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# The Study of Achievement and Satisfaction on Basketball Using 5E Instructional Model of the First-Year Students of Electrical Major in GUANGXI Polytechnic Vocational and Technical College

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## Abstract

The purposes of this research were to (1) compare the learning achievement in Basketball between before and after learning using 5E instructional model (2) compare the learning achievement in Basketball after learning using 5E instructional model with the 75% criterion (3) study the students' satisfaction on basketball using 5E instructional model. The sample was 25 first year students, majoring in electrical engineering at Guangxi Polytechnic. who were conducted by simple random sampling. Research instruments included of 1) the management plans of "5E" Instructional Model in the basketball class 2) the Basketball learning achievement test which had the Item Difficulty value between 0.40-0.67, Discrimination value between 0.20-0.67, and Lovett reliability value 0.83; the satisfaction questionnaire with IOC between 0.60-1.00, and reliability 0.74. Pre-test - post-test design is research design. The statistics used for data analysis are mean, percentage, standard deviation, and T-test.

The results are as follows:

1. The students' learning achievement on Basketball after using 5E instructional model on Basketball is higher than that before the test, which is statistically significant at 0.01 level and higher than 75% full mark standard.

2. The students' basketball skills after using 5E instructional model in basketball class is higher than that before, which is statistically significant at 0.01 level and higher than the 75% full mark standard.

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3. The students' satisfaction to the 5E instructional model is at the highest level. The average score of the questionnaire was 4.84, indicating the highest degree of satisfaction.

**Keywords:** Achievement, Satisfaction, 5E Instructional Model

## Introduction

In 2021, the Ministry of Education of the People's Republic of China released the Eighth National Survey on Students' Physical Fitness and Health (hereinafter referred to as the Survey), which showed that compared with 2014, the excellent and good rate of national college students' physical fitness has only increased by 0.2% in the past five years, and the physical fitness level of college students is still at a relatively low level. In the context of the Internet era, there is an inseparable relationship between college students and electronic devices. Studies have shown that current college students who use electronic screens for more than four hours a day will have a negative impact on their physical function and endurance quality.

In the academic year 2021-2022, judging from the final assessment results, the basketball course assessment results of first-year students majoring in electrical engineering at Guangxi Polytechnic are not ideal. The average score of the freshman basketball course is only 67 points, the full score is 100 points, lower than the school average. From the analysis of students' examination situation, students lack physical strength, basketball skills are not skilled, sports health (basketball) knowledge and sports learning interest is not high.

It is mentioned in the outline of Curriculum Reform of Basic Education (Trial) that the current classroom teaching should not only pay attention to the continuation of the traditional mode of knowledge infusion and limit the development of students' personality, but should formulate a targeted teaching mode according to the characteristics of students, so as to make the teaching more flexible. College education is a key component of China's education system. (Zhu Jin, Meng Baoan, 2003). The educational goal of college physical education classroom to highlight the core quality system, enrich students' sports knowledge, improve students' sports skills, cultivate students' healthy living habits and develop good moral quality. In traditional teaching, classes are taught collectively, and all students deliberately emphasize single fragmented skills in repetitive exercises, thus ignoring the overall cognition of special skills and paying insufficient attention to the cultivation of students' motion exploration ability and deep learning ability in basketball class. How to cultivate students' inquiry ability in physical education courses requires a teaching mode in

which inquiry is the main body. Students acquire knowledge concepts independently in the process of inquiry, and teachers leave classroom exploration space for students. As a guide, teachers introduce key points based on students' grasp of knowledge concepts, reflecting a teaching mode in which teachers and students' classroom status develops in a coordinated manner. (Xie Mingye, Zhai Qiang, 2012),

"5E" instructional model as a new inquiry teaching mode, it divides teaching into five aspects: The biggest differences between "5E" teaching and other inquiry-based teaching include: Engagement, Exploration, Explanation, Elaboration and Evaluation It integrates five teaching ideas, including scene introduction, inter-group exploration, teacher guidance, consolidation and improvement, and inter-group communication and evaluation, into one model in order, centering on students' concept construction of basketball technical action knowledge in the process of group exploration. In the early 21st century, the "5E" teaching model was introduced into China and achieved good results. Wu, C.J., &Zhang, M. (2010) believes that 5E learning mode can be applied in a wide range, including the teaching of specific courses, specific subject courses, or the teaching of the whole course. Hu, J.H., &Gao, C. (2017) found that 5E teaching mode is of great significance in the promotion and application of education and teaching practice in China, and this mode also has certain reference value for the study of teaching paradigm to promote students' understanding and development. From stimulating students' interest through scenario introduction, to exploring learning content between groups, to correcting wrong concepts and introducing key and difficult points, to demonstrating skills to each other, and finally, students conduct process evaluation on each other, which is consistent with the teaching policy of improving students' comprehensive quality. The application of "5E" teaching model to the discipline of physical education is relatively few, mainly natural science. The "5E" teaching mode emphasizes the connection between the five links and the interaction between all instructional model links in teaching, emphasizing the unity of students' active inquiry and knowledge construction. When applied to the teaching of designated subjects, it is necessary to design a reasonable teaching plan. "5E" instructional model, as a teaching mode with cooperative exploration as the main body, has rarely been applied in the relevant practice of team sports. At present, this research is still in the preliminary development stage of "the localization" application of sports disciplines in China, and generally focuses on the design of teaching cases of a certain class. This study will precisely focus on the study group in the basketball class of non-sports majors in colleges and universities. Through the design of "5E" basketball teaching unit plan.

**Research Questions**

1. Is learning achievement in the Basketball course after using 5E instructional model higher than before?

2. Is learning achievement in the Basketball course after using 5E instructional model higher than the 75% criterion of full score?

3. What is the level of student satisfaction in the Basketball course after using 5E instructional model?

**Research Objectives**

1. To compare the learning achievement in the Basketball course between before and after using 5E instructional model higher than before?

2. To compare the learning achievement in the Basketball course after using 5E instructional model with the 75% criterion of full score?

3. To study the students' satisfaction in the Basketball course after using 5E instructional model?

**Research Hypotheses**

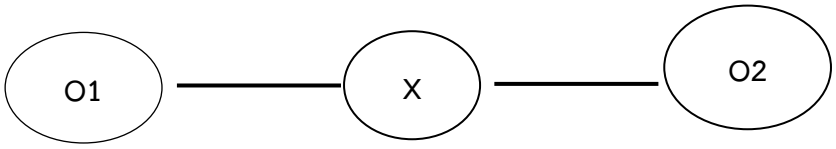
1. Learning achievement in the Basketball course after using 5E instructional model is higher than before.

2. Learning achievement in the Basketball course after using 5E instructional model is higher than the 75% criterion of full score.

3. The students' satisfaction in the Basketball course using 5E instructional model is at the heigh level.

**Research design**

The researchers used a pre-experimental study model. The group, pre-test and post-test design and study process are as follows (Somboon Suriyawong et al, 2010)




X is instead of 5E Instructional model

01 is instead of pre-test

02 is instead of post-test

**Research instruments**

The instruments used in this study consist of two parts. The learning methods and tools used to gather information are as follows:

1. Instruments used in learning management

The tool used in learning management is the learning management plans using the 5E Instructional model, researchers developed the learning management plan according to the curriculum standard content based on the Physical Education The process of learning management is divided into five steps: the first step is to generate interest (participation); The second step is exploration; Step 3 Explain and draw conclusions (explain); Step 4 Expand knowledge (elaboration); Step 5 Evaluate.

2. Instruments for data collection

2.1 The Physical Education achievement test, 4 multiple choices, 30 items.

2.2. The 15 items satisfaction questionnaire, which is a 5-rating scales, divided into 5 levels: most satisfied, very satisfied, moderately satisfied, less satisfied, least satisfied.

**Statistics used in data analysis**

1. Mean ($\overline{X}$), standard deviation (S.D.) and T-test were used to compare the scores of students' basketball skills in post-test and pre-test.

2. The comparison of the mean scores of the posttest of the students' PE scores with a full 75% score was made using the mean ($\overline{X}$) and standard deviation (S.D.) and relying on the T-test.

3. Mean ($\overline{X}$) and standard deviation (SD. were adopted in the study of students' satisfaction with basketball class using 5E instructional model.

**Data analysis results**

1. The comparison of learning achievement on Physical Education course (Basketball) using 5E instructional model of the electrical major basketball class of Guangxi Polytechnic College after the test and before the test and the comparison between the score after the test and the score of 75% standard.

| Item | Grade of Class A before experiment | | | Grade of Class A after experiment | | | T | P |
|---|---|---|---|---|---|---|---|---|
| | N | $\overline{x}$ | S.D. | N | $\overline{x}$ | SD | | |
| Basketball | 25 | 30.76 | 5.74 | 25 | 39.48 | 4.50 | 5.978 | 0.000 |
| 1 minute free throw line shot | 25 | 15.32 | 6.25 | 25 | 25.08 | 3.95 | 6.732 | 0.000 |
| Pass and lay up | 25 | 11.64 | 4.00 | 25 | 16.44 | 2.08 | 5.323 | 0.000 |
| Total score | 25 | 57.72 | 8.82 | 25 | 81.00 | 5.79 | 11.03 | 0.000 |

** Statistical significance at the .01 level, t (0.01;24) = 2.4922.

From Table.1 According to the data test of the free-throw line shooting scores in 1 minute before and after Class A 5E teaching, the average score of the pre-test was only 15.32, and the standard deviation was 6.25. The mean score of the rear side increased to 25.08, the standard deviation was 3.95, and the score improved significantly. The T value is 6.732, and the P value is 0.000, which is less than 0.01. It can be concluded that the health knowledge of sports (basketball) before and after the experiment has a very significant difference.

**Table 2:** A comparative analysis of the post-test scores of Class A students and 75% of the standard scores.

| Item | N | Score | Threshold | $\overline{x}$ | S.D. | (%) | t | p |
|---|---|---|---|---|---|---|---|---|
| Basketball | 25 | 50 | 37.5 | 9.48 | 4.50 | 79.0 | 2.599 | .008 |
| 1 minute free show Line shot | 25 | 30 | 22.5 | 5.08 | 3.95 | 83.6 | 3.269 | .003 |
| Pass and lay up | 25 | 20 | 15 | 6.44 | 2.08 | 82.2 | 3.456 | .002 |
| **Total** | **25** | **10** | **75** | **81.0** | **5.79** | **81.0** | **5.183** | **.000** |

It shows the comparison between the test score and the standard score of 75% of class A students after 5E instructional model. The average scores and standard deviations of sports (basketball) health knowledge scores, 1-minute free throw line shooting scores and full-court passing and layup scores were 39.48± 4.50, 25.08±3.95

and 16.44±2.08, respectively. The t-value formula (T-test) was used to show that the T-values were 2.599, 3.269 and 3.456, and the P-values were 0.008, 0.003 and 0.002, respectively, which were all lower than 0.01 and had statistical significance at the 0.01 level. It shows that the final exam scores of students trained by "5E" teaching mode are more than 75% of the standard scores, which is at a significant level. This is based on assumptions.

2. The satisfaction of first-year students using 5E instructional model at Guangxi Polytechnic.

**Table 3:** Evaluation results on the satisfaction of first-year students using 5E instructional model on Basketball.

| No | List | Satisfaction | | Interpret |
|---|---|---|---|---|
| | | $\bar{X}$ | S.D. | |
| 1 | Teachers have the ability to impart knowledge | 4.62 | 0.59 | the highest |
| 2 | Compared with traditional teaching, you think 5E teaching is more lively and interesting. | 4.86 | 0.36 | the highest |
| 3 | Teachers use a usually polite manner that is easy to understand. | 4.81 | 0.40 | the highest |
| 4 | The teacher gave the students a chance to ask questions. | 4.95 | 0.22 | the highest |
| 5 | situations, teachers stimulate students' interest in learning and bring them into the classroom | 4.95 | 0.22 | the highest |
| 6 | Students use learning materials for training in learning activities. | 4.86 | 0.36 | the highest |
| 7 | The 5E learning mode encourages students to understand the content and learn faster. | 4.81 | 0.40 | the highest |
| 8 | The 5E learning mode helps students to learn independently. | 4.81 | 0.40 | the highest |
| 9 | The exploration section can construct the subjective concept of the learned technical action. | 4.81 | 0.40 | the highest |

**Table 3:** Evaluation results on the satisfaction of first-year students using 5E instructional model on Basketball. (Continue).

| No | List | Satisfaction | | Interpret |
|---|---|---|---|---|
| | | $\bar{X}$ | S.D. | |
| 10 | The explanation section enriches students' own cognitive framework. | 5.00 | 0.36 | the highest |
| 11 | The 5E instructional modell can stimulate and encourage the atmosphere of science learning in the classroom | 4.90 | 0.30 | the highest |
| 12 | Students participate in the learning activities of each class. | 4.90 | 0.30 | the highest |
| 13 | The content involved in the learning activities is very interesting. | 4.71 | 0.46 | the highest |
| 14 | Although you feel pressured, you think you are suited to this style of learning | 4.95 | 0.22 | the highest |
| 15 | The duration of the learning activities for each content is appropriate. | 4.67 | 0.66 | the highest |
| | **Total** | **4.84** | **0.38** | **The highest** |

In the survey of the satisfaction of the first-year students in Guangxi Polytechnic after using the 5E instructional model, the students are satisfied. The mean value is 4.84, the standard deviation is 0.38, and the satisfaction is at the highest level.

**Discuss the results**

Through the study on the application of 5E instructional model on basketball class of electrical students in Guangxi Polytechnic, the researchers discussed the above results:

The application of "5E" teaching mode to basketball teaching results in extremely significant differences between students before and after mastering sports (basketball) health knowledge, which can also verify that "5E" teaching mode from the perspective of students, through its own subjective concept of technical movement construction and cooperative exploration, To the greatest extent, students can truly understand the importance and difficulties of technical movements, so as to improve special skills, and guide students to understand the inherent attributes of sports.

There were significant differences in dribble passing and layup scores before and after the experiment. It shows that the application of "5E" teaching mode has

extremely significant differences in students' dribble passing and layup in the whole court. The main reason is that in the process of passing and catching, students conduct in-depth analysis of their own characteristics, communicate with each other and learn from each other, reflecting the characteristics of the basketball team, so there are extremely significant differences in results compared with before the experiment. (Zhang Chunyan, 2014). The significant improvement of one-minute shooting results is inseparable from the deep processing of the "5E" teaching model. Deep processing is a solid practice and flexible use of the classroom. Through the learning of the first two links, students can form a perceptual understanding of technical movements and have movement images in their brains, but they do not fully understand the internal law of motor skills. (Meng Shangfu. 2018). The teacher sets a series of relevant practice activities and organizes students to carry out in-depth technical movement exercises to establish the motivation pattern. In addition, the teacher creates a shooting game scene, so that students can enter a new situation and use relevant technical actions flexibly. This section can provide enough time and space for students to practice. (Wang Xiaoming, 2018).

Basketball has good educational value for college students in interpersonal communication and collective cooperation. "5E" teaching model can significantly improve students' interest in sports learning and reduce the negative impact of sports. The traditional physical education teaching model is easy to make students in the process of learning the teaching content is too scattered, so that it is difficult for students to understand the complete sports skills, repeated practice is easy to lead to students from the beginning to understand the key points and difficulties of technical movements, teaching is not conducive to the use of basketball project teamwork attributes. For this reason, college students' satisfaction with the "5E" teaching model is the highest level.

## Recommendations

1. Recommendations for utilizing the research results

1.1 When applying the "5E" teaching mode to basketball teaching, on the basis of guiding students to explore the essentials of movement, certain physical quality training should be reasonably arranged.

1.2 In the part of Exploration and Explanation, when students conduct exploration for complex technical movements, teachers should implement process guidance. It is suggested to guide students at the beginning of exploration, rather than following the stereotypical "5E" teaching sequence after students have explored results.

1.3 Teachers should be divided into groups of "inter-group homogeneity and intra-group heterogeneity". When displaying and explaining technical movements in groups, teachers should flexibly assign interpreters and demonstrators, so that each student can play different roles, so that students can gain a sense of achievement in the Evaluation process, and thus improve the learning atmosphere and interest in sports learning in each group.

1.4 "5E" is applied to students with weak sports foundation and shallow basketball cognition to give full play to the teaching efficiency of all aspects of "5E" teaching.

2. Recommendation for the further research

2.1 It is suggested that the "5E" teaching mode should be applied to sports courses with long PE class hours, strong understanding ability of students, weak sports foundation and low participation enthusiasm of students. It is not recommended that the "5E" teaching mode should be applied to the teaching group with good sports foundation. Avoid the phenomenon of students mastering the teaching content faster than the teaching progress of each section of "5E" teaching.

2.2 Research should be done to develop learning achievement by using 5ELearning Technique in other subjects to study whether this type of learning management is suitable for students in any grade level or which groups of learning subjects are most
appropriate.

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