

Based on the CIPP Theory Perspective: The Application of Information Technology Integration in Physical Education Course Evaluation - A Case Study of Software Engineering Institute of Guangzhou

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Abstract

CIPP, as a decision-oriented new model of curriculum evaluation, is suitable for the evaluation needs of information-based physical education courses. The evaluation of teaching in information-based physical education courses based on the CIPP model is divided into four categories: context evaluation, input evaluation, process evaluation, and product evaluation. This study explores the evaluation system of information-based physical education courses to fully leverage the guiding function of course evaluation, aiming to better optimize the construction of information-based physical education courses and improve the quality of teaching in these courses.

Keywords: informatization, integration, evaluation

1. Problem Statement

The 21st century marks the era of humanity's comprehensive entry into an information-driven society, with the rapid development of information technology accelerating this transition. Information technology not only greatly enhances the pace of societal productivity development but also deeply impacts lifestyles and social structures. The level of informatization has become an important indicator to measure a country's modernization and comprehensive national strength. The informatization of society inevitably includes the informatization of education, and the development level of educational informatization has become one of the symbols of modern education. The integration of information technology with subject curricula is an important approach to achieving educational informatization. The Ministry of Education of the people's Republic of China (MOE, 2001, Paragraph11.) explicitly states that: We should vigorously promote the widespread application of information technology in the teaching process, promote the integration of information technology and subject curricula, gradually achieve changes in the presentation of teaching content, students' learning methods, teachers' teaching methods, and the interaction between teachers and students. We aim to fully leverage the advantages of information technology to provide students with a rich and diverse educational environment and powerful learning tools.

The integration of information technology and curricula represents a significant trend in new curriculum reforms. As an essential component of school education, physical education courses are inevitably influenced increasingly by this trend, with more and more universities attempting to combine information technology with physical education in their school-based courses. Evaluating newly developed school-based informatized courses is an important issue that cannot be ignored. This paper uses the CIPP theory to evaluate the informatized physical education courses at Software Engineering Institute of Guangzhou, with the aim of providing a reference for optimizing and improving teaching quality.

2. Concept Introduction

2.1 Curriculum

Abroad, the word "curriculum" originates from Latin, meaning "to run." It metaphorically refers to "a segment of the educational process." In the 19th century, British educator Spencer used the term in his article "What Knowledge is of Most Worth?" to denote "the systematic organization of teaching content." Japanese scholars translated it as "educational curriculum," marking the earliest use of the term "curriculum" in the West (Fuquan & Jainming, 2019). Chinese scholars believe that the concept of curriculum can be broadly or narrowly defined. Broadly, the curriculum refers to the sum of educational content and its process selected by schools to achieve training objectives, encompassing all subjects taught in schools and purposeful, planned educational activities. Narrowly, the curriculum refers to a particular subject (Encyclopedia of China, 1985).

2.2 School-Based Curriculum Development

Professor Xu Yuzhen from Capital Normal University (Yuzhen, 2006, p83) defines school-based curriculum development as: An activity that takes place and unfolds on the school site, guided by the basic spirit of national and local curriculum outlines. It is developed voluntarily, independently, or in collaboration with external groups or individuals, based on the nature, characteristics, conditions, and resources of the school. It aims to meet the learning needs of all students in the school and is a continuous and dynamic process of curriculum improvement.

2.3 Integration of Physical Education Curriculum and Information Technology

Professor He Kekang (Kekang & Juan, 2007, p.152) believes, The integration of information technology and subject curricula is about effectively incorporating information technology into the teaching processes of various subjects to create an informatized teaching environment. This integration aims to realize a teaching and learning method characterized by 'autonomy, inquiry, cooperation', which not only highlights the teacher's leading role but also fully reflects the students' main position. It fully brings out students' initiative, enthusiasm, and creativity, fundamentally transforming the traditional teacher-centered classroom teaching structure, thus actualizing the cultivation of students' innovative spirit and practical abilities.

This primarily includes three attributes: creating an informatized teaching environment, realizing new teaching methods, and changing the traditional teaching structure.

2.4 Curriculum Evaluation

Broadly, curriculum evaluation includes teaching evaluation, teacher evaluation, student learning achievement evaluation, and curriculum product evaluation, hence referred to as curriculum and teaching evaluation; narrowly, curriculum evaluation refers solely to curriculum product evaluation. Curriculum evaluation means, based on certain standards, systematically collecting relevant information, using various qualitative and quantitative methods, to make value judgments on the plan, implementation, and results of the curriculum and seek improvements (Stufflebeam, 2000).

3. Basic Content of the CIPP Evaluation Model

The CIPP evaluation model, developed by Stufflebeam (Stufflebeam, 2000), is a curriculum evaluation model. The CIPP model is primarily aimed at improving programs and is widely applied in educational or curriculum evaluation. It consists of four types of evaluations: context evaluation, input evaluation, process evaluation, and product evaluation, forming a macroscopic comprehensive evaluation model. Stufflebeam believed that evaluation should not be limited to assessing the achievement of objectives but should provide useful information for curriculum decision-making. In a very succinct way:

(1) Context Evaluation: Context evaluation is the most basic form of evaluation. It includes defining the school's background, identifying the service targets of the curriculum and assessing their needs, identifying possible ways to meet these needs, diagnosing the problems faced by the needs, and judging whether the objectives can respond to known needs. The purpose of context evaluation is to provide a basis for determining curriculum objectives.

(2) Input Evaluation: This evaluates the conditions needed and available to achieve the curriculum objectives, assessing the feasibility of curriculum implementation. It mainly involves issues such as the feasibility of achieving objectives; potential costs of various plans; strengths and weaknesses of the curriculum; ethical issues of the curriculum; availability of curriculum resources, etc.

(3) Process Evaluation: This stage of evaluation mainly describes the implementation process of the curriculum to identify or predict problems, such as whether related activities are implemented as planned, whether existing curriculum resources are used effectively, etc., thereby providing effective information for curriculum developers to adjust

(4) Product Evaluation: this stage of evaluation primarily involves measuring, interpreting, and judging the effectiveness of the curriculum. The specific approach is to collect various descriptions and judgments related to the results obtained. Notice that "Product evaluations follow no set algorithm, but many methods are applicable. Evaluators should use a combination of techniques. This aids them to make a comprehensive search for outcomes. It also helps them cross-check the various findings." (Stufflebeam, 2000, p. 298).

4. Characteristics of the CIPP Evaluation Model and Its Suitability for Informatized Physical Education Courses

Several specific characteristics, regarding the work here presented, can be summarized and mentioned.

The CIPP model is improvement-oriented, with evaluation results directly serving the improvement of teaching plans. It emphasizes dynamism and process, meeting the autonomous learning needs of course participants and providing a decision-making basis for teachers to optimize teaching plans.

The evaluation in the CIPP model involves more comprehensive indicators, including the setting of teaching objectives, formulation of teaching plans, organization of course resources, behavior of participating entities, and recording of learning outcomes. This approach allows for a more comprehensive reflection of the actual situation of each aspect and stage of teaching.

The CIPP model adopts a modular setting approach, with each module having clear functions and operational processes. The four evaluation components not only meet the needs for process evaluation but also come together to form a unified comprehensive evaluation.

The CIPP model emphasizes the role of feedback, integrating evaluation results with the teaching process. It can timely identify problems in teaching activities, providing dynamic and flexible assistance and support for adjusting teaching plans and learning methods for the main participants of the course: teachers, students, and educational management institutions.

5. Introduction to the Informatized Physical Education Course "Physical Fitness Training" at Software Engineering Institute of Guangzhou

The "Physical Fitness Training" series is a mandatory physical education course for students, constituting a compulsory part of the professional talent training program and integrated into the school's curriculum teaching management system. If students fail the "Physical Fitness Training" course, they must retake the exam after the end of the semester (specific time will be notified separately). Failure to pass the "Physical Fitness Training" course before graduation may affect normal graduation.

This course uses the Sports World Campus app (hereinafter mentioned as App), a mobile running App, to register and gather all the students' running activities, as each course requires a running distance of 36 kilometers for male students and 30 kilometers for female students. The course aims to train students in the correct running posture and techniques, prevention and management of running injuries, and knowledge in these areas. Its goal is to enhance physical health, improve cardiorespiratory endurance, increase muscle strength and endurance, improve flexibility and extensibility, and increase speed and agility for comprehensive physical development. Additionally, the course also covers theoretical knowledge of exercise physiology, biomechanics in sports, sports nutrition, and training plan formulation.

This course plays a crucial foundational role and theoretical guidance in helping university students cultivate exercise habits and develop healthy lifestyles.

(I) Theoretical Guidance

(1) Establishment of Online Guidance Groups: Each instructor sets up a QQ group (an online chatting room service, instant message and web portal provided by Tencent QQ), inviting students to join via school notifications based on the course schedule.

(2) Teaching of Theoretical Knowledge: Online guidance is provided, including instructions on course completion and precautions. Relevant sports theory teaching materials are sent to the group in PDF format for all students to study independently, enhancing the theoretical guidance of the course and increasing the informational content of classroom teaching.

(3) Question and Answer Sessions and Interaction: This series of courses utilizes QQ groups for addressing student queries and facilitating teacher-student interaction.

(II) Training Implementation

(1) Students are required to run in designated areas during their free time: the school football field, the old

basketball court, and the roads around the E-type teaching building. The running process is recorded and scores are uploaded via the mobile App.

(2) Completion Standards for Each Semester: Students are required to complete a certain distance: 36 kilometers for male students and 30 kilometers for female students. The number of runs is up to the individual, with each run covering at least 1 kilometer but not exceeding 4 kilometers. The frequency is 2-3 times per week, with a pace ranging from 2 minutes and 11 seconds to 10 minutes per kilometer. The effective time for running each day is from 6:30 AM to 10:00 PM. Students are advised to run within these hours. Running is not restricted to the class schedule (i.e., not limited to the times listed in the timetable, and running during midday is not recommended).

6. Application of CIPP curriculum evaluation model in informationized physical education curriculum evaluation

Indicator Classification	Primary Indicator	Secondary Indicator	Tertiary Indicator
Context Evaluation	A1 Teaching Environment Foundation	B1 Student Attitude and Capability Reserve	C1 Acceptance of Informatized Physical Education Teaching Model
		B2 Teacher Philosophy and Comprehensive Quality	C2 Online Learning Ability C3 Basic Running Technique Foundation.
		B3 Teaching Basic Preparation	C4 Willingness to Implement Informatized Physical Education Course Teaching Reform C5 Information Technology Application Ability C6 Teaching System Design Ability for Informatized Physical Education Course C7 Class Size C8 Specialized Venue and Equipment Setup for Informatized Physical Education Courses C9 Teaching Objective Setting and Applicability to Informatized Physical Education Courses
Input Evaluation	A2 Teaching Resource Investment	B4 Student Investment	C10 Time Spent on Online Learning Outside Class C11 Time Spent on Technical Practice Outside Class C12 Online Resource Viewing Volume
		B5 Teacher Investment	C13 Pre-Class Online Guidance C14 Timely Update of Pre-Class Learning Resources for Students C15 Teaching Plan Formulation for Flipped Classroom
		B6 School Organizational Guarantee	C16 Organizing Teacher Teaching Research and Training C17 Basic Guarantee of Online Learning Equipment C18 Regular Inspection and Maintenance of Teaching Venues, Equipment, and Network Media C19 Number of Policies Supporting Informatized Physical Education Course Teaching
Process Evaluation	A3 Teaching Implementation Process	B7 Student Performance	C20 Raising and Solving Pre-Class Online Learning Questions C21 Interaction and Communication Effectiveness with Teachers and Students C22 Cultivation of Scientific Exercise Awareness C23 Running Technique Skill Demonstration
		B8 Teacher Performance	C24 Setting Targeted Activities to Test Student's Pre-Class Preparation C25 Handling of Pre-Class Student Questions C26 Offline Group Tutoring C27 Individualized Guidance C28 Cooperative Communication Group Division C29 Teaching Summary
		B9 Overall Classroom Performance	C30 Integration of Online Learning with Classroom Practice C31 Classroom Practice Intensity C32 Classroom Atmosphere
Result Evaluation	A4 Classroom Teaching	B10 Student Growth	C33 Online Learning Test Scores C34 Accumulation of Excellent Classroom Performances

Effectiveness	C35 Assessment Scores
B11 Teacher Development	C36 Improvement in Teaching Scores
B12 Overall Teaching Performance	C37 Enhancement of Practical Teaching Ability for Informatized Physical Education Courses
	C38 Achievement of Teaching Expected Goals
	C39 Student Satisfaction with the Informatized Physical Education Course Teaching Model

6.1 Background Evaluation - Basis of Teaching Environment

Background evaluation is the evaluation and judgment of the rationality of the educational program objectives. In this study, the reasonableness of the established teaching objectives is evaluated through an environmental basis of the whole teaching of the course, so the first-level index is set as the environmental basis of teaching. It mainly evaluates students' attitude and ability base, teachers' concept and comprehensive quality, and basic teaching conditions.

(1) Students' attitude and ability reserve

College students' acceptance of information-based physical education courses is usually positive, especially in the context of the rapid development of digitalization and information technology. Information-based physical education courses offer more personalized and flexible learning options, such as online teaching, personalized training plans, etc., which is very attractive for college students who pursue personalized experiences. With the enhancement of health consciousness, more college students begin to pay attention to physical health and physical training, and the information sports course just provides this support. Therefore, college students' acceptance of information-based physical education courses is still relatively high. As digital natives, most college students are very familiar with new technologies and information tools, so they are more likely to accept and try information sports courses. They have the ability to use network resources and tools to study and research. Students have higher self-management and self-discipline skills to ensure continuity and effectiveness of learning. At the same time, physical education course is a compulsory course for college students, primary schools, middle schools and high schools. Except for students with special physique who cannot participate in physical exercise, they have certain sports (running, jumping, throwing, climbing, etc.) ability.

(2) Teachers' philosophy and comprehensive quality

The comprehensive quality of teachers is an important factor affecting the quality of teaching, and the teaching concept of teachers also restricts the play of teachers' comprehensive ability. Teachers are the leaders of classroom education activities, and the willingness of teachers to implement the information-based physical education model also determines what teachers can bring to classroom teaching. Physical education teachers fully realize that information technology can improve teaching efficiency, enrich physical education teaching methods, so as to better motivate students to participate in physical exercise and meet students' learning needs. Therefore, physical education teachers actively participate in curriculum reform and innovation, and actively integrate information technology into physical education curriculum teaching. As an engineering university, our school leaders attach great importance to the overall informatization construction of the school, and support and encourage teachers to explore and practice the reform of informatization curriculum. The school regularly organizes teacher training to improve teachers' information literacy. Physical education teachers are proficient in computer, Internet, educational software and data collection and processing, including the ability to publish online teaching resources and collect students' online learning. At the same time, they also need to be able to carry out teaching design based on the characteristics of information-based physical education courses.

(3) Teaching foundation preparation

In order to cooperate with the implementation of the informatized physical education course, our school has specially marked out the running path for students to run, and the 400-meter track and field is also kept open all day to meet the running needs of students. For students in the Physical Training course, students' technical movements need guidance, first of all, the standardization of movements, which needs to control the number of students in each class to ensure that teachers can respond to the problems raised by students in a timely manner. The core of the information-based physical education course "Physical training" is that students use mobile phone apps to complete the prescribed amount of running in their spare time. First of all, students should make a running plan according to their leisure time, and then complete the running task according to the plan at the

specified time, and complete the theoretical learning task within the specified time. The setting of curriculum objectives considers factors such as students' physical foundation, age, ability, current situation of school facilities, and arrangement of class hours. The setting of the objective of the information-based physical education curriculum should be as comprehensive as possible, focusing not only on the improvement of sports skills, but also on knowledge and attitude objectives. The goal is specific and targeted, which can effectively promote the all-round development of students.

6.2 Input Evaluation - Teaching Resource Input

The input evaluation is mainly to assess the rationality and feasibility of the educational program by understanding all aspects of the situation. To evaluate whether the teaching plan is reasonable and feasible is to estimate whether the input of teaching resources can meet the needs of course teaching. Therefore, the first-level index formulated in this study is to evaluate the input of teaching resources, including the input of students, the input of teachers and the guarantee of schools.

(1) Student involvement

Student input refers to students' efforts and preparations for the completion of curriculum objectives and the normal implementation of teaching programs. It is the source of strength for the completion of teaching objectives. The evaluation of students' learning input can effectively measure the growth quality of students. Students' extracurricular involvement is mainly evaluated from students' offline learning and practice time and online resource browsing, because time is the most intuitive way to evaluate students' learning engagement, and the number of online resource browsing can reflect the overall viewing situation of learning resources in the class.

(2) Teacher input

The input from teachers directly affects the quality of teaching resources received by students, so it is necessary to analyze the input of teachers in the evaluation so as to make timely teaching adjustment according to the teaching quality data. Pre-class teaching resources are the main way for students to understand classroom learning, so teachers should update pre-class teaching resources in time, and provide resources of different difficulties and stages according to the differences of students. Before class, teachers should not only release teaching resources, but also guide students in advance, so that students can actively explore teaching resources and have a deeper understanding of teaching content. At the same time, teachers should also formulate targeted teaching plans and develop students' ability and accomplishment through face-to-face classroom interaction, communication and cooperation according to the formulated high-level teaching goals.

(3) School organization guarantee

School organization guarantee refers to all aspects of support and backstop that schools can provide for teaching implementation, mainly including regular testing and maintenance of infrastructure such as venue equipment and network media to ensure the safety of students participating in physical education courses, as well as organizing training for teachers to improve physical education teachers' information literacy, school-based curriculum development ability, and adapt to the special requirements of information-based teaching. Ensure that courses are organized and implemented in accordance with relevant educational policies and standards, including Department of Education regulations and internal policies of the school.

6.3 Process Evaluation -Teaching Implementation Process

Process evaluation is a whole-process assessment of the pre-process in which teachers and students participate in the implementation procedure, and the implementation plan can be continuously improved and adjusted in the ongoing process, including the performance of students in the classroom, the performance of teachers and the overall performance of classroom activities.

(1) Student performance

Student performance is the specific behavior of students in the implementation of offline courses, the formulation of running plans, the effective implementation of running plans, the reasonable allocation of running amount, the full warm-up before running, and the relaxation after running. Online learning ensures sufficient time investment and completes all teaching assignments carefully. Be able to actively interact with the teacher and communicate with the teacher in time when there are questions. Motivated to learn, able to apply theoretical knowledge to practice.

(2) Teacher performance

As the organizer and guide of the information-based physical education curriculum, teachers play an important

role in the process of students' autonomous learning and practice, and the evaluation of teachers in the process of teaching implementation is mainly based on the organizational activities made by teachers. At the beginning of the course, teachers should timely publish teaching resources to design targeted content to test students' understanding of knowledge and motor skills, and at the same time deal with students' questions. In addition, based on the characteristics of information technology, the design of innovative and interactive physical education curriculum. This includes selecting the right technical tools and resources, as well as developing effective teaching plans and strategies. Manage and maintain the technical equipment and resources used in teaching and learning to ensure their proper operation and effective use. It not only focuses on skills and physical health, but also focuses on cultivating students' teamwork ability, sports spirit and social skills. Finally, it is to evaluate teachers' summary ability, such as the evaluation of students' technical progress and the spirit of overcoming difficulties.

(3) Overall course performance

The overall performance of the course is the evaluation of the teaching arrangement and teaching form of the whole course. The main link arrangement of the information-based physical education course is the connection between online learning and offline practice. Students have learned the theoretical knowledge of running technology online, while offline class is used by students to practice and internalize knowledge. Therefore, the two should be connected through the joint efforts of students and teachers to improve the teaching quality. Evaluate whether the technical tools and resources used are appropriate for the physical education curriculum and whether they are effectively integrated and applied. Check if the program offers a personalized learning experience that adapts to different student needs and ability levels.

6.4 Result Evaluation -Teaching and Teaching Effect

Outcome evaluation is the evaluation of the results of educational programs, which is to judge the expected and unexpected, positive and negative effects of educational programs, and to determine the degree to which educational programs meet people's needs. It is mainly evaluated from the growth and harvest of students, the development of teachers and the overall performance of teaching.

(1) Student growth

The growth of students mainly includes the results obtained by students when they learn online. The process evaluation of students during the course implementation, including the initiative of students in learning, mainly includes recording the number of students' active questioning, interaction and demonstration, etc., which can be combined with teacher evaluation and student self-evaluation. Course evaluation also includes students' completion of running tasks.

(2) Teacher development

The development of teachers includes the improvement of teachers' teaching performance, which can be reflected by teachers' self-evaluation and third-party supervision evaluation, and the evaluation of teachers' real ability to improve the teaching practice of information-based physical education courses. For example, the evaluation results can be used to find out their shortcomings and other aspects, and the teaching effect can be improved through improvement.

(3) Overall teaching performance

The overall teaching performance is an overall evaluation of the teaching quality of the information-based physical education course. The first evaluation is the completion of the pre-set objectives of the class, which is the core content of testing the teaching quality of a class. In addition, students' satisfaction with the teaching method of the information-based physical education course should be considered, so as to reflect the overall teaching effect peroration

To sum up, the CIPP model is reasonably applied to the information-based physical education curriculum. Through background evaluation, input evaluation, process evaluation and result evaluation, including diagnostic evaluation, process evaluation and final evaluation, the effect and deficiency in teaching practice can be scientifically and objectively feedback, and the effect of information-based physical education curriculum reform can be further improved. Of course, the construction of curriculum evaluation system is not a static process, and how to quantify the evaluation results is also a problem worth exploring. In the future teaching, the author will continue to carry out relevant teaching empirical research, obtain, present and discuss the quantitative analysis of evaluation results, and constantly adjust and optimize the evaluation index system of informationized physical education curriculum.

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