A Study on College PE Teaching System Reform Design Based on Flipped Classroom

Yongxing Wang

Shangqiu Institute Technology, Shangqiu476000, China

Abstract

With the rapid development of the era, the traditional teaching mode is unable to adapt to the need of the modern society. Flipped classroom, an emerging teaching mode, is widely used in the teaching of various majors. It has made the significant gains by subverting the traditional teaching pattern. The author explains connotations and features of the flipped classroom and puts forward to the reform way of the flipped classroom teaching mode from three aspects, namely innovative PE teaching ideas, building the information PE teaching platform and improving PE teaching evaluation system. It also discusses the PE teaching reform strategies of flipped classroom teaching mode to improve the students’ learning efficiency and teachers’ teaching quality.

Keywords: Flipped Classroom, College Sports, Teaching System, Reform Design.

1. RESEARCH BACKGROUND

1.1 Literature review

PE is a highly practical subject, including the cultivation of sport quality, mental health quality, interpersonal communication quality, teamwork quality etc. So it requires a loose educational environment, modern educational technology and diversified teaching means for the teaching process. Therefore, it is full of great realistic significance to study the application of modern information technology in college PE teaching. With the popularization of information technology in the educational field, PE teaching activities involve more and more Internet and multi-media information technology means. However, no systematic teaching mode is available. As a result, PE teaching ideas are unable to be carried out fully and PE teaching quality fails to be improved really. In recent years, a teaching reform wave (Wang,2016) has occurred in the flipped classroom. Flipped classroom provides students with a large quantity of spare time for study, improves the teaching class form and enhances the communication between teachers and students. Then it can improve students’ grades, teaching effects and teaching effectiveness. Teaching effectiveness includes stage teaching objective setting, teaching material integration, specific teaching method design, teaching evaluation system building, student recognition ability analysis etc. Only these teaching tasks are planned fully can the teaching strategy be carried out and the teaching effectiveness be achieved. Flipped classroom can improve the teaching effectiveness (Liu,2015).

1.2 Study purpose

Information technology can be applied in innovative activities of various fields to greatly enhance the social development. For the teaching of all subjects in educational field, the information technology is used to help teaching reform. An intelligent teaching mode of “Internet+specialized subject” is formed and gets the good teaching practical effect. During the development process of PE teaching, Internet technology and multi-media technology have been used for teaching activity assistance, but little effect is obtained. Information technology is only used as an assisted technology during the PE teaching reform. The concept of “informatization” fails to be integrated into PE teaching ideas and system. Flipped classroom teaching mode can contribute to the implementation and development of PE teaching ideas, PE teaching resources, PE teaching method under the informatization background. Then PE teaching objective (Li and Wang,2015) can be achieved efficiently. Flipped classroom teaching mode can greatly expand PE teaching resources, extend PE teaching knowledge, improve students’ learning enthusiasm and contribute to students’ PE quality.
2. OVERVIEW OF FLIPPED CLASSROOM TEACHING MODE

2.1 Connotation of flipped classroom

Flipped classroom is a widely-used teaching method in recent years. Different from the traditional teaching mode, flipped classroom is much more flexible. The concept of flipped classroom was put forward by two foreign chemistry teachers, Jonathan Berman and Aaron Sams. It aims at supplementing the missing lessons when the students learn by video. Teachers shall record the teaching contents and post the videos onto the web. Students shall watch these videos via different online platforms before class. After learning the teaching contents, they can preview fully according to their own situation. The original teaching purpose of the teaching means is changing with the change of the era. Flipped classroom subverts the traditional teaching mode. It is so flexible that students can learn via various media anywhere (Liu and Wang, 2015). Flipped classroom can provide a bridge between in-class and before-class, inspire students’ learning motivation and contribute to the interaction between teachers and students. Flipped classroom teaching mode can be shown in Figure 1.

![Flipped classroom teaching model](image)

Figure 1. Flipped classroom teaching model

2.2 Features of flipped classroom

In traditional teaching mode, students are in a completely passive position and teachers arrange all teaching activities. With the guidance of teachers, students are unable to build their own thinking system. Students play a main role in flipped class and take the ownership of their learning. Students’ real level can be fully considered in flipped classroom. Key teaching points and proper teaching contents make it possible to teach students in accordance with their aptitude. Level games are designed in the course design so that the videos can be suitable for different levels of students (Liu, 2016). At the same time, identity of teachers and students is changing. Teachers are not playing a dominant role in class anymore and students are not be upset with learning something they don’t like. But there is no face-to-face communication in flipped classroom. Students are unable to give the learning result feedback to the teacher or have the accurate course evaluation. Flipped classroom is flexible. Students can choose the study time according to their personal situation. Without the time and space restrictions, students shall not get bore easily. It focuses on students and fully considers students’ interests, so the active classroom atmosphere shall be created. To avoid traditional knowledge imparting mode, students shall be encouraged to solve the problem flexibly and trained to draw inferences about other cases from one instance. Flipped classroom teaching mode saves some in-class time, so students can have more time to solve the problems and learn more knowledge. It achieves the reasonable arrangement of class time (Song, 2016).

3. College PE teaching system reform strategy based on flipped classroom

3.1 Self-taught part before class

Here are the main tasks of flipped classroom informatization teaching mode before the class: innovative PE teaching video, courseware and reference materials shall be uploaded to PE teaching platform for students to
learn independently. It can inspire students’ learning interest and make them master the knowledge etc. to lay a foundation for the subsequent class teaching activities. Teachers shall reorganize the teaching contents based on the teaching objective and students’ cognitive competence. They shall also extract (Qi, 2016) the difficult points, important points and interest points of teaching contents. Informatization technology means shall extract the teaching contents and make a video to upload it onto PE teaching platform. Teaching video shall be controlled about 10 minutes. If it is too long, students are hard to focus on it. In the teaching video, teachers are expected to teach concisely and interestingly so that students can have higher learning initiative. Students shall preview before class to learn PE knowledge and PE sports skills. In this way, teachers can spend less time on theoretical knowledge in class and students can have a clear learning orientation to make good preparation (Zhou, 2016) for classroom teaching. Teaching situation of flipped classroom before class is shown in Figure 2.

3.2 In-class teaching part

In-class teaching part aims at: imparting PE professional knowledge, training the practical application ability of students’ PE knowledge and skills, cultivating students’ teamwork spirits etc. Teachers shall explain PE professional knowledge concisely to summarize students’ self-taught activities before class and build the class teaching orientation. This teaching part is inadvisable to be long. It can take about a quarter of the whole class hours. Since students have learned about PE knowledge and skills basically, teachers only need to make a summary. PE practical activities (Zhang and Tang, 2016) aim at reinforcing and enhancing PE knowledge and skills.

Flipped classroom can effectively reflect application principles of PE skills. Teachers can use multi-media technology means to show key skilled movements via many forms, like slow action replay, three-dimensional presentation, simulated actual practice. Students can master the knowledge connotation via sensory experience and rational analysis. Teachers can adopt simulated mode to show PE project technology and tactics via three-dimensional presentation and use some classic game videos to make students learn the importance of teamwork awareness and the key skills of team cooperation etc. Flipped classroom can show the teaching contents which are difficult to be explained orally. Students can also finish the knowledge cognition (Yang and Jiang, 2016) based on independent learning ability.

Limited by the objective condition, the traditional PE teaching activities are hard to make PE training courses work well. Flipped classroom can build any game or training environment so that students can get scientific PE training plan and contents. It can fully show the skill details of PE sports via virtual reality technology. In its simulated scene, these objective factors can be fully considered, including wind, rain, temperature, humidity, day and night etc., so students can have the real training effect under the flipped classroom teaching mode and
improve their practical application ability (Li, 2016). The in-class teaching situation of flipped classroom is shown in Figure 3.

![Figure 3. Flipped in class](image)

### 3.3 After-class practical part

The key PE teaching points shall transform into PE spirit cultivation and physical quality improvement from original PE knowledge imparting. It is the PE teaching direction and the teaching objective of PE teaching after-school practices. Teachers can guide and supervise students' PE activities via the interaction module of PE teaching platform. Students can also ask the teacher for help (Miao, 2016) when meeting any difficulty in the PE training. Informatization technology guarantees the good subsequent communication between teachers and students. PE teaching is greatly extended and PE teaching effectiveness is improved. Teachers can use flipped classroom to set PE practical modules in PE teaching platform, like pattern skilled movement drilling, simulated PE competition, uploading the related video for the students. It shall improve students’ training enthusiasm and make students master the key PE skill points accurately. After-class situation of flipped class teaching mode can be shown in Figure 4.

![Figure 4. Flipped after class](image)

### 4. REFORM WAY OF COLLEGE PE FLIPPED CLASSROOM TEACHING MODE

#### 4.1 Innovative PE teaching idea

The concept of “informatization” needs to be put into PE teaching ideas when flipped classroom is integrated into PE teaching. The concept of “informatization” can be involved into PE teaching system to play a positive
role (Cao, 2016) in PE teaching activities. In flipped classroom teaching mode, students shall play a main role and teachers shall help students to finish the learning tasks. Design and implementation of all flipped classroom teaching links shall focus on cultivating students’ independent learning ability, inspiring and guiding students’ independent learning ability. This way students can enhance their PE knowledge and skill cognition level. At the same time, their potential and innovative thinking way can be excavated fully. Flipped classroom emphasizes the proper application of informatization technology and combines multi-media with teaching method well. Then flipped classroom mode can be integrated with students’ independent learning ability. Informatization technology can improve PE teaching practice effectiveness. Markov is often used in PE teaching evaluation to build the math model of random process. Basic difference shall be eliminated during PE teaching evaluation application. The method can rank students’ grades into B levels. There are A students in the class. Then the proportion of each level of students shall be calculated. The proportion shall be regarded as state vector and reflected as C. C = \{\frac{a_1}{a}, \frac{a_2}{a}, ..., \frac{a_k}{a}\}, after a period of teaching, students’ grades shall be ranked again. Next transfer matrix D shall be calculated.

\[
D = \begin{pmatrix}
a_{11} & a_{12} & \cdots & a_{1k} \\
a_{21} & a_{22} & \cdots & a_{2k} \\
\vdots & \vdots & \ddots & \vdots \\
a_{k1} & a_{k2} & \cdots & a_{kk}
\end{pmatrix} = (D_b)_{b \times b},
\]

where \(a\) is the number of students in level e. \(a_{ef}\) is the number of students which are in level e but whose grades are in level f. It meets \(\sum_{f=1}^{b} D_{ef} = 1, 0 \leq D_{ef} \leq 1, (e, f = 1, 2, ..., b)\).

Chapman Kolmogorov is used in quotation \(D_{(g)} = D_{(g-1)}D_{(1)} = [D_{(1)}]^g\). When \(g \to \infty\), it is in the stable state. Quotation group \((1-D)^3C=0\) shall be solved to get the quantitative index value. To get the correct information, C can build the transfer matrix.

\[
H_{ef} = (e-f)^3 d_{ef} = \frac{(e-f)^3 a_{ef}}{b_e}, (e, f = 1, 2, ..., e)
\]

the preliminary

\[
H = (H_{ef})_{e \times e} = \left\{\frac{(e-f)^3 a_{ef}}{a_e}\right\}_{e \times e}
\]

and efficiency degree of transfer matrix

\[
I_{(h)} = \sum_{e=1}^{b} \sum_{f=1}^{b} h_{ef} = \sum_{e=1}^{b} \sum_{f=1}^{b} (e-f) d_{ef} = \sum_{e=1}^{b} \sum_{f=1}^{b} (e-f)^3 \frac{a_{ef}}{a_e}
\]

can be used as the model of assisted PE teaching evaluation.

### 4.2 Building flipped classroom teaching platform

The PE teaching practice of flipped classroom must be achieved via online PE teaching platform. Building online PE teaching platform is a key of flipped classroom teaching mode. Most teaching links need to be carried out on the platform. PE teaching platform shall include teaching resource module, teaching material module and interaction module. At the same time, some PE culture contents and PE practice modules can be included in PE teaching platform. It can obtain full data about students’ browsing operation and learning operation on the registration platform, which can provide PE teaching evaluation with the objective references. PE teaching platform can make it possible for students to learn independently before class. Some PE difficult points shall be presented via audio and video means so that students can learn the essential and connotation (Yang, 2017) of PE knowledge directly. There exist many different variables in lipped classroom teaching. The evaluation method that many questions shall be simplified is the level-analysis method. The related matrix shall be built according to the importance of various factors. It can be simplified as \(J = (k_{ef})_{a \times a}, k_{ef} > 0\); \(k_{ef} = 1\); \(k_{ee} = 1\).

One-time index \(L.M. = \frac{\delta_{max} - \delta}{a - 1}\) can be calculated to get one-time proportion \(L.N. = \frac{L.O.}{N.O.}\) and random conformance rate.
L. M. = $\frac{\sum_{f=1}^{N} a_f \times L_{0f}}{\sum_{f=1}^{N} a_f \times N_{0f}}$. According to judgment matrix, its matrix shall be obtained. In quotation

$c_{ef} = \frac{b_{ef}}{w_{ef}}. b_{ef} = \frac{a_{ef}}{\Sigma_{f=1}^{N} a_{ef}}, c_{ef} \sim N(1, \varphi_0^2)$. the test statistics $t^2 = \sum_{c=1}^{a^2-1} (c_{ef} - c_{ef})^2 - t^2(\alpha^2 - 1)$ shall be obtained. Statistical test method can be used to test the consistency of the judgment matrix. The method makes up for the disadvantages of consistency proportion test method. People can make a choice according to the real situation and personal preference. At the same time, the revised judgment matrix shall keep more information in the original judgment matrix.

4.3 Improving PE teaching evaluation system

PE teaching evaluation system is an important part of PE teaching system and plays a necessary role in assisted PE teaching activities. PE teaching evaluation contents shall be shown in Figure 5.

![Physical Education Teaching Evaluation Content](image)

Figure 5. Physical Education Teaching Evaluation Content

Traditional PE teaching evaluation is to measure students’ PE knowledge and skill level as well as teachers’ teaching level be based on students’ test grades and sports grades. Since its one-sidedness, it cannot fully reflect students’ comprehensive quality and potential. Besides, it may mislead students’ learning purpose. Teaching evaluation system of flipped classroom can fully estimate students’ self-taught process on the platform and their learning performance in class as well as in practical activities. Then we can learn students’ independent learning initiative, independent learning method rationality, innovative awareness, teamwork awareness and potential etc. (Liu, 2016). When the information information above is analyzed and evaluated to give or improve the coping strategy according to the evaluation result, excellent talents can be cultivated during PE teaching activities.

5. CONCLUSIONS

First, the author studies PE teaching direction and application signification of flipped classroom. Then it shall be
implemented from three aspects, namely innovative PE teaching ideas, building the information PE teaching platform and improving PE teaching evaluation system. The scientific and systematic flipped classroom teaching mode is built. Flipped classroom teaching mode shall be applied in PE teaching practice so that teaching quality can be improved from teaching ideas, students’ independent learning ability cultivation, teaching means application, practical activity innovation and PE spirit cultivation etc. Flipped classroom teaching mode in the PE teaching activity practice is the necessary direction of the PE education field development in new era and the core strategy to improve students’ PE quality.

REFERENCES