

Research on learners' learning behavior and learning effect under online learning platform——Taking Python Programming in Higher Vocational Colleges as an example

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Abstract: Python programming course is mainly to learn the relevant knowledge of Python programming, so as to cultivate students' ability to analyze and solve problems using programming thinking. However, higher vocational students come from different regions, and there are certain differences in learning starting points and learning styles. Therefore, hybrid teaching is adopted. However, its online platform is currently only used to store teaching resources, submit assignments, manage grades, etc., and does not effectively use the data generated in the learning process. Based on this, with the help of superstar teaching platform, This paper effectively analyzes the data generated by online learning, constructs an online learning behavior analysis framework, and explores the relationship between learners' learning behavior and learning effect. It concludes that the number of questions completed by the online judgment system is highly correlated with learning effect, video progress, test scores, homework scores are moderately correlated with learning effect, and the number of logins, online material reading progress, homework completion times The number of forum interactions is low related to the learning effect. Finally, some suggestions and measures are put forward, such as enriching video resources, improving the online judgment system, and carefully designing assignments and tests.

Key words: blended teaching; Analysis of learning behavior; Online learning

1. Introduction

Python programming is a professional compulsory course for computer majors in higher vocational colleges, which mainly cultivates students' basic ability of Python Programming and the ability to analyze and solve problems using programming thinking. However, the students of higher vocational colleges come from different regions and provinces, and their programming foundation is very different. There are also differences in learning style and learning ability. Therefore, it is imperative to use blended teaching to solve the problem of differentiation in teaching.

Blended teaching can meet the reform of teaching and learning, conform to the learning habits and living habits of the new generation of students, and make good use of existing mobile devices for autonomous learning and personalized learning. With the wide application of blended teaching mode and the deep integration of educational technology and teaching links, more and more learning related data have been generated in the teaching process, which can provide good value for subsequent courses and help teachers understand students. However, at present, most online platforms are only used to store teaching resources, submit assignments, manage scores and other basic teaching management functions, and do not effectively use the relevant data generated in the learning process to analyze the existing learning behavior characteristics of learners, which leads to the independent online and offline behaviors of Hybrid Teaching and the low switching rate between behaviors. Therefore, exploring the learning behavior mode of learners under the online learning platform has important research value, which can provide relevant information for teachers, and then design the offline classroom teaching content and teaching methods, as well as the presentation of online learning resources. Based on this, with the help of superstar teaching platform, we can carry out effective statistics and analysis of a large number of data generated by online learning, build an online learning behavior analysis framework, and explore the relationship between learners' learning behavior and learning effect, so as to take relevant measures to improve students' learning effect.

2. Designing an analytical framework for learning behavior

1. platform introduction

Xuelitong is a free app integrating mobile teaching, mobile learning, mobile reading and mobile social networking. It can record learners' task completion, video and audio viewing, check-in, voting, selection, answering, theme discussion, in class practice, questionnaire, grouping tasks and other data, providing a data base for subsequent online behavior models.

2. online behavior related models

Guxiaoqing et al. mainly selected the learning behavior indicators when building the prediction model of online learning platform: landing frequency, resource access frequency, task completion frequency, number of new posts, number of reply posts, number of course forum discussions, number of reading posts, viewing resource records, frequency of application search function, and number of emails sent.

Zhaohuiqiong et al. collected the learning behaviors of 21 learners on Moodle platform. Through research, it was found that the behavior indicators that affect learners' learning effect mainly include: the number of posts in the total forum, the number of online tests, peer evaluation, self-evaluation, task submission, and the number of times of browsing teaching resources.

Pengwenhui proposed the oocp model of learning behavior, which divides learning behavior into four levels: operational behavior level, cognitive behavior level, executive behavior level, and problem solving behavior level, such as reading, memory, discussion, and design.

3. online learning behavior indicators

According to the output storage function of superstar learning platform and the existing online learning behavior indicators, the factors affecting learning behavior are determined, and the online learning behavior indicators suitable for Python programming are constructed, as shown in Table 1. It is mainly divided into five modules: course access, content learning, test statistics, interaction, and online judgment system. Because programming requires students to do more questions, an online evaluation system is added to help students master the idea of programming, and help students master programming knowledge from multiple dimensions.

Table 1 online learning behavior indicators

index	behavior
Course visit	Login times
Content learning	Video completion progress and online reading progress
Test statistics	Test scores, number of assignments completed, and assignment scores
interactive	Number of speeches
Online question judgment system	Number of questions completed by online question judgment system

4. online learning behavior analysis framework

According to the determined online learning behavior indicators, with the help of the existing analysis functions of superstar platform and python tools, we can analyze these indicators, build a learning analysis framework (Figure 1), and explore the correlation between each indicator and learning effect.

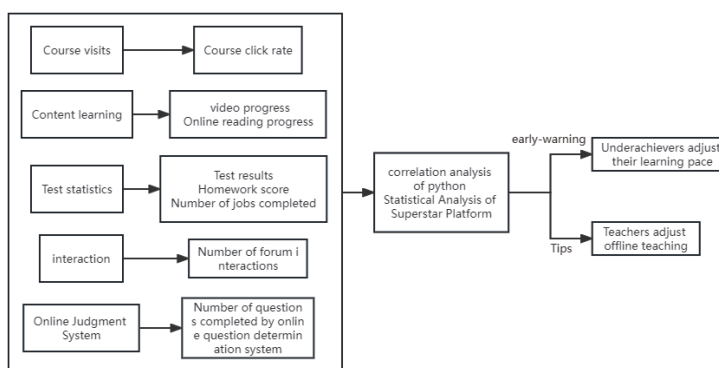


Figure 1 learning analysis framework

3. Explore the correlation between online learning behavior and learning effect

This study selects the python programming course of Freshmen in a higher vocational college, and establishes the course on the superstar learning platform. Before class, emphasize the learning rules and assessment mechanism with students. The relationship between the independent variable and the dependent variable is explored by coding each learning behavior as the independent variable and taking the mid-term examination score as the dependent variable.

Table 2 code of learning behavior

independent variable	Login times	Video progress	Online reading progress	Test results	Homework performance	Job completion times	Number of forum interactions	Number of questions completed by online question judgment system
Argument name	X1	X2	X3	X4	X5	X6	X7	X8

All kinds of behavior data are exported from superstar learning platform and imported into Python for correlation analysis. The results are shown in Table 4.

Table 3 Correlation analysis results

	X1	X2	X3	X4	X5	X6	X7	X8
Y	0.283801	0.400815	0.296988	0.674932	0.437501	0.215444	0.036702	0.701346

The correlation coefficient greater than 0 and less than 0.3 is low correlation, greater than or equal to 0.3 and less than 0.8 is moderate correlation, and greater than or equal to 0.8 and less than or equal to 1 is high correlation. It can be seen from table 3 that the number of questions completed by the online question judgment system is highly correlated with the midterm score, video progress, test scores, homework scores are moderately correlated with the midterm score, and the number of logins, online material reading progress, homework completion times, and forum interaction times are low correlated with the midterm score.

4. Research conclusions and suggestions

1. enrich teaching resources and increase video proportion

Students in Higher Vocational Colleges lack the initiative to read electronic materials independently. According to the results of correlation analysis, videos, i.e. micro lessons, have a greater impact on students' learning effect, and those who do not can watch them

repeatedly until they learn. At the same time, when recording the video, it should be more interesting and practical. In the video, interactive questions should be added so that students can concentrate and watch carefully.

2. combine learning and practice to enrich the question bank of the online judgment system

The online judgment system is to set various test points according to the problem setting in advance, and learners can verify the correctness of the code in time through the Python code submitted. Because the test data are diversified, many factors need to be considered in the process of question making, such as extreme values, special situations, etc. According to the results of correlation analysis, it is highly correlated with learning effect. Therefore, the question bank should be enriched in the future, so that learners can exercise their ability to analyze and solve problems by practicing questions.

3. carefully design assignments and tests

Homework and tests are one of the ways to test students' learning achievements. Good homework and tests can help consolidate students' classroom knowledge and improve students' skills. From a practical point of view, we can design life-related cases, such as "elevator overweight", "car overspeed", etc.

4. carry out personalized counseling according to learning data

According to the data analysis, all kinds of data have more or less an impact on students' learning effect. Teachers can effectively use these data to provide personalized guidance for students. At the same time, you can also send early warning forms regularly, so that students can have a sense of crisis and work harder in the follow-up study.

5. Concluding remarks

In the 21st century, blended teaching has become one of the most commonly used teaching modes in schools at all levels. The effective use of the relationship between data and learning effect helps teachers adjust classroom content in time and grasp the important and difficult points; It helps students understand their current learning situation. However, due to the limited data collected in the course, the research has certain limitations. In the future, the sample will be increased to timely understand the current learning situation of students, so as to achieve better results.

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