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Effect of Added Functional Training into Basketball Program for Primary School Students

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Abstract

Background and Aim: After the investigation found that the current stage of elementary school basketball teaching only teaches basketball skills, while ignoring the training of fitness, related research verifies that functional training can better practice fitness, while fitness has a key role in basketball skills, so it is especially important to join functional training. Related studies have also proved that after functional training, basketball skills and fitness greatly improved. Therefore, this paper proves that functional training is more effective by adding functional training to the basketball program for primary school students.

Materials and Methods: This paper is a quasi-experimental study with a sample of 30 people divided into an experimental and control group of 15 people each. The experiment has eight weeks, three times a week training, training times are Monday, Wednesday, and Friday, each training time 60 minutes. Before the formal experiment, the functional training program IOC test and Try Out, record the basic information of the physical characteristics of the experimental group, the control group, and the data of the experimental group, the control group of the basketball test and fitness test, and calculate the mean and standard deviation of the data through statistical software. Comparison between the experimental group and control group before the experiment was done by t-test, and comparison between the experimental group and control group after the experiment was done by t-test for basketball skill test and fitness test, and one-way ANOVA repeated test and Bonferroni post-hoc test were used for basketball skill test and fitness test within the experimental group, and the significance level was 0.05.

Results: (1) The t-test showed that there was a significant difference between the test results of the experimental group and the control group in the pre-test, but there was no significant difference in the post-test, and the test results of the experimental group were better than those of the control group in the post-test. (2) ANOVA shows a significant difference between the test results of the experimental group in the pretest-posttest, and the improvement in the experimental group's performance is better than that of the control group.

Conclusion: After the experiment, the basketball skills and fitness of the experimental and control groups improved, but the experimental group improved better than the control group.

Keywords: Functional Training; Primary School Students; Basketball Program

Introduction

Since the 18th Party Congress, General Secretary Xi Jinping's idea of a strong sports nation has become an indispensable part of his ideology of national governance and has clearly pointed out five strategic tasks such as building a strong sports nation, and explicitly mentioned the need to promote the comprehensive ability of competitive sports and fight for the glory of the motherland (Xinhua News Agency, 2019). Basketball, as one of the three major ball sports, has a high popularity rate in China, and with the development of campus sports, basketball is loved by young people, and basketball classes have become an important part of campus physical education classes in primary and secondary schools (Lu, 2010). With the development of basketball in the world, basketball techniques and tactics are constantly updated, and the requirements for technology are constantly improving, especially in the elementary school stage, the foundation stage is particularly important. Basketball not only requires good skills, but the application of skills is also important. The better application of skills needs the stability of the body to support it, and the stability of the body needs physical quality as a foundation. It can be said that physical quality is the foundation of all basketball skills, which has a key role in improving the basketball quality of primary school students (Yin et al, 2019). Through reviewing relevant information, as well as field investigation and questioning relevant physical education teachers, it was found that in previous elementary school basketball teaching, teachers only focused on the teaching of basketball skills and

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ignored the practice of physical quality. Especially in Zhengzhou Chenzhong Experimental School, the school studied in this paper, this phenomenon is especially obvious for the basketball club students here, that is, there is a certain basketball foundation, but due to the physical quality is not able to lead to the game which the technical movements cannot be better applied, so this status quo needs to be changed urgently. As for how to improve basketball skills and what methods are needed to improve basketball skills, one of the studies mentioned that through the intervention of functional training, the shooting percentage of middle school basketball players was greatly improved through functional training (Wang, 2022) and another study mentioned that the foot movement ability of adolescent basketball players was greatly improved through functional training (Sun et al, 2023), which suggests that functional training is the most effective way to improve basketball skills, which is the most effective way to improve basketball skills. 2023), which suggests that a functional training program will have a role in the improvement of basketball skills. Meanwhile, the level of fitness test can also be improved through functional training, in which the study mentioned that the bouncing strength of basketball high school students was improved significantly through functional training (Chen, 2023). Another study mentioned that physical endurance quality test scores were substantially improved through functional training (Su, 2023), which also suggests that functional training programs can play a role in improving fitness test scores.

In a word, comprehensive the current situation and related research, adhering to the principles of relevance, safety, and gradual progress, the basketball club of Zhengzhou Chenzhong Experimental School Primary School is taken as a research object. By combining functional training, to see the effect of functional training to make up for the lack of research in this area and the urgent need to change the status quo at home and abroad. The difference with the previous literature is that this paper proves that basketball skills and fitness can be improved through functional training, and it is not limited to a certain basketball action and fitness action, which is also the difference between this paper and the previous papers, so I want to do this research.

This study was conducted to improve the basketball skills of primary school students through a functional training program. The population of the study was the students of Zhengzhou Chenzhong Experimental School, the population was 60 male children aged 11-12 years old from the basketball club of Zhengzhou Chenzhong Experimental School, the experiment took 30 people as samples and divided them into two groups, one group of 15 people, which were the experimental group and the control group. Synthesize related books, information, and literature to derive some functional factors related to basketball skills, and combine them with personal experience to derive a functional training program. Then synthesize the related books, information, and literature to come up with the test methods and scoring standards for the three items of the basketball skill test, as well as the test methods and scoring standards for the three items of the fitness test. The initially identified functional training program will be tested for validity and five experts will be selected to test it, and after the validity test, a Try Out will be conducted to see how the functional training program is implemented in practice. Then the formal experiment was carried out, the experimental group carried out the functional training program the control group carried out the original basketball training program for eight weeks, and the basketball skill test and fitness test were carried out before, after four weeks, and after the experiment, respectively. The results of the post-experimental data analysis of the experimental group and the control group were compared to demonstrate that the addition of functional training was more effective.

Limitation of research: Limitations of the research object: the sample only consisted of 30 male children aged 11 to 12 in basketball clubs, which could not comprehensively cover primary school students in the whole country, so the scope of the research has some limitations. The limitation of the length of the experiment: the experiment only lasted 8 weeks, although the experimental group improved, the improvement of basketball skills is a long-term process, so the length of the experiment has some limitations. Limitations of experimental data: Firstly, funds, instruments, and space are limited, and some specialized equipment cannot be implemented in place. Secondly, some unexpected phenomena, such as

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leave of absence, sudden injury, etc., will also have a certain impact on the operation of the experiment. All these factors will have some impact on the final experimental data.

Methodology contribution: In exploring the effects of a functional training program on primary school students' basketball skills, this study makes significant methodological contributions and is divided into three areas. Innovative research design: the study integrates multidisciplinary theories, innovatively combines functional training with primary school students' basketball skills, and analyzes the relationship between the two through empirical research, providing a new perspective for research in related fields. Data collection and processing: Scientific and systematic methods were used to collect data, and advanced statistical software was used to analyze the data to ensure the objectivity and accuracy of the research results. Experimental design and control: By setting up experimental and control groups, experimental variables were strictly controlled to more accurately assess the effects of functional training on primary school students' basketball skills.

Academic contribution: This study also makes an important contribution to the development of the field at the academic level and is divided into three areas. Cross-integration of disciplines: The study integrates the knowledge of several disciplines, such as physical training, exercise physiology, child development psychology, etc., which promotes cross-integration between disciplines and provides new theoretical support for basketball training of primary school students. Knowledge updating and improvement: The empirical study provides new evidence for the knowledge system of related fields, which helps to improve the theoretical framework and skill system of basketball training for primary school students.

Application distribution: In addition to methodological and academic contributions, this study has significant applied value and is categorized into three areas. Guiding practice: the results of the study provide coaches and physical education teachers with specific and practical functional training programs, which help them better guide primary school students in basketball training. Promoting skill progress: Through functional training, the basketball skills and fitness levels of primary school students were significantly improved, which helped them to achieve better results in the competition. Reference for policy making: The results of this study provide a reference for the relevant education departments to formulate sports training policies for primary school students, which can help promote the healthy development of primary school students' sports education.

Research Questions

1. Did the effect of added functional training in basketball programs for primary school students on basketball skills and fitness?
2. Did the basketball skills and fitness in the experimental and control groups improve after training?
3. Which group of the experimental and control groups improved basketball skills and fitness faster after training?

Objectives

1. To study the effect of added functional training in basketball programs on fitness and basketball.
2. To compare the mean and standard deviation of the basketball skill test and fitness test between the experimental and control groups on the pretest and posttest by t-test.
3. To compare with in experiment group by ANOVA.

Research Hypothesis

1. Basketball skills and fitness of the experimental and control groups were improved.
2. The experimental group improved their basketball skill and fitness better than the control group in the pretest-posttest.

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Literature review

In basketball, the importance of physical quality to skill level is self-evident. First of all, physical quality is the foundation for basketball players to execute various skill movements. For example, shooting, dribbling, passing, and other actions need good physical quality support to be completed. Secondly, physical quality directly affects athletes' explosive power and endurance in the game, which is crucial for performance at key moments such as jumping quickly, grabbing rebounds, and breaking through with the ball. Therefore, for basketball players, good physical quality is the key to improving skill level and competitive ability.

Functional training has received more and more attention as a training method for athletes' specific skill needs. In basketball, the goal of functional training is to improve athletes' movement efficiency and skill level by simulating common movements and postures in the game. Studies have shown that functional training can effectively improve the explosive power, flexibility, and movement control of basketball players, thus improving their performance in the game. At home and abroad, there are many experts and scholars in the field of physical training to conduct in-depth research on functional physical training. Functional physical training in improving athletic ability is unanimously recognized, at the same time in comparison with China's traditional physical training, also unanimously agreed to have a perfect significance. However, in terms of practice, there is a lack of empirical research due to the insufficient allocation of domestic first-line full-time fitness coaches and training equipment. However, the overall development prospects for functional strength training in the country, to enhance sports performance have full care. Combined with relevant literature, some basketball training methods and principles are derived, and combined with functional training, a more reasonable training program can be developed. All in all, functional training is a comprehensive and effective training method that covers a wide range of aspects such as muscle strength and endurance, joint mobility, balance function, flexibility, core stability, movement patterns, and daily living ability. Through scientific training and adherence, it can effectively improve the body's overall athletic ability and quality of life. Because of the young age of the research subjects in this paper when performing functional training, it is necessary to develop an appropriate training program based on the individual's health status, sports experience, and training goals. At the same time, correct posture and technique are crucial, and it is best to train under the guidance of a professional coach to ensure the effectiveness and safety of training.

In addition, the functional factors of basketball include basic skills, muscle strength and explosive strength, stability and flexibility, and teamwork ability. The combined effect of these factors makes basketball skills the key to a player's success in the game. Therefore, the functional training program needs to be combined with these functional factors. Combined with the research object and the actual situation of the experiment, this paper decides to select three functional factors: strength, flexibility, and stability, from which some movements are selected as part of the functional training program.

Finally, the cultivation of primary school students' basketball skills needs to pay attention to the solid basic skills and the cultivation of teamwork ability. The comprehensive training in the above eight aspects can improve the basketball skills of primary school students and lay a solid foundation for them to achieve better results in future basketball games. We should also pay attention to the reasonable arrangement of training time and intensity to avoid the adverse effects of excessive training on the body. Therefore, the relevant research on basketball skills for primary school students has also attracted much attention. These studies aim to explore how to improve the basketball Skill level and competitive ability of primary school students and promote their all-round development through systematic training courses and scientific training methods. According to the research results, primary school basketball skill contains a lot of content. Combined with the research object and the actual situation of this article, it was finally decided to choose the three skills of shooting, passing, and dribbling, choose the relevant functional training of these three skills, and add them to the functional training program.

Combined with the Stroup Basketball Test and Bunn Basketball Ability Test in the book "Sports Test and Measurement" (Boonchai, 2014), we can get the test methods and scoring standards for the three

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techniques of shooting, dribbling, and passing. Then through the three literatures of "Research on the improvement of kneeling push-up training methods on the push-up ability of female cadets in military schools" (Zhao & Ai, 2012)), "Sports Talent" (Arnot & Gaines, 2019), and "Sargent jump test" (Mackenzie, 2016), it can be obtained that test methods and scoring criteria for three fitness tests: push-ups, wall squats, and vertical jumps. In total, there are six tests, three basketball skill tests, and three fitness tests.

The principles of basketball training, the method of basketball training, the principle of functional training, and the method of functional training mainly follow the basic physical characteristics of the test subject, and the specific content mainly refers to Boyle (2022) wrote the book “Functional training in sport”. Since the test target is primary school students, the basketball training of primary school students is a systematic and complex process, which needs to pay attention to the comprehensive improvement of basic skills, fitness, teamwork, and other aspects. Scientific and effective training methods, combined with the accumulation of experience in actual combat games and observation and learning, stimulate players' interest in basketball and cultivate their good sports habits and teamwork spirit. For primary school students' basketball training principles, we should follow the principles of focusing on interesting guidance, paying attention to basic skills training, developing fitness in an all-round way, reasonably arranging exercise load, gradually improving ability, personalized discrimination, emphasizing tactical and Skill cooperation, and attaching equal importance to safety and health. Through scientific and systematic training, we can help primary school students master basketball skills, improve fitness, cultivate team spirit, and enjoy the fun of basketball. Functional training, covers basic strength training, balance coordination training, flexibility improvement, dynamic stability training, functional strength training, cardiopulmonary endurance training, and movement mode training. Through the comprehensive application of these methods, the body's function and exercise performance can be comprehensively improved to achieve a better health state and exercise effect. The principles of functional training, cover individualized differences, gradual load increase, the correctness of movement mode, unbalanced overall development, the safety of injury prevention, timely adjustment flexibility, and continuous monitoring and evaluation effect. Following these principles, we can ensure the scientificity and effectiveness of functional training to help individuals improve their athletic performance, optimize physical function, and reduce the risk of injury.

In summary, fitness and functional training play an important role in improving the skill level and athletic ability of basketball. One of the functional factors, that helps to provide targeted training programs for improving basketball skills, is for primary school basketball skill information search, you can find the appropriate basketball test program. After summarizing the previous literature, finally, this study decided that shooting, dribbling, passing, vertical jumping, wall squats, and push-ups would be the test items. The training principles and methods were also practiced as mentioned in the book, And the movements were selected as the training program from six aspects: strength training, flexibility training, functional stability training, passing functional exercises, shooting functional exercises, and dribbling functional exercises.

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Conceptual Framework

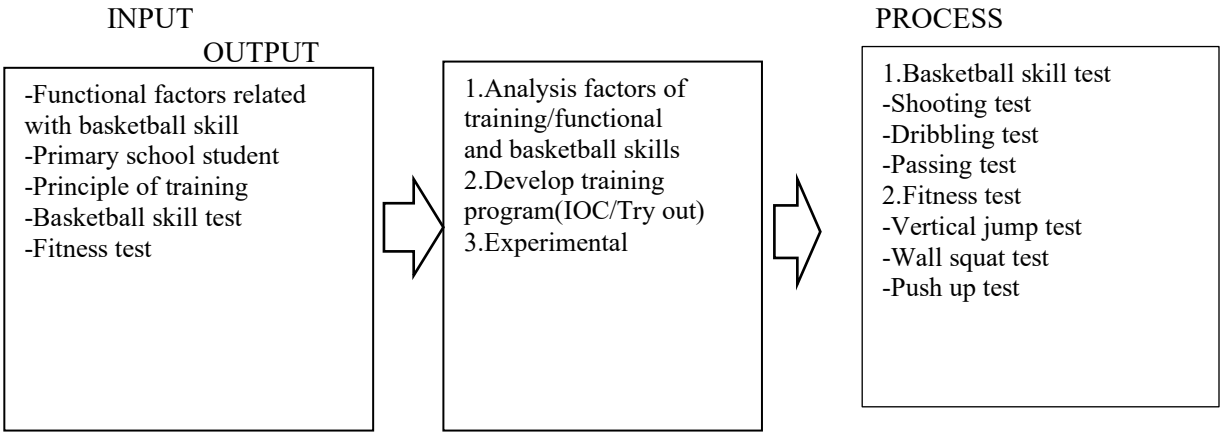

Figure 1 Conceptual Framework

Methodology

This research is quasi-experimental design,68/2567.

Population and sample

Population specification and size: The subjects of the study were male children aged 11 to 12 years old in the basketball club of Chenzhong Experimental School in Zhengzhou City, with a total number of 60.

Sample: The sample of this study was male children aged 11 to 12 years old in the basketball club of Chenzhong Experimental School in Zhengzhou City, 30 people were selected from the total number of people through simple random sampling for the aptitude test, the aptitude test consists of six movements: shooting, dribbling, passing, push up, vertical jump and wall squat. The students were ranked according to their scores on the test from low to high in the order of 1-30, and then the sample was divided into 2 groups of 15 people each through the matching method.

Matching

1----------2
4----------3
5----------6
8----------7
9----------10
12----------11
13----------14
16----------15
17----------18
20----------19
21----------22
24----------23
25----------26
28----------27
29----------30

Research control

1. Three leaves of absence are automatically deleted and replaced by others.
2. Students with accidental injuries will be replaced promptly.

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3. Explain the situation to parents in advance and ask for their support.
4. The whole course is taught by the same teacher and conducted in the same venue.

Research instrument

IOC Questionnaire: Used to test the validity of the functional training program by five experts. (IOC value: 0.89)

Try out: Find ten students to try out in advance, all the same as the formal experiment, to see how the functional training program works in real situations.

Functional training program (For Experimental group): Develop an 8-week functional training program with 50 minutes of training, 5 minutes of warm-up, and 5 minutes of cool down. Training was performed three times a week on Monday, Wednesday, and Friday. The functional training program was performed only in the experimental group. The specific training program is as follows: (1) Warm-up movements: Chest expansion, abdominal and back exercises, knee circle, lunge press. (2) Training movements: Kneeling push-up, vertical jump, sit-up, plank support, jianzi kick, shooting from a sitting position, rocket push, supine passing, one-legged squat pass, dumbbell curl, child's grip, squat jump, boat-leg dribbling. (3) Cool down movements: Standing calf stretch, squat thigh stretches, sip stretch, shoulder relaxation.

Basketball training program (For control group): The control group underwent a basketball training program for 8 weeks, with the same number of training sessions per week and the same time per session as the experimental group. Warm-up and cool-down were the same as those of the experimental group.

Basketball skill test: (1) Shooting test (Boonchai, 2014)-calculating the time taken to score ten goals, expressed in seconds. (2) Dribbling test (Boonchai, 2014)- calculating the time taken from start to returning to the starting point, expressed in seconds. (3) Passing test (Boonchai, 2014)- calculates the number of times a player hits the wall in one minute.

Fitness test: (1) Vertical jump test (Mackenzie, 2016)-Subtract the standing touch height from the starting touch height in place to obtain the vertical jump height, expressed in centimeters. (2) Push-up test (Zhao & Ai, 2012)-using kneeling push-ups to count the number of reps done in 30 seconds. (3) Wall squat test (Arnot & Gaines, 2019)-calculating the length of time used for wall squats, expressed in seconds.

Data collection: (1) Basic information on the five experts was collected in the form of interviews. (2) Get some functional factors related to basketball skills from the collected information, in combination with your experience, to conduct a functional training program. At the same time, through the collection of data from related books and literature, we get the testing methods and scoring standards of basketball skill tests and fitness tests. (3) Distribute the Functional training program validity assessment form to the five experts. (4) 10 students were selected for Tryouts before the formal experiment, and the basic situation was consistent with the formal experiment. (5) Collect basic information about the physical characteristics of the experimental group and control group, including age, height, weight, and BMI. (6) Record the data of three tests of six test items of the experimental group and control group, the three test times are before the experiment, four weeks later, and after the experiment.

Data analysis: (1) A summary of an evaluation of the effectiveness of a functional training program was created, and inversion of control (IOC) values were calculated. (2) Calculate the mean and standard deviation of the basic information of physical characteristics of the experimental group and the control group by statistical software, and express them as M±SD. Calculate the mean and standard deviation of the basketball skill test of the experimental group and the control group by statistical software, and express them as M±SD. Calculate the mean and standard deviation of the fitness test of the experimental group and the control group by statistical software, and express them as M±SD. (3) A t-test was used to compare the basketball skill test and fitness test of the experimental group and the control group before the experiment. T-test was used to compare the basketball skill test and fitness test of the experimental group and the control group after the experiment. (4) With the in-group comparison of the basketball skill test and fitness test of the experimental group by ANOVA.

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Research Process

This research was divided into 6 Steps as follows:

Review of literature and research, collection of information; (1) Synthesize the literature, information, and official websites to come up with scoring criteria and test methods for basketball skill tests and fitness tests. (2) Synthesize the literature, information, and official websites to come up with some functional factors related to basketball skills.

Creating a training program and validity test; (1) Create a functional training program based on the researcher's own experience. (2) Get five experts to test the validity of the functional training program and get the IOC value.

Tryout: After the validity test, carry out tryout, the basic situation is the same as the formal experiment, carried out before the formal experiment, to see the actual situation of the functional training program in the actual implementation of the situation.

Conducting the formal experiment

1. 30 samples were divided into two groups, experimental and control, a group of 15 people, the experimental group conducted a functional training program and the control group conducted a basketball training program.

2. Both the control and experimental groups were subjected to 8 weeks of training, with 3 times training per week, on Mondays, Wednesdays, and Fridays, all of which lasted for 60 minutes.

3. Collect the basic physical information of the experimental and control groups, including age, height, weight, and BMI.

4. Both experimental and control groups were tested three times. The times were before, after four weeks, and after the experiment. There are mainly basketball skills tests and fitness tests.

Data analysis and validation of functional training program

1. The mean and standard deviation of the basketball skill test and fitness test of the experimental group and control group in three tests were obtained through statistical software.

2. Conduct in-group comparisons of the pre-experimental basketball skill test and fitness test of the experimental group and the control group by t-test, and also conduct inter-group comparisons of the post-experimental basketball skill test and fitness test of the experimental group and the control group by t-test.

3. By the way of ANOVA to the experimental group for group comparison, and combined with a t-test to prove that the basketball program to add functional training effect is better.

4. Finally, the independent variables and dependent variables in the experimental process are derived as follows: (1) Independent variable-functional training program. (2) dependent variable-basketball skill and fitness. (3) Concluding and writing the final report. (4) Summarize and analyze the data, and finally write a report.

Results

Test results: It mainly includes the mean and standard deviation of the basketball skill tests of the experimental and control groups, as well as the mean and standard deviation of the fitness tests. Each test was conducted three times, and the tests were conducted before, after four weeks, and after the experiment.

Analysis of test results: The basketball test and fitness test of the two groups before the experiment were compared by t-test, and the results of the six tests, namely, shooting test, dribbling test, passing test, push-up test, vertical jump test, and wall test, the control group's average scores were better than those of the experimental group before the experiment. The basketball test and fitness test of the two groups after the experiment were also compared by t-test, and the results showed that the average scores of the six tests of the experimental group were better than those of the control group. There was no significant difference in each test before the experiment, while there was a significant difference in each test after the experiment.

One-way ANOVA repeated measures and Bonferroni post hoc test were used to compare the mean values of basketball skill and fitness tests within the experimental group, and finally, it was concluded that

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there was a significant difference in each test, indicating that the experimental group's performance in each test improved significantly after training.

Summary of results: The t-test showed that there was a significant difference between the test results of the experimental group and the control group in the pre-test, but there was no significant difference in the post-test, and the test results of the experimental group were better than those of the control group in the post-test. ANOVA shows a significant difference between the test results of the experimental group in the pretest-posttest, and the improvement in the experimental group's performance is better than that of the control group.

Discussion

This paper concludes that after the experiment, the basketball skills and fitness of the experimental and control groups improved, but the experimental group improved better than the control group.

For basketball skills, the experimental group improved better than the control group in shooting, passing, and dribbling. The experimental group improved better than the control group in basketball skills by adding functional training. Zhang (2020) also improved the experimental group's footwork better than the control group by adding functional training. The experimental group's shooting and dribbling better than the control group by adding functional training. Wang (2022) also improved the experimental group's shooting better than the control group by adding functional training. Sun et al (2023) improved the footwork ability of the experimental group over the control group by adding functional training to basketball training.

For fitness, the experimental group improved better than the control group in push-ups, vertical jumps, and wall squats. The experimental group improved upper body strength better than the control group after adding functional training. Harwood et al (2020) had the experimental group improve explosive strength better than the control group after adding functional training. Lu (2021) improved the lower limb explosive strength of the experimental group better than the control group after adding functional training. Su (2023) improved the endurance quality of the experimental group better than the control group after adding functional training. Chen (2023) improved the bouncing ability of the experimental group better than the control group after adding functional training.

In summary, functional training is more effective than using a traditional basketball training program because it practices the parts of the body used for each basketball skill, giving those parts a full workout and improving physical stability. At the same time, functional training conducted strength training, stability training, endurance training, and fitness training, while the basketball training program seldom practices fitness, so it is more effective than using the traditional basketball training program. Therefore, after adding functional training, it was more effective and the experimental group also improved their basketball skills and fitness better than the control group.

Recommendation

Practice Recommendation

1. A team is needed to divide the labor so as not to be understaffed resulting in data loss and inaccuracy;
2. During the testing process, testers should strictly follow the requirements to ensure the accuracy of the data;
3. The testing instruments should be relatively fine, the testing order should be stable, and the data of the test should be accurate and fine when calculating;
4. There are countermeasures to prevent the inability to cope with emergencies when they occur, such as the sudden injury of an experimental subject.

Further Research Recommendation

1. Some zero-based students can be chosen for the next experiment;

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2. If zero-based students are chosen, the length of the experiment needs to be lengthened so that the effect will be more obvious;

3. The scope of the study can be expanded by choosing some other students of the same stage.

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