Construction of Online Assessment System for the Effectiveness of Curriculum Ideological and Political Construction of Vocational Colleges Based on Kirkpatrick Four-Level Evaluation Model

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Abstract. This paper takes the evaluation of curriculum ideological and political construction in vocational colleges as the research object, and innovatively introduces Kirkpatrick four-level evaluation model into the effectiveness evaluation of curriculum ideological and political construction by virtue of the application advantages of network information technology, computer application technology and data analysis and statistics technology. In Python environment, the author combined with Django framework to complete the online evaluation system of curriculum ideological and political education based on Web. The overall design of the system chooses B/S architecture, which can support users of various roles to complete the selection of indicators, data collection and statistical operation of curriculum ideological and political teaching evaluation with concise and efficient interactive operation. At the same time, the system will also use the data analysis and processing class libraries such as Pandas, Numpy and Scipy to test the final evaluation results. According to the final results of the T-test algorithm, the system will analyze and compare the indicators of the effectiveness of curriculum ideological and political construction in higher vocational colleges and get the final evaluation results.

Keywords: Kirkpatrick evaluation model · Vocational colleges · Effectiveness of curriculum ideological and political construction · Python · computer application

1 Introduction

With the release of China's "14th Five-Year Plan" and the outline of the long-term goal in 2035, building a high-quality education system in an all-round way has become the starting point and focus of further deepening the reform and innovative development of China's higher education [1].

With the continuous deepening of the high-quality education system, vocational colleges should actively practice the working concept of "three-round education", effectively promote the all-round development of curriculum ideological and political construction, deepen the reform of curriculum ideological and political education, and

enhance the effectiveness of curriculum ideological and political education [2]. However, in the process of curriculum ideological and political construction, many vocational colleges are limited by their own teaching mode and organizational system, and often only complete the teaching of curriculum ideological and political work unilaterally, ignoring the importance and necessity of evaluation of curriculum ideological and political teaching. This leads to the problems of difficult implementation of ideological and political evaluation of courses, non-universal evaluation criteria, single evaluation subject and one-sided evaluation results [3]. In view of this, this paper believes that vocational colleges should adhere to the correct theoretical system of curriculum ideological and political construction, adhere to innovation-driven, give full play to the application advantages of network information technology, computer application technology and data analysis and statistics technology, and build a Web-based online assessment and evaluation system of curriculum ideological and political in vocational colleges. The system will take Kirkpatrick's four-level evaluation model as the core, and design an evaluation system for the effectiveness of curriculum ideological and political construction, which is convenient for students, teachers, leaders and other users with different roles to evaluate the whole process of curriculum ideological and political education and teaching [4]. By comparing the evaluation results of curriculum ideological and political education in different stages, the actual value of curriculum ideological and political construction in vocational colleges can be determined.

2 Development Process

First, CentOS7.7 is selected as the underlying operating system, and Visual Studio 2019 is selected as the compiling tool. Pyton 3.10.6 is selected as the development environment, and Anaconda integrated distribution can be selected for installation and deployment to shorten the time [5]. Secondly, the system needs to add a data input function module in the front-end interactive page to ensure the collection of user data. Under Layoutit, the Bootstrap framework is used to complete the input tag to obtain the value, and then it is inserted into Mysql database. The function implementation code is shown in Fig. 1 [6]. After the data collection is completed, the system will automatically perform statistical operations on various indicators under the Kirkpatrick four-level evaluation model, and call the T-test algorithm to compare and analyze the operation results, and get the final evaluation results.

Finally, the Django framework is selected for the system Web Server. Nginx server is selected as the Web server, and the database version is MySQL5.7. After creating the Django project in PyCharm, import the Bootstrap framework and other contents into the corresponding directory, configure the corresponding ports, and publish them on the server side [7]. Through the introduction of the above key technical theories, the overall environment of system development, the running process of related software and tools are determined, and the technical feasibility of the overall project of the online assessment and evaluation system for curriculum ideological and political in vocational colleges is also clarified.

```
<!-- botstrap-tags css and js -->
<link rel="stylesheet" href="bootstrap-tags/css/bootstrap-tagsinput.css" type="text/css">
<script src="bootstrap-tags/js/bootstrap-tagsinput.js"></script>
<form action="" method="post">
<div class="form-group">
<label>Tags</label>
<input type="text" name="tags" data-role="tagsinput" value="sport, politics, business">
<div class="form-group">
<input type="submit" value="add tags">
```

Fig. 1. Bootstrap framework completes user input data acquisition function code

3 Detailed Function Implementation

3.1 Home Page

The system has a unified initial login interface. When the user finishes logging in, the system will automatically jump to the homepage interface. Under the homepage interface, users will improve their personal information and enter the curriculum ideological and political teaching evaluation module according to the operation guide.

3.2 Teaching Evaluation

Under this function module, the system will design the evaluation system of curriculum ideological and political teaching in vocational colleges according to Kirkpatrick four-level evaluation model. The overall evaluation system consists of four parts: reaction layer, learning layer, behavior layer and result layer, and each part has corresponding evaluation content, evaluation subject, evaluation index and evaluation marking point [8]. Maintain an independent and progressive logical relationship between all levels, which makes the overall evaluation of curriculum ideological and political teaching in vocational colleges in a dynamic process, as shown in Table 1, which is the Kirkpatrick four-level evaluation index of curriculum ideological and political teaching in some courses.

Different users complete index scoring at different levels according to different system permissions. According to the setting of evaluation marks, the Likert scale is used to answer, that is, five options, excellent, good, average, poor and very poor, are used as the basis, and scores of 5, 4, 3, 2 and 1 are given respectively, which provides convenience for subsequent calculation and inspection [9]. In addition, some auxiliary data are needed for the evaluation marking points of the result layer, so there is no need to set the evaluation subject.

3.3 Results Output

After users with different roles complete the evaluation of curriculum ideological and political teaching, the system will preprocess the collected original data, remove some invalid data, and make descriptive analysis of the data by using the mean value and poor

Table 1. Phased comparison results

Hierarchy	2022.1 ~ 20226	2022.6 ~ 2022.12	T value	P value
Reaction layer	69.41 ± 2.51	74.12 ± 3.18	12.51	0.000
Learning layer	64.31 ± 1.97	65.72 ± 1.73	0.078	0.938
Result layer	21.69 ± 0.81	25.84 ± 0.93	24.42	0.000

labeling. At the same time, the system will also call T-test to make a phased comparative analysis of the four-level evaluation indicators of Kirkpatrick's curriculum ideological and political teaching, and form the evaluation results of curriculum ideological and political construction in vocational colleges. Table 2 shows the results of stage comparison. As shown in formula 1, it is the formula for calculating t value, where $\bar{x}$ is the sample mean, μ is the population mean, S is the standard deviation, and n is the sample size. Where the T value is whether the average difference between the two stages is significant, so as to prove whether the two groups of data come from the same group. P value is a test statistic, and the smaller it is, the more the authenticity of the mean value can be guaranteed [10].

$$T = \frac{\overline{X} - \mu}{S/\sqrt{n}} \sim T(n-1) \tag{1}$$

4 Conclusion

In order to build an evaluation system for the effectiveness of curriculum ideological and political construction in vocational colleges, this paper comprehensively uses the functional advantages of network information technology, computer application technology and data analysis and statistics technology, and builds a web-based online evaluation system for curriculum ideological and political construction with Kirkpatrick four-level evaluation model as the core. The system reshapes the implementation process of curriculum ideological and political teaching evaluation with convenient and efficient visual interactive operation, which promotes the reform of curriculum ideological and political teaching evaluation mode and makes a beneficial attempt for the networking, informationization and intelligent construction of higher education.

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