



The Design and Practice of Data-Driven Teaching Evaluation Model in Colleges and Universities

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Abstract. With the rapid development of information technology in the 21st century, we have entered the era of big data. Based on information technology and big data, there are new teaching concepts, teaching models and teaching methods. In the last two years of teaching, we have tried to design and practice a data-driven college teaching evaluation model. Build an intelligent auxiliary teaching platform to provide teachers, students and teaching management personnel with intelligent assistance; take the “diversification-value process-testing ability” as the guiding ideology to carry out curriculum assessment reform, stimulate students’ enthusiasm for learning, and promote students’ all-round development; On the basis of constructing the classroom teaching index system and collecting a large amount of course data, the paper constructs a data-driven classroom teaching evaluation model: establishing a curriculum real-time evaluation teaching goal, constructing a classroom evaluation index system, and designing data-driven classroom teaching.

Keywords: Data driven · Incentive mechanism · Intelligent learning

1 Introduction

At present, there are two major problems in Chinese universities: first, the classroom attendance is low, participation is low, students do not study at ordinary times, before the test, only pay attention to test results, do not pay attention to the learning process, the study and examination of the significance of cognitive bias; the second is the college students’ employment rate is not ideal, college students professional knowledge, There is a deviation between the ability of learning and the ability of innovation and the demand of employing units.

The reform of the course examination mode is an important breakthrough to solve these two problems. The basic aim of curriculum assessment is to transform the curriculum knowledge into students’ professional cognitive ability and application ability, and to convert them into lifelong learning ability and creative ability. Whether the course examination method is reasonable not only affects the effect of the assessment directly, but also relates to the effect of classroom teaching and students’ learning effect.

We propose to take “pluralistic-value process-examination ability” as the guiding ideology, it aims at stimulating students’ learning enthusiasm, improving learning effect, promoting students’ all-round development, exploring the comprehensive assessment method based on the combination of formative evaluation and summative evaluation, and forming a system of multiple assessment.

The new scheme will inevitably encounter the habits of teachers and students in the school conflict. First of all, teachers have been accustomed to the current assessment methods, especially the old teachers who have been teaching the same course for many years, using the original syllabus and examination mode to be familiar, and the implementation of the new teaching model may arouse objections. Because the curriculum examination way endows the teacher with the bigger autonomy, if the teacher does not support the new examination way, still maintains the original way, then the curriculum examination way reform will be fictitious. Secondly, because the teachers should be given greater autonomy, if the performance evaluation can not transcend the bondage of human society, reform effectiveness greatly reduced. Again, students are accustomed to getting a decent grade with the busy week before the exam, in the new assessment mode, each class, every homework and examination should be taken seriously, each paper can not use the network crash, if the students can not really understand the significance of the new assessment methods and timely adjustment of mentality and learning habits, Their scaled grades are likely to decrease. Therefore, we should fully arouse the teacher’s guiding role and break the habit constraint which hinders the reform of the course examination mode.

Larry Cuban (cuban 2013) once asked: “Why is there a lot of structural changes in the school, and the change in teaching practice is still very small?” in the case of great changes in school management, curriculum, culture, teacher-student relationship—new textbooks, modern technology and new teachers are entering the classroom The basic teaching of teachers shows continuity and stability, such as back answers, paper and pencil tests are always retained by teachers [1]. However, with the 21st century’s ability or core literacy becoming a growing number of countries’ educational goals, teachers must be able to design and implement innovative teaching methods (innovative Pedagogies) to provide students with the conditions to achieve higher levels of learning outcomes, Thus systematically developing students’ abilities or accomplishments in the 21st century, rather than achieving these results by chance.

Teaching has duality. Teaching and learning are interrelated and mutually reinforcing. It is a dynamic interaction between teaching and learning knowledge and practice. This requires motivating teachers to guide reform and implement new curriculum assessment programs. Encourage teachers to promote teaching, increase classroom teaching, course papers, group subject guidance and training, cultivate students’ professional thinking and professionalism, improve students’ communication skills and teamwork ability in professional knowledge. To this end, we completed the exploratory construction of the teaching evaluation system of “teaching evaluation” in colleges and universities, and proposed to use the students’ learning results to evaluate the quality of classroom teaching, realize teaching interaction, and finally achieve the goal of precision teaching (Fig. 1).

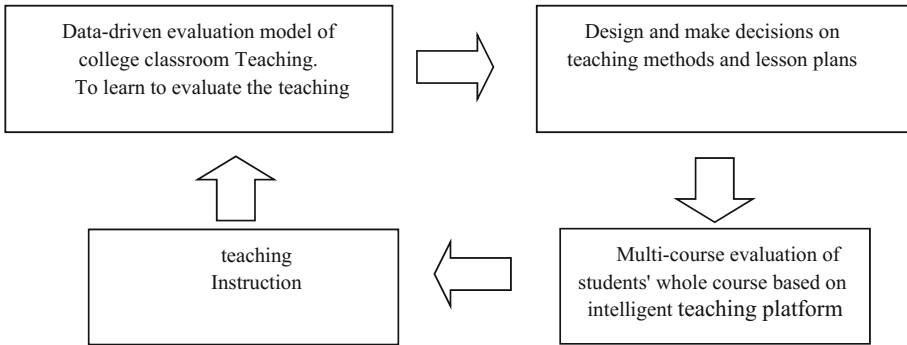


Fig. 1. Design framework of intelligent assistant teaching platform

2 The Design and Practice of Students' Multi-course Examination Mode Based on Intelligent Teaching Platform

The reform of curriculum assessment is guided by the principle of “pluralism-value process-examination ability”; To promote students' learning and to promote teaching as the assessment goal, the aim is to arouse the enthusiasm of student study, to improve the effect of learning, to promote the all-round development of students, and to make teachers adjust teaching specific goals, update teaching contents and forms in time, Improve the pertinence and effectiveness of teaching activities.

2.1 Explore the Course Examination Plan

This paper explores the comprehensive assessment method based on the combination of formative evaluation and summative evaluation, forms a system of multiple assessment, and designs and implements the reform plan of curriculum assessment according to different types of courses, and constructs the question bank with updating mechanism.

Based on the combination of formative evaluation and summative evaluation, the whole process, comprehensive, diversified and personalized assessment methods are designed.

Learning is a complex continuous process, beginning and end, from the knowledge learning, there is a start, expand, deepen and complete the process of construction, formative assessment and summative evaluation of the learning process and results of the diagnosis and evaluation. Summative evaluation is at the end of the semester, the use of the final examination methods to assess the students knowledge and ability, and the examination results of the analysis and value judgments, can reflect the curriculum knowledge and theory of memory, understanding and application ability. Formative evaluation is in the semester, the continuous use of a variety of ways to continuously assess student learning activities, and real-time, dynamic, multiple assessment results of the analysis and value judgments, this is a process of evaluation mechanism, is conducive to grasp the overall students learning process [2].

In order to carry out the diagnosis and evaluation of the whole process of students' learning, the new comprehensive system of curriculum assessment is based on the principle of the combination of formative evaluation and summative evaluation, using multiple assessment methods, highlighting the requirements of competency assessment, designing the whole process, comprehensive, pluralistic and personalized assessment.

The whole process of assessment: In the student learning process, non-stop to carry out multiple forms, multiple content assessment, to achieve the whole process of student learning activities tracking, diagnosis and feedback. In the whole process assessment, timely diagnosis and feedback of student learning effects, at any time based on the students' learning progress and real situation of students' knowledge and ability to carry out targeted teaching and guidance, improve student learning and teacher teaching; To motivate and maintain the continuous motivation of students to focus on learning every day; The result of the whole process assessment is to grasp the change and development process of students' learning dynamics, to reduce the whole process of student learning and to give the process evaluation.

Comprehensive Assessment: Learning is a comprehensive system of multi factor interaction and common progress, based on the comprehensive evaluation of students' learning activities, the construction of knowledge, ability and quality as the main content of the Comprehensive Assessment Index system. The reform of curriculum assessment should be assigned to complex and comprehensive indexes, to determine the proportion of the factors of knowledge, ability and quality in the assessment of students, in general, the curriculum assessment reform should be based on knowledge assessment, highlighting the requirements of competency assessment, taking into account the quality assessment, to guide the all-round development of students' knowledge, ability and quality.

Multi-Assessment: Diversified assessment means that many subjects of teaching activities participate widely and use a variety of assessment methods to realize the whole process of student learning and the development of students comprehensive quality assessment. In the course of teaching, the continuous release of a variety of learning tasks and real-time evaluation, the formation of various forms, rich content of multiple assessment. The system consists of the following components: Classroom performance, daily work, practical performance, Report papers and test tests, including test before class, unit test, mid-term examination, final exam.

Personalized assessment: Through the whole process of student learning to track and feedback, master the individual knowledge, ability and quality of the comprehensive situation of students to judge the characteristics of knowledge learning and quality development, the formation of individual learning development process diagnosis, Individualized learning guidance can be provided for students' special learning situations and individualized learning needs.

Using the whole process, comprehensive, pluralistic and individualized examination method to realize the whole process assessment and comprehensive assessment can impel students to pay attention to the whole process of learning, develop comprehensive ability and accomplishment, keep learning initiative and enthusiasm, improve learning efficiency, and urge teachers to adjust teaching objectives, update teaching contents and forms in time, Improve the pertinence and effectiveness of teaching activities.

2.2 Using the Intelligent Teaching Platform

Intelligent teaching Platform The platform currently contains a check-in system, job management system, examination system, question and answer system, Curriculum Knowledge Atlas system, evaluation management, teaching resources management functions. From this platform you can get student check-in, classroom online questioning, classroom online practice, classroom online Review, each chapter online test, Learning Resources browsing situation, case analysis and so on data analysis obtains the student’s examination result, in addition to the achievement, but also takes the Knowledge Atlas form to display the examination result, may have the individual curriculum knowledge Atlas, may also be the class knowledge Atlas, the calendar year curriculum Knowledge Atlas and so on form comprehensively objective demonstration Course examination result.

Based on the information technology to construct the Intelligent Assistant teaching platform, can collect and analyze the students’ learning process data, so it needs the function of teaching management, online learning, evaluation management, teaching resource management, and provides the intelligent assistant for teachers, students and teaching administrators. As shown in the Fig. 2:

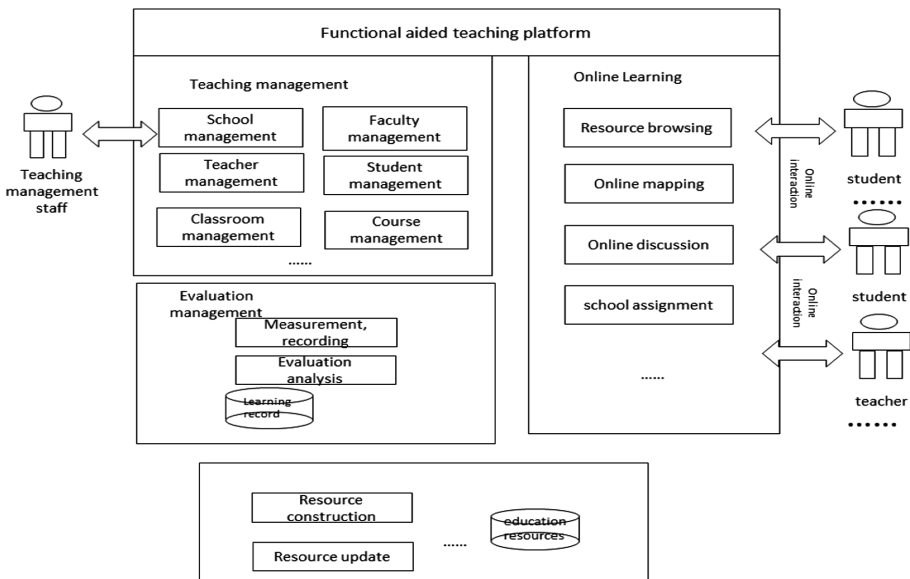


Fig. 2. The function of intelligent assistant teaching platform

2.3 Implementation Exploration

Since 2016, the intelligent teaching platform has been developed, based on the project team members, the process assessment and finalization of the management Information System course are analyzed, the goal of the course teaching is decomposed into the

individual goal of the students, and a new model of curriculum evaluation is summed up according to the results of many years' practical teaching. Comprehensive evaluation of students' comprehensive achievements is made from four aspects, such as knowledge mastery, curriculum participation, personal contribution and team cooperation ability. Based on the reform guiding ideology of Formative curriculum assessment, the new assessment system pays attention to the process and development evaluation, emphasizes the improvement of students' ability and the growth of students, increases the content of students' comprehensive accomplishment and innovation ability, and enhances the weight of formative assessment.

At the same time, in the design of the weight system, the project team for the different curriculum assessment objectives and curriculum characteristics of the corresponding weight distribution. Taking into account the applicability and operability of performance evaluation tools, the use of simple empirical estimation method to determine its weight ratio, and follow the following principles: the corresponding weight of knowledge mastery should be more than 70% of its total, "Management Information System" Student performance evaluation Index System.

Knowledge Mastery (70%) consists of normal test scores (15%), Case assignments (5%) and final test scores (50%), including peacetime tests, case studies and final tests, the whole process of multiple, knowledge and competency assessment combined.

Curriculum participation (20%) consists of classroom performance, answering questions (5%), online discussion (5%), class attendance (5%) and Knowledge point Browsing (5%), focusing on classroom participation and motivating students to participate actively.

Personal contributions (5%) from the search for relevant information, theoretical preparation (2%), point of view, method unique, innovative (3%), mainly in the group members of peer review, on the platform for scoring.

Team collaboration Capability (5%) includes further research capability, knowledge development ability (1%), active participation, communication ability, collaboration ability (2%) and task completion, problem solving (2%), and the evaluation of results by teachers according to case discussion.

The effect of multi-evaluation method system: (1) constantly provide a variety of assessment methods for students to learn the whole process of tracking assessment and real-time feedback. (2) comprehensive diagnosis and evaluation of the comprehensive development of students' knowledge, ability and quality by using a variety of assessment methods. Different forms of assessment methods focus on different assessment content, such as various tests focused on the effect of knowledge learning, the paper focused on the ability to study, including the use of knowledge theory, the ability to deal with integrated information and logic, dialectical and critical thinking ability, the group task focused on innovative ability and team cooperation ability.

In the two-year "Management Information System" course teaching practice, has received the positive effect, has raised the student's study enthusiasm and the curriculum whole process participation degree, to the student this discipline comprehensive accomplishment and the ability Questionnaire show, has the obvious enhancement.

3 Data-Driven Evaluation Model Design of College Classroom Teaching

3.1 Construction of Classroom Teaching Index System

In view of the traditional teaching mode, the aim of teaching evaluation is single, one-sided evaluation, subjective problem of evaluation standard, complete the exploratory construction of teaching evaluation system of “learning evaluation teaching” in college class, evaluate the quality of classroom teaching with the result of students, realize teaching interaction, and finally achieve the goal of precision teaching.

The basic idea or assumption of the design of Teaching evaluation Index system of “learning to teach” is to evaluate the effect and quality of teachers’ teaching by the performance and state of learning behavior caused and promoted by teaching. On the basis of theoretical analysis, this paper constructs the evaluation Index system of classroom teaching based on the teaching assessment. From the perspective of system theory, summarize all aspects of the classroom teaching process, and then select key elements and behavioral characteristics from the perspective of effective teaching.

3.2 Effective Use of the Teaching Aid Platform

In view of the limitation of time and space under the traditional classroom teaching mode, the incomplete evaluation of data collection, the weak analysis ability and the not timely feedback of the evaluation results, this paper constructs an intelligent assistant teaching platform to explore how to collect student data more conveniently and in time to realize the objective evaluation of teaching.

Based on the requirement of acquiring students’ learning situation in real time, this platform realizes the functions of teaching management, online learning, evaluation management, teaching resource management and so on, and provides intelligent assistant for teachers, students and teaching administrators.

3.3 Constructing Data-Driven Classroom Teaching Evaluation Model

On the basis of completing the construction of classroom teaching index system and collecting a large amount of course data, the paper builds a data-driven classroom teaching evaluation model: establishing a curriculum real-time evaluation teaching goal, constructing a classroom evaluation index system, and designing data-driven classroom teaching.

- (1) Analyze the correspondence between the classroom teaching index system and the specific observation points of the student classroom data.

The basic idea of the design of teaching evaluation index system based on “teaching evaluation” is to evaluate the effect and quality of teacher teaching by the performance and state of learning behavior caused and promoted by the teaching. On the basis of theoretical analysis, we construct the evaluation Index system of classroom teaching based on the teaching assessment. From the perspective of system theory, this paper sums up all the links in the course of classroom teaching, then selects the key

elements and behavioral characteristics from the perspective of effective teaching, and determines whether the students' classroom data can be collected by constructing the intelligent education aid platform. At present, the index system is designed by teaching effect, teaching benefit, teaching efficiency, background variable, four evaluation items, 13 evaluation points.

There are four aspects of teaching effectiveness: (1) the comprehensiveness of learning outcomes, the achievement of students' academic achievement, mastery of knowledge and skills, and the values of emotional attitudes; (2) sustainability of learning outcomes, interest in learning, self-confidence Heart, learning ability, self-efficacy and learning habits; (3) the level of learning outcomes, whether the results of different courses taught by different teachers are different; (4) the comprehensiveness of learning outcomes, whether teaching can promote the whole Student learning and development.

There are three aspects of teaching efficiency: (1) Learn to apply, whether students can apply the knowledge gained in the course to practice; (2) Learn to study, whether the students in the process of positive thinking, active questioning, there is no internal understanding, active construction; (3) Learn to behave, Whether to actively pay attention to and guide students in teaching activities of various moral performance and moral development.

The teaching efficiency has two aspects: (1) The teaching time, whether the classroom teaching time is used in the teaching and learning activities which point to the goal; (2) The time utilization, whether the teaching activity points to the value maximization teaching content.

The background variables consider four aspects, (1) teaching objectives, whether there are stratified design goals, content, schedule, and job requirements; whether students of different levels or characteristics have different teaching objectives; (2) Whether the content of the teaching grasps the characteristics of the subject; whether the interpretation of the content is accurate (reasonable determination of the focus of teaching); whether it meets the teaching objectives; (3) Academic situation, the curriculum design is adapted to the student's experience foundation, matches the student's knowledge base, and adapts to the students' thinking ability. The curriculum design meets the students' learning needs; (4) Teaching conditions, whether the teaching behavior of this class has corresponding time, space and material conditions.

On this basis, it is the key to analyze and establish the correspondence between the Classroom Teaching index system and the students' classroom data, and construct the data-driven evaluation model by using the platform data.

(2) Multi-evaluation management and integration among modules in teaching aid platform.

Construct a developmental and diversified evaluation system to promote multi-agent and multi-dimensional interaction. Constructing a multi-evaluation system: On the subject of evaluation, teachers evaluate each other among students, students, teachers, students, students, in the evaluation content, each subject can evaluate the teaching content, teaching resources, student work content and form.

Based on the need to obtain student learning in real time, the use of information technology to build an intelligent auxiliary teaching platform, the platform has realized

the functions of teaching management, online learning, teaching resource management, providing intelligent assistance for teachers, students and teaching management personnel. On this basis, improve evaluation management and its integration with other modules.

- (3) build a data-driven evaluation of teaching and learning classroom teaching evaluation model.

Big data-assisted teaching platform to keep as many students and students as possible in the data information on the platform, including the teaching platform for students of all activities, such as learning knowledge map, do quizzes, upload assignments, participate in the discussion, interactive evaluation, click Resource Links. With the continuous development of students' learning, new real-time data are produced, and the data will be greatly increased in both volume and surface.

- (1) to analyze a large amount of data and excavate valuable teaching information. The large data-assisted platform displays a large amount of information collected and stored in a graph, and provides teachers with data analysis tools. On this basis, teachers use classification or combination analysis, individual analysis and other methods to have a large number of real-time data analysis, accurate grasp of the individual or all students learning progress and learning needs, ideological trends and ideas, and so on to obtain a large number of valuable teaching information.
- (2) using valuable information obtained from large data analysis to guide teaching activities. In the course of teaching objectives and program formulation, teachers adjust teaching objectives and programs according to the results of data analysis, and can also put forward individualized or group teaching scheme for individual or some groups of different characteristics. In the course of classroom teaching, it is fully based on the students' learning ability, learning needs and interests, thoughts and viewpoints, setting appropriate teaching contents and choosing appropriate teaching methods. In the teaching feedback and the evaluation link, synthesizes the Student classroom study situation and the unceasingly updated platform study data to the continuous and the comprehensive appraisal, consummates and enriches the appraisal system.
- (3) How the big data-assisted teaching platform plays an important role in promoting students' learning. The first is to adapt to the students' networked, digitized and fragmented learning mode, so that students can easily access various learning resources on the teaching aid platform, and use the fragmented time to learn at any time to extend the learning time and space. Second, the teaching aid platform gives students full learning autonomy. Students decide their own learning and expanding content, freely participate in discussions and evaluations, and enable students to consciously internalize correct ideas. The third is to make students' online and offline learning complement and deepen each other.

4 Conclusions

To make the change happen and sustainable, the key is to motivate teachers, in large data environment, using a variety of advanced platform design teaching, teachers as a common designer (co-designer), not only the implementation of design activities. The implementation process of design based research generally includes: researchers and participants collaborate to analyze the problem-using existing theories, methods, techniques to build theoretical prototypes-iterative practice in real situations, revising the scheme, summarizing the experiences, methods and principles of design and implementation (Baoha 2015) [3]. It should be realized that in the process of change, teachers are also learners. Therefore, training for teachers should conform to effective scientific principles of learning, while common design implies learning principles such as collaborative learning, real problem solving, and inquiry learning.

In addition, the main place where teacher teaching occurs is that the classroom is nested in schools, school districts, society, countries and other systems. Therefore, the change of teaching evaluation model depends on the changes at all levels. Nancy Law links change with learning and builds a multi-level, multi-scope learning model that demonstrates how to support innovation in teaching (Fig. 3). First, changes at all levels should be understood as a concept of learning, which means that at different levels, the factors that influence student learning should also be defined as learning outcomes at that level (see figure below).

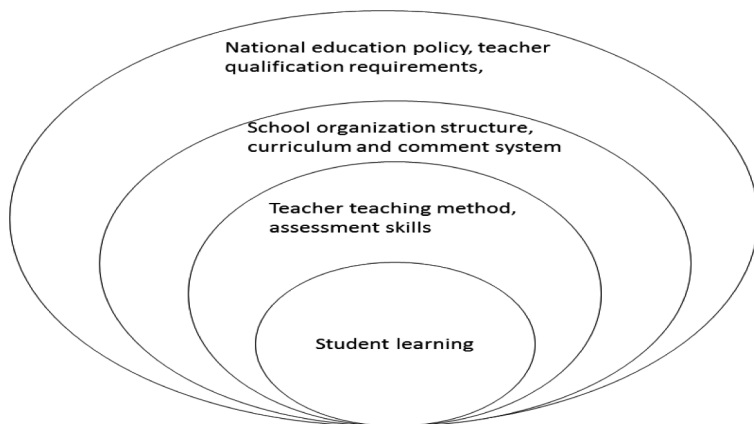


Fig. 3. Levels that affect student learning factors

Therefore, if we take a simple analysis of the problem perspective, we will think that the teaching change can be divided into a number of isolated and static parts, which can be solved by using algorithms and flow chart techniques, and once the initial problem is solved, the result is reproducible; The perspective of analysis will regard teaching change as an environment consisting of multiple factors that are interdependent and constantly changing, so the teaching change is nonlinear and uncertain. In

fact, the data-driven college teaching evaluation model reflects systemicity and complexity. The new evaluation model is not realized in a vacuum and isolated environment. The macro background of students, teachers, schools, society, countries and even the world will be It has an impact on this. Therefore, in solving the problem of teaching change, it is important to have great patience and keen perception, and to be sensitive to the iterative feedback results appearing at various levels, so as to continue to advance.

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