assess their game performance in the real competitions, which is also the ultimate goal of acquiring basketball skills.

3.4 Comparative Results of Students' Physical Fitness After the Experiment Between the Control Class and the Experimental Class

After the experiment, the physical fitness of college students in the control class and the experimental class were tested. The data obtained from four items were analyzed by independent sample T-test, and the results are shown in Table 4 below.

Table 4. Comparative results of students' physical fitness after the experiment between the control class and the experimental class

Test Items	Count	Class	M	SD	T	P
50-meter sprint	30	Control	79.77	7.205	-2.558	0.013
	30	Experiment	86.27	10.405		
1000-meter running	30	Control	68.87	12.950	-0.980	0.331
	30	Experiment	72.97	8.198		
Standing long jump	30	Control	68.23	24.297	1.659	0.103
	30	Experiment	68.10	24.241		
Pull-up	30	Control	18.13	26.282	-0.448	0.656
	30	Experiment	21.47	26.569		

Note. NB: $P < 0.05$ indicates a significant difference; $P > 0.05$ suggests no significant difference.

It can be seen in the Table 4 that the P values between two classes of 50-meter sprint (score), 1000-meter running (score), standing long jumping (score), pull-up (score) were respectively 0.013, 0.331, 0.103 and 0.656. To be specific, as to 50-meter sprint which stands for the speed, the P value is under 0.05 suggesting a significant difference in the speed quality between students in both classes. On the contrary, in terms of 1000-meter running which represents endurance, standing long jumping which represents explosive power of the lower limbs and pull-ups which represents the power of the upper limbs, the respective P values are all above 0.05 indicating no significant difference in these qualities between students of both classes.

To sum up, there is no considerable difference in the four physical qualities between students in both classes after the experiment. The reason may be that it requires time and systematic training to improve physical qualities such as endurance, lower limb explosion and upper limb strength. Within a short period, the TGFU teaching mode and the traditional teaching method may not exert a huge impact on the physical fitness of college students.

4. Discussion

4.1 The Effect on Students' Basketball Tactics Before and After the Implementation of TGFU Teaching

The data were collected before and after the teaching experiment and were in line with the requirements of the preliminary experimental design. Through statistical analysis, it is found that after 8 weeks of TGFU teaching, remarkable improvement can be noticed in students' basketball tactical level (three-point shot, dribble drive, game performance), which is consistent with Turner & Mitchell's discoveries in 1992. Therefore, it can be concluded that the TGFU teaching method can improve college students' basketball tactics.

4.2 The Effect on Students' Physical Fitness Before and After the Implementation of TGFU Teaching

The data were collected before and after the experiment and were in line with the requirements of the preliminary experimental design. Through statistic analysis, it is found that after 8 weeks of TGFU teaching, remarkable improvement can be noticed in 50-meter sprint, but no significant difference in the rest three items, namely, 1000-meter running, standing long jump and pull-ups, which is consistent with Shi Liang's findings.

The TGFU method stresses the tactical understanding and decision-making skills through games rather than focuses on practicing a single skill. Therefore, in TGFU method, structured physical training for specific fitness indicators such as cardiovascular endurance, muscular strength, and flexibility are typically absent. If this absence is not valued, students' physical fitness may not improve significantly.

Therefore, it can only be concluded that the TGFU teaching method can improve college students' speed quality.

4.3 The Effect of TGFU Teaching and Traditional Teaching on Students' Basketball Tactics

Based on the data above, it is shown that the college students in both experimental and control classes has improved their basketball tactics after an 8-week basketball course. However, the average scores of the experimental class in each aspect of basketball tactics are superior to those of the control class, which proves that

the TGFU teaching can enhance their abilities such as skill execution, decision making, and game understanding because students have to solve the problems in the game scenario by formulating and applying their own ideas (Salimin et al., 2020; Memmert et al., 2015; Gray et al., 2011). The reasons behind it are twofold. Firstly, the traditional teaching method, with the aim of grasping skills, focuses on the learning effect of single technical movements. On the contrary, the TGFU mode, built on the advantages of traditional teaching methods, attempts to promote students' understanding and application of technical movements through an exploratory and situational game or competition scenario, and thus improving students' basketball tactics. Secondly, in the actual teaching process, the core concept of TGFU is empowerment. College students, guided by both group cooperation and self-direction, are allowed to cooperate with group members and compete with rivalry groups. Within the group, students can help with each other and make concerted progress; while between groups, students can compete with each other under the guidance of the group leader. Both forms share the same objective: to win the game by honing skills. Therefore, the TGFU mode, with game as a media, is more favorable to the skill mastery of college students. For example, in basketball (Griffin et al., 1997), volleyball (Chatzipanteli et al., 2011), soccer (Barquero-Ruiz et al., 2020), and badminton (Nathan, 2016), students' knowledge of the sport, understanding and application of the rules, and the frequency of decision-making (e.g., active shooting in basketball, active receiving in soccer, active blocking in volleyball, etc.) all witnessed considerable improvement.

4.4 The Effect of TGFU Teaching and Traditional Teaching on Students' Physical Fitness

From the data above, no significant difference can be noted in the students' physical fitness between the TGFU mode and the traditional teaching method, both with increase in overall average scores. This indicates that both teaching methods have a positive effect on students' physical fitness. Tan Shuiquan (2020) once tested 50-meter sprint, 1000-meter running, 1-minute rope skipping, 1-minute sit-ups and seated forward bending to measure students' physical fitness, and the results also demonstrated no significant difference between the TGFU group and the control group. The reason why TGFU can effectively improve students' physical fitness may be that the game and competition settings stimulate students' learning motivation and increase their exercise frequency, thus directly contributing to their stronger physical fitness. However, some other research also found that improvement in physical fitness requires long-term, systematic, and targeted training. Therefore, more efforts remain to be made to confirm whether TGFU can improve students' physical fitness.

To sum up, the TGFU mode is not superior to the traditional teaching method in developing physical qualities such as explosive power, upper and lower body strength, and overall performance, but with an exception in the speed quality.

5. Conclusion

5.1 Research Findings

TGFU, as one of the mainstream modes of ball teaching applied in schools worldwide, focuses on cultivating student cognitive ability and tactical awareness, especially their technical and tactical ability and problem-solving ability in ball games. The TGFU mode is of great significance to the reform of ball game teaching in China. This study was designed into basketball teaching units based on TGFU mode by contrasting two classes with an intention to explore whether the TGFU mode can improve college students' basketball tactics and physical fitness.

5.1.1 The Effect on Students' Basketball Tactics Before and After the TGFU Teaching Mode

At the end of the 8-week teaching experiment, the pre-test and post-test data from the experimental class were analyzed and compared. Remarkable improvement can be noticed in students' basketball technical level (skill level, game performance) after the TGFU teaching.

5.1.2 The Effect on Students' Physical Fitness Before and After the TGFU Teaching Mode

At the end of the 8-week teaching experiment, the pre-test and post-test data from the experimental class were analyzed and compared. Significant improvement can be noticed in students' physical fitness after the TGFU teaching.

5.1.3 The Effect of TGFU Teaching and Traditional Teaching on Students' Basketball Tactics

After comparing data from both classes, it is found that the TGFU-based teaching mode has remarkably improved college students' basketball tactics, including three-point shot, dribble drive, and game performance, which indicates that the TGFU mode is beneficial to cultivating college students' technical, tactical and athletic abilities. Especially, compared with traditional teaching, the TGFU mode is more effective in promoting

basketball technical and tactical levels, which proves the superiority of TGFU teaching in this aspect.

5.1.4 The Effect of TGFU Teaching and Traditional Teaching on Students' Physical Fitness

After analyzing data from both classes, it is found the speed quality of the experimental class was significantly improved compared with that of the control class, but the other items saw no significant change. Despite improvement of both classes after the experiment, it is safely concluded that the improvement of physical fitness is a lasting process which demands time and training.

5.2 Suggestions

5.2.1 To Adopt TGFU Teaching Mode in the Teaching of Ball Games

The TGFU mode, targeted at and applicable to ball games, is believed to promote reform on ball game teaching. The study has confirmed that TGFU teaching mode can significantly improve college students' comprehensive quality in ball games. Therefore, schools should encourage teachers to reform physical education, and actively try teaching modes that well adapt to ball game teaching. In doing so, college students can not only improve their tactics in an efficient manner, but also kindle their interest in sport to grow into a lifetime sports person.

5.2.2 To Encourage College Students' Subjectivity in TGFU Teaching Mode

In the TGFU teaching mode, students should be encouraged to give a full play. Whenever necessary, they should be appropriately guided to leverage their thinking ability, imagination, creativity, teamwork, combined with moral education as well as intellectual education through knowledge acquisition.

5.2.3 To Improve Teachers' Professionalism in TGFU Teaching

For teachers, to adopt the TGFU teaching mode is professionally demanding. Before class, teachers must well design and prepare the content that can help students understand the core tactics to achieve the expected teaching effect. During the class, teachers must be able to flexibly address problems or emergencies. After the class, teachers must reflect on the lesson and identify timely solutions.

5.2.4 To Make Reasonable Lesson Plans

In the long term, it is necessary for teachers to control the teaching time, streamline the teaching content, and increase skill practice. Besides that, the teaching time should be flexibly adjusted according to characteristics of different sports programs, so as to effectively improve sports tactics and physical fitness.

5.3 Limitations

The research participants are college students, so it is unknown whether the TGFU mode can improve learning effects of other groups. In addition, due to the limited research conditions, the long-term learning effect of the TGFU mode is worth further verifying. Lastly, considering different situations, none of the ideas or experimental programs proposed in this study can be simply replicated and applied.

5.4 Implications

For college students, skill mastery serves as the foundation, and competition ability is the key. The TGFU teaching mode is advised to be introduced into college basketball courses so that technique practice can be implemented in a scenario close to the real game. In this scenario, students can be inspired to identify their problems and make a wise decision, while the teacher can propose a possible solution. After understanding the importance of technique to the game and acquiring certain technique, students then turn to deal with the problems that appear in the real game, which is conducive to stimulating their intrinsic learning motivation. In the end, college students can apply what they have learned and change from passive reception to active participation, thus improving their basketball tactics and physical fitness.

Considering the characteristics of TGFU teaching mode, the teaching time and venue must be guaranteed to ensure desirable learning effects. During the experiment, some students were absent from class for various reasons like competition, bad weather, illness and so on, which leads to the lost of partial samples. On top of that, college students' basketball tactics and physical fitness are affected by a variety of factors, such as exercise habits, extra-curricular exercise time, family participation in sports activities, participation in off-campus sports training, and so on. So it is difficult to completely control all the variables in the experiments that may affect the results.

Physical education is more a form of art than a discipline. As we all know, the aims of physical education in colleges is to improve college students' athletic and tactical ability, and to enhance their physical fitness by developing exercise habits. As science and technology develops by bounds and leaps, college students are increasingly exposed to extensive knowledge. Despite certain advantages of the traditional teaching mode, young

teachers should be bold and innovative enough to explore new teaching methods which are in favor of the development of college students and inspire students to think critically. As to the teachers, they should communicate with students in a timely manner to find an optimal solution.

The TGFU teaching method, firstly, allows college students to understand the characteristics, rules and tactics of basketball, then to carry out targeted practice, and finally test their learning effects through games. After the whole procedure, college students are likely to enhance their practical application of basketball tactics. Given this, college students should be equipped with certain level of basketball tactics and physical fitness if they are to be taught with the TGFU mode. Therefore, it is not advised to adopt the TGFU teaching method or to avoid it as much as possible when the targeted students are poor in basketball tactics or physical fitness.

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Data sharing statement

No additional data are available.

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