

Construction of Witkey Practice Teaching Mode under the Era of Big Data

A Case Study of Software Development in Higher Vocational Colleges

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Abstract—Due to the limitations of teaching on the basis of software development in higher vocational colleges, the article, based on Witkey and current big data technology, proposes a big data-based Witkey practice teaching model, analyzes and builds it from three aspects namely re-creation of teacher-student organization, integration of teaching resources, reconstruction of evaluation systems, and the big data technology is used to analyze and evaluate the teaching effect with suggestions proposed for improvements, it stimulates efficiently the enthusiasm of students to study and improve the quality of professional practice teaching.

Keywords—higher vocational colleges; big data; Witkey; practice teaching mode

I. INTRODUCTION

In recent years, education informatization has been a main focus for the educational reform and development, the *National Outline for Medium and Long-term Education Reform and Development (2010-2020)* (1) points out clearly that the information technology has a revolutionary influence on the educational development and lists the construction of education informatization into one of the top ten projects. During the information-based teaching reform, how to informatize the practice teaching and make it go out of the "ivory tower" of textbooks and connect with actual needs of the society has been plaguing scholars, in 2005, Dr. Liu Feng, from CAS, was the first to propose the concept of Witkey, which brought a new thought for the reform. Karel (2) suggests that the social interaction in online learning has a positive effect on teaching. Gunawardena (3) thinks that the level of interaction achieved by learners through interactive media directly influences the success or not of the online learning. Thus, the Witkey platform can not only socialize the teaching practice, but also increase students' interest in learning and practical ability through the social online interaction of the Witkey. Based on the software development,

the article aims to create a big data-based Witkey practice teaching model through analyzing traditional teaching modes, and the Witkey model is used as a practical teaching platform to carry out the informatization reform on the project teaching, and the big data technology is used to analyze a large amount of unstructured data involved in the teaching and excavate the implicit information value, find invisible demands, and improve the interactive experience of teacher-student online practice teaching from individualized practice strategies, diversified comprehensive evaluation and so on and balance the needs of teachers, students and the society.

II. CONCEPTS OF WITKEY AND BIG DATA

A. Concept and Characteristics of Witkey

Witkey refers to those who change the wisdom, knowledge, ability and experience of their own into actual benefits through Internet. Through the Witkey website, they are paid to provide solutions for problems arising out of science, technology, work, life and learning so as to realize the economic value of knowledge, wisdom, experience and skills. Currently the well-run Witkey websites mainly include Witkey China, Zhubajie (ZBJ) and so on. Refer to "Table I" for details.

TABLE I. FEATURE OF WITKEY

Feature	Description
Paid service	Clients offer certain economic returns according to the complexity of problems, the individual intellectual results are released online through competitive bidding, knowledge sales, etc. which reflect the value changed into wealth, and it is a main operating mode of Witkey websites.
Interactive and low cost	The products for transaction through the Witkey are mostly knowledge and experience, which are invisible, so during the business, it needs no goods sources or logistic systems. Though the marketing costs of the Witkey are lower, yet it can attract more clients to participate.
Easy to access	The Witkey provides a fair, just and open platform, which has no limitations in age, educational background, title, certificate and work experience. As long as you are a netizen, if you can provide solutions for clients, you will be qualified for participation.

B. Concept and Characteristics of Big Data

In May 2011, McKinsey and Company, a world famous consultancy, published a report: *Big Data, The Next Frontier Area for Innovation, Competition and Productivity* (6), which was the first to present the concept of "big data" and pointed out that the data had penetrated into every industry and business field, and become an important production factor gradually; and the use of massive data by the people will herald a new wave of productivity growth and consumer surplus. At present, the big data is not yet defined uniformly, within the book *A Big Data Age*, it is described as follows:(5), it refers to a data process instead of sampling surveys. The big data is a forefront technology for data analysis, which may obtain valuable information quickly out of a variety of data. The "Yuanti Database" released in 2013 is the only big data-based intelligent online education system. Refer to "Table II" for advantages of the big data.

TABLE II. CHARACTERISTICS OF BIG DATA (4)

Features	Description
Mass	Mass data, the TB magnitude has been unable to meet the needs of the data, but extended to PB, ZB and YB.
Diverse	The data structure changes from single to diverse, including semi-structured or unstructured data such as webpages, pictures, audio, video, geographical location, etc.
High speed	The generation speed of data is the same as the fast rhythm of life, so it requires efficient and timely data monitoring and processing.
High value and low density	Continuous monitoring of data flow, achieve a 360-degree monitoring, and mine valuable data information.

C. Relationship between Big Data and Witkey

Big data technology and Witkey platform support each other. The Witkey platform, as an application service agent, provides a large number of real tasks for bidding. The big data, as the data process layer, based on the massive tasks released by customers, will take charge of the data acquisition, collation, conversion and statistics as per the project acceptance, evaluation, user browsing history, successful bids and transaction amount, which reflect information as industrial

development trends, social focus, technical distribution of users, predicted project bidding probability and so on. According to the information, the Witkey platform can adjust contents in time, keep up with the development, recommend flexible technical services to customers and offer users with personalized projects, which enable customers, users and enterprises to acquire useful information within the shortest time and improve work efficiency.

III. LIMITATIONS IN THE COMPUTER PROJECT-BASED TEACHING IN HIGHER VOCATIONAL COLLEGES

At present, many vocational colleges adopt different teaching modes as combining work and study, theory and practice, etc, through working in study and studying in work, the students will be in a professional work environment and feel the work atmosphere. No doubt, the models are at a qualitative leap compared with traditional class teaching, but they also face many problems in practical teaching, mainly including:

Most practice training projects fall behind the rapid development of social skills, in lack of practicality.

Limited by the stepped teaching arrangement, the relationship between projects is loose, in the lack of systematic training and integration, except the technical training and practice, it is difficult for students to obtain comprehensive practices related to skills such as teamwork, communication with customers and the like.

In most colleges, the project-based teaching is executed as follows: Teachers teach and demonstrate the project, students learn and imitate behaviors of teaches, and make minor changes in projects at the request of teachers, in fact, the one-way teaching still fails to get rid of the passive learning fundamentally.

Due to the differences between students, it is difficult to grasp overall the real level and individual needs of students in order to adjust teaching strategies in time, as a result, the teacher-student interaction is always kept in a passive situation.

IV. THE WITKEY PRACTICE TEACHING MODE DRIVEN BY THE BIG DATA

In the current era of knowledge explosion, the ways for students to acquire knowledge is no longer limited to classroom, most network resources are available. The software development specialty is mainly involved in the data as courseware, video, project, question, code, behavior, defect and process (9). The integrated project development under the Witkey practice platform can well achieve the integration of the elements, and the use of big data technology may mine valuable information out of the large number of data related to learning, which can not only provide students with follow-up practice and personalized recommendations, but also offer teachers with students' learning behaviors and effect, help teachers improve teaching methods and guarantee the interaction between teachers and students more scientific and effective. "Fig. 1"

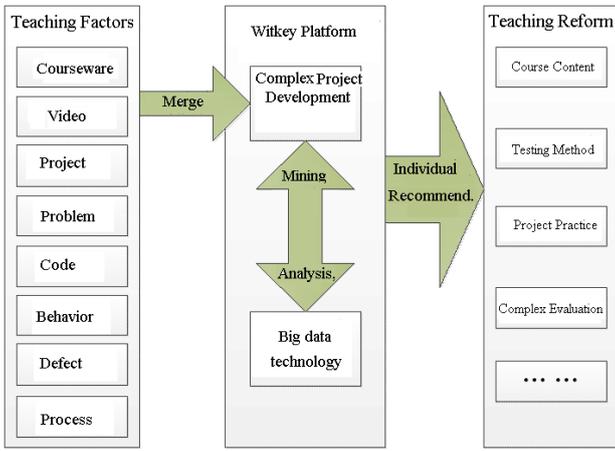


Fig. 1. Witkey practice teaching mode driven by big data

A. Introduce the Witkey-Related Knowledge, Rebuild Teacher-student Relationship, Design A Student-centered Personalized Learning Flow

At the beginning of a new semester, provide students with special lectures, introduce the Witkey-related knowledge, contents and operation, and the process to participate in tasks, and make students understand the significance and value of the Witkey practice training, which, for students facing the Witkey for the first time, is a necessary step.

As shown in “Fig. 2”, during the Witkey practice teaching, according to the project management guide, teachers and students will be organized for a project team, teachers act as project managers, 3-5 students forming a group for project arrangement. Throughout the teaching practice, project managers assign tasks to project groups and members according to the projects and control the whole project progress and monitor the project quality. The project groups and members should complete the tasks of their own according to the division, and complete the whole project development together with other members under the leading of project managers. As a result, the relationship between teachers and students will be changed to "teachers teach, students learn, teachers do and students imitate", the one-way knowledge teaching has been changed to a partnership to achieve a

uniform goal, which reduces the possibility of passive learning of students prone to reverse psychologies, stimulates the senses of responsibilities and collective honors, placing an organizational foundation for the Witkey teaching.

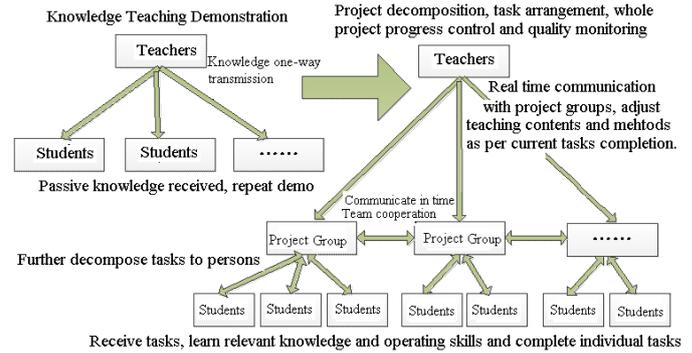


Fig. 2. Teacher-student relationship under the Witkey teaching mode

B. Design A Witkey Platform-based Teaching and Training Program, and Organize to Carry out An Effective Practice Training Teaching

The key point for education is to arouse the power of students and guide them to discover, understand and solve problems, straighten out the solution ideas (7). The teaching content designed shall be based on the cultivation of computational thinking ability, a main line, reflecting the idea of "based on theories, regard skills and promote application", and focus on training students' capabilities to decompose, analyze and handle problems under real data. “Fig. 3” Takes the Database Application Technology course of the software development specialty as an example for the Witkey-based teaching content design, it breaks the previous content arrangement mode "from easy to difficult and stepped", and the whole project is taken as a unit to reorganize the teaching contents. The course contents are divided into knowledge points necessary to complete the project development, which not only reflects the market demand, application value and practical significance, but also make students obtain senses of honors to participate in the process and share the results.

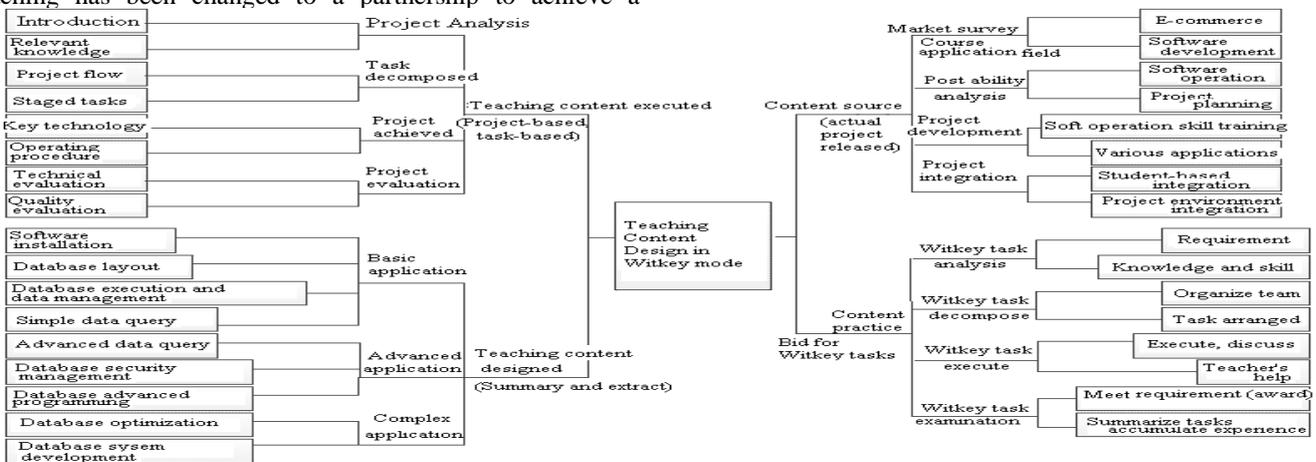


Fig. 3. Teaching contents under the Witkey teaching mode

For the Witkey platform is mainly to undertake projects in operation, therefore, in the Witkey practice teaching mode, the teacher-student interaction mode is shown as follows: students rely on the project groups for internal learning, and teachers, in charge of collaborative teaching, help students confirm the learning direction, contents, and assist them to solve problems arising out of the self study. The teaching process has become a process of project management, including project start, planning, execution, control and conclusion. "Fig. 4"

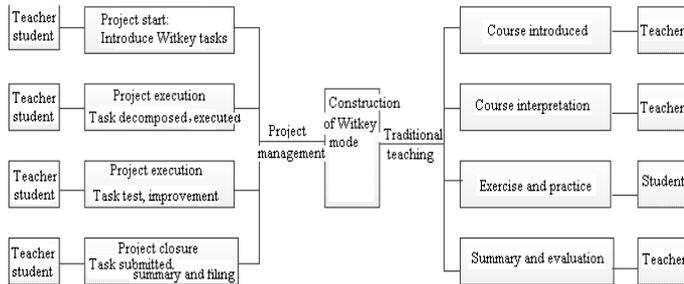


Fig. 4. Bulding the process of Witkey practice teaching mode

C. Improve the Check and Evaluation System

For the Witkey teaching takes projects as carriers for teaching, facing real tasks from the society. So in the check and evaluation system, based on traditional check modes, the enterprises (customers) are introduced for evaluation, the project task is incorporated to the check system. Rely on the industrial acceptance criteria to build a multiple check mechanism characterized of all-member participation and course evaluation from the project completion quality, members' performance, knowledge and skills, customers' satisfaction, and completion of projects as required, mainly including "Table III":

TABLE III. CHECK AND EVALUATION ON THE WITKEY PRACTICE TEACHING CONTENTS

Check Content	Rate	Check Method	Evaluation Subject	Evaluation Indices
Theoretical Knowledge	10%	Written test, interview	Teachers and students	Check scoring
Complex Level	30%	Witkey practice	Teachers, customers and students	Conversion of reward scores by task examiner
Special Skill Application	30%	Practice training	Teachers and enterprises	Works appraisal
Software Applicaition	30%	Computer operation	Teachers	Task appraisal

TABLE IV. CHECK AND EVALUATION ON THE WITKEY PRACTICE PROJECT DEVELOPMENT

Check Content	Rate	Description	Evaluation Subject
Project compleiton as required	10%	Wether the project development flow conforms to the norms and standards for the project development of modern enterprises, whether the compilation of codes and files and filing conform to the enterprise standards during the project development	Teachers and customers
Quality of project completion	20%	Engage in the project development at the request of customers, achieve tasks as required within the given time and realize the function of demand	Teachers and enterprises
Members' performance	30%	Well complete individual tasks, actively learn relevant knowledge; directly face problems arising out of the development; have senses of responsibilities, soundly cooperate with other members of the project groups; abide by project management systems.	Teachers and students
Application of knowledge and skills	30%	Have profound understanding of knowledge, able to integrate theories to practice, solve problems flexibly Able to find an accurate position for the knowledge learned in the whole industrial filed, and understand roles in the actual project development	Teachers and students
Customer's satisfaction	10%	After examination, the project basically meets clients' requirements, comparatively satisfied at the work attitude and professional technique of the project groups during the project development.	Teachers and customers

D. Well Analyze and Evaluate the Teaching Effect and Improve the Teaching Quality

Big data can provide decision-making basis for the optimization and reform of Witkey practice teaching courses. Take the teaching reform of grade 14 software development specialty in 2015-2016 of our university as an example, according to the status quo of the project-based teaching reforms, we provide the platform with students' information, classroom teaching method, contents, student check result, study attitude, number of projects for bidding, number of projects undertaken, project type, number of tasks released, online learning, attendance to classroom and so on. The proportions of major teaching methods are obtained through the data mining, as shown in "Fig. 5".

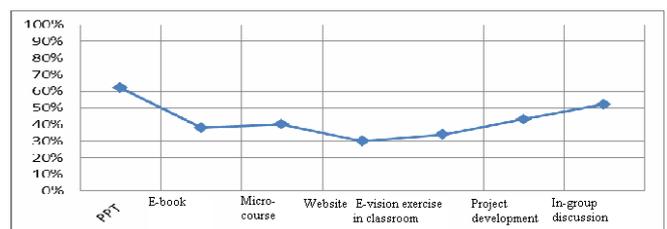


Fig. 5. Proportion of teaching methods in the practice teaching

The analysis through big data shows, PPT teaching plans: 62%, electronic lecture books: 38%, micro-video teaching: 40%, website-based self-learning Q&A: 30%, electronic classroom exercises: 34%, project development practice: 43%, discussion within project groups: 52%. Thus, after one-year practical teaching reform, both the teaching contents and methods are gradually changed to the information technology-based teaching, and the teaching scope gradually goes out of classrooms and accesses to the daily life of students, the project practice is being accepted by students, and the gradually frequent group discussions make it possible for students to share information between them and strengthen the teamwork. However, due to the influence of traditional teaching modes, the PPT teaching still occupies a higher proportion in the class teaching. In the coming teaching reforms, it is suggested to gradually intensify the project development and in-group discussion, and continuously strengthen the project-based practice teaching on the basis of the informationized teaching reforms.

In a word, on the one hand, the big data technology may help teachers make an overall control over the practice teaching effect and problems arising out of the teaching, improve teaching strategies, modify the practice training outlines and make the practice teaching much reasonable; on the other hand, students may understand the strength and deficiency of their own clearly and impersonally and take special measures for self improvement.

V. CONCLUSION

There are more and more problems found in traditional computer teaching modes, and the emergence of Witkey platform and big data technology provide new methods for the project-based teaching reform. The reform of Witkey model for practice teaching may provide teachers and students with more chances to access to real projects of enterprises and intensify the capabilities of actual operation. The social participation in the evaluation provides school teaching with timely industrial evaluation direction and promotes the industry-school connection. In addition, the big data technology forms a data management system integrating screening, integrating, analyzing and mining, which provides the development trend of education and the real-time change of hot issues in time. Relying on tracking a lot of unstructured data and mining related knowledge, it may provide personalized and accurate services for the needs of different students to enhance the interactive and real-time teaching, and drive the data-based online practice teaching. However, the practice teaching reform can not be done overnight, and it needs gradual development and improvement, correspondingly we need to keep up with the big data technology and the Witkey model, introduce advanced thinking, methods and theories, and achieve the sound development through constant attempts, and foster the students of software development specialty in capabilities of practice and innovation

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