ISSN 2522-6398 Vol. 3, Issue 15: 92-98, DOI: 10.25236/FER.2020.031519

An Empirical Study on the Elective Course of Public Physical Education in Universities Based on "Project-Based Learning" -- a Case Study of the Elective Course of Public Physical Education (Yoga) At Taizhou University

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ABSTRACT. *The teaching mode reform of public physical education in colleges and universities has a profound impact on the improvement of curriculum quality. Different from the conventional teaching mode, "project-based learning" (PBL) gets rid of the time and space boundaries that constrain traditional classroom, and highlights the subjectivity of students as well as the improvement of students' application ability and innovation ability. Herein, an experimental intervention was carried out in college students that took the elective course of public physical education (yoga). Specifically, a comparative study was conducted between the "project-based teaching mode" and the traditional teaching mode. Moreover, the course objectives of two dimensions, physiological function (special physical quality) and skill level (motor skill learning) were comprehensively evaluated. The changes brought by the two teaching modes to the realization of students' curriculum objectives were discussed. The research results show that PBL is more effective in improving students' physical qualities and their motor skills, showing a significant difference from the traditional teaching mode.*

KEYWORDS: *Physical education, Project-based learning, Teaching mode*

1. Introduction

PBL (Project-based Learning) means a process of allowing students to independently complete the reform project with good expected effect and strong operability design, based on the project content as the core together with self-learning and collaboration. The implementation of specific projects enables students to understand and grasp the requirements of each link and the difficulties of the whole process. [1] Exploration and practice based on task-driven and problem-oriented combination of public physical education in colleges and

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universities provide an important opportunity for students to take physical exercise and learn sports skills. The development of college sports club courses will also further improve the quality of physical education courses, and arouse students' interest in sports and help them develop lifelong habits of sports. The improvement of teaching mode is to solve the problem of how and to what extent to teach.

The traditional teaching mode is based on the procedure of explanation, demonstration and imitation, etc. Though it gives full play of the leading role of teachers, the requirement of the new curriculum reform that highlights students as the main body of classroom teaching cannot be met. The traditional teaching mode hinders the improvement of students' autonomy and enthusiasm and suppresses their emotions, resulting in an inactive classroom atmosphere and weakening students' interest in PE courses though they may like sports. Under this context, how to improve the teaching method from the perspective of teaching? It is particularly important to enhance students' interest in PE courses. From an empirical perspective, this paper presents an experimental intervention of two teaching modes among 140 students in TaiZhou University's elective course (Yoga), together with a comprehensive evaluation from the two dimensions of students' physiological function and skill level, as well as an exploration of the differences between the two teaching modes.

2. Research Objects and Methods

2.1 Research Object

Four yoga classes of grade 19 in TaiZhou University were selected, with a total of 140 students selected as experimental subjects and investigation subjects. They were equally classified into the experimental group and the control group.

2.2 Research Methods

(1) Literature Method

According to research needs, "Project-based Learning", "physical education", "network teaching" and "flip" class were used as the main key words to conduct online retrieval. Among the literature, 20 papers were selected as the main reference materials to study the recent physical education curriculum teaching. Based on the research progress of flip classrooms on network platforms, we analyzed the research progress of the project-type teaching mode to explore the applicability of this model to the yoga class as a college PE course.

(2) Teaching Experiment Method

1) Experimental subjects: 140 students from the yoga elective course of grade 19 in TaiZhou University were selected as experimental and investigation subjects, and equally classified into the experimental group and the control group. Before the

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experiment, the two groups showed no significant difference.

2) Experiment time: the experiment was conducted the first semester of the 2019-2020 academic year, lasting 16 weeks, one class per week and each for 90 min.

3) Experimental control: The teaching contents of the experimental group and the control group were the same. “Fitness Yoga 108” issued by the General Administration of Sport of China was adopted, in which 4-6 movements and “Sun salutations” were selected for the examination of individual movements and combined movements respectively. The same teacher was responsible for the teaching task and conducted the final evaluation. Specifically, the traditional teaching mode and PBL were applied to the control group and the experimental group respectively. The differences in learning effect, physical fitness and teaching evaluation between the two groups after the experiment were compared, as shown in Table 1. In detail, the traditional teaching mode was detailed as clarifying the course content and goal -- the style explanation, demonstration and correction -- assigning homework after class. The teaching mode of PBL was clarifying the course content and goal -- determining the learning project, dividing the work among groups -- clarifying the content of yoga asanas, developing the learning plan -- independent and cooperative learning on the network platform -- classroom discussion, resource sharing -- punching in after class and completing the project -- result exchange and activity evaluation. At the end of the 16-week course, according to the requirements for the public elective course of Physical Education by TaiZhou University, the teaching content and physical fitness were assessed.

Table 1 Comparison of Teaching Modes between the Control Group and the Experimental Group

Teaching method	Traditional	Classroom teaching explanation and demonstration
	PBL	Clearly define the course objectives, determine learning projects, divide labor in the group, conduct independent learning, classroom discussion and question-answering, as well as after-class expansion
relations	Traditional	The teacher led the class, while students accepted knowledge passively
	PBL	The teacher guided students to explore knowledge
Teaching content	Traditional	Fitness Yoga Level 4-6 of “New body Yoga” and Sun Salutation by General Administration of Sport
	PBL	Fitness Yoga Level 4-6 of “New body yoga” and Sun Salutation by General Administration of Sport, yoga content of online App
Teaching form	Traditional	Explain – demonstrate -- practice
	PBL	Project groups – collect information from APP-set up PBL tasks and learning plans -- display and reflect on the project results
Study time	Traditional	during and after class
	PBL	before and after class

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3. Results and Analysis

3.1 Comparative Analysis of Sports Skill Evaluation between the Control Group and the Experimental Group

The evaluation was conducted in June 2019 based on the evaluation content, scoring standards and methods of the yoga class. Students' performance was scored on a 100-point system. The evaluation of sports techniques and skills was divided into two parts, accounting for 50% of the total score respectively. The first was optional movements. Among Fitness Yoga Level 4-6 of "New body Yoga" by General Administration of Sport, a movement was selected from sit-and-reach, backward stretching, twisting, balance and inversion for evaluation. The difficulty score of level 6 is as high as 10 points, and that of the remaining levels have a difference of 2 points in the starting score. At the same time, the teacher conducted evaluation based on the standardization, fluency and proficiency of students' movements, with a full mark of 10 points, when the movements were very standard and proficient and matched breathing. Moreover, 8 points were given to relatively standard and proficient movements, 6 points were given to general standard and proficient movements, and less than 4 points were given to irregular and poor control movements. The second part for examination was the required posture "Sun Salutation". See Table 2 for the specific scoring of examination.

Table 2 Yoga Assessment Scoring Table (Technical Evaluation)

Score	Criteria
100-90	Excellent movements, good rhythm, good sense of power, graceful posture, proper breathing, strong expression, good control of the body.
89-75	Relatively standard movements, no obvious mistakes in detail, good sense of rhythm, good sense of strength, graceful posture, proper breathing, good control over the body.
74 - 60	General standard movements, good sense of rhythm, good sense of strength, graceful posture, less than 2 mistakes, proper breathing, general control of the body.
<60	non-standard movements and no sense of rhythm, more than 3 mistakes, unable to coordinate breathing and poor body control.

As shown in Table 3, the mean of yoga skill evaluation scores for the experimental group and the control group after the experiment was 84.44 and 81.54, respectively; the standard deviation of the experimental group and the control group was 7.137 and 6.871, respectively. According to the Student's t-test, the sig value of the two groups was 0.017, less than 0.05, indicating a significant difference in skill scores between the two groups under different teaching modes. It reveals a significant difference between the traditional teaching mode and PBL in terms of students' skills in yoga teaching, which is related to the requirement of the yoga program for students to master higher skills.

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Table 3 Independent Sample Student'S t-Test of Yoga "Sun Salutation" Results

Skill assessment score	M	SD	t	sig
Experimental group	84.44	7.137	2.411	.017
Control group	81.54	6.871		

According to the usual classroom performance, the experimental group outperformed the control group in terms of activity and participation in class. Students in the experimental group studied as a team to better demonstrate postures in the classroom. They also actively collected data and completed a preview of yoga postures, thus actively participating in the class. Therefore, the after-class practice and understanding of asana movements in the class of the experimental group were better than those of the control group. The yoga program has a low threshold for entry and a wide range of adaptability. It can achieve the effect of strengthening the body through gentle exercise, making it suitable for students to practice by themselves after class. The PBL teaching mode encourages students to explore, discover and apply, allowing them to realize fitness by yoga anytime and anywhere in the post-epidemic era by using network resources.

3.2 Comparative Analysis of Physical Function Assessment between the Two Groups

3.2.1 Comparative Analysis of Physical Basic Quality Assessment between the Two Groups

Table 4 Independent Sample Student'S t-Test of Yoga Body Skills

Group	Sit And Reach			long jump			sit-up		
	M	SD	sig	M	SD	sig	M	SD	sig
Experimental group	22.775	4.4776	0.003	1.705	0.2570	0.046	38.67	6.533	0.00
Control group	19.762	6.7515		1.629	0.1814		32.01	6.929	

Before the experiment, the two groups displayed no significant difference in various physical fitness indexes (P >0.05). After 16 weeks of teaching, Table 4 shows students' improvement in the long jump, sit-ups and sit-and-reach. The results of the experimental group and the control group in the sit-and-reach were 22.775cm and 19.762cm, respectively; those of the long jump were 1.705m and 1.629m; those of the sit-ups were 38.67 and 32.67, and the T-test was all less than 0.05. It indicated a significant difference between the experimental group and the control group. The cause of this difference was analyzed. Yoga has rich asana, requiring trainees to

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maintain stability in a single action and realize the coordination between muscles. Notably, lower limb strength and core stability are crucial. The experimental group under the teacher's guidance realized self-digestion and absorption of the course content in small teams after class, while the control group only practiced in the class, with shorter practice time and a lower frequency, together with the lack of interaction between students and teachers, and low activity enthusiasm for completing homework after the class. Hence, the two groups showed significant differences in the improvement of physical quality and skills.

3.2.2 Comparative Analysis of Specific Body Function (Balance Performance on One Leg) between the Two Groups

Table 5 Independent Sample Student'S t-Test of Yoga Body Skills

Group	Single-leg balance (right)			Single-leg balance (left)		
	M	SD	sig	M	SD	sig
Experimental group	30.58	19.009	0.001	32.88	17.441	0.035
Control group	20.13	18.365		25.42	23.059	

The single-leg balance mean grades of the two groups after the experiment were compared. The right leg results of the experiment group and the control group were 30.58 and 20.13, respectively, corresponding to the standard deviation of 19.009 and 18.365. According to the Student's t-test, the sig value of the two groups was 0.001, less than 0.05. The results of the left leg were 32.88 and 25.42 respectively, corresponding to the standard deviation of 17.441 and 23.059. The sig value of the two groups in the student's t-test was 0.035. Hence, under different teaching modes, the two groups showed significant differences in the balance ability of right or left leg balance. Yoga asana practice attaches more importance to the foundation, which is the premise of other movements. As a representative movement of the foundation, the mountain pose requires the trainees to keep their feet on the ground and tighten their legs, hips and core, so as to keep breathing for several times. This static strength training allows students to pay attention to the contraction and control of body muscles, thus improving the core stability rapidly. The experiment group adopted PBL, in which the teacher guided students to explore and perceive muscle power and control during yoga asana practice. Different from the control group, this group of students would come to the class with the cognition of postures, thus obtaining a comprehensive and profound understanding of movements in the class, saving action demonstration time, and promoting the rhythm of classroom practice. In addition, the continuous practice of this group after the class further improved the teaching effect.

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4. Conclusion

1) The comparative experiment shows that under the PBL with the support of the network, students' special physical and motor skills were better than those of the traditional teaching mode. Therefore, applying network-based PBL to the yoga course in higher education can arouse students' enthusiasm for learning, stimulate their learning initiative, and increase learning interest, thereby improving their performance.

2) Compared with the traditional teaching mode, network-based PBL provides more flexible and diversified learning approaches, which can stimulate students' interest in learning and improve their practice frequency. Hence, this mode is suitable for college yoga classes in the post-epidemic era.

Acknowledgments

Funded Project: TaiZhou University Education and Teaching Reform Research Project (Project No.: 2018JGB32).

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