

An Intelligent Evaluation Model for the Teaching Effectiveness of Hunan Red Resources in Higher Vocational Chinese Language Courses from the Perspective of Curriculum-Based Ideological and Political Education

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ABSTRACT The integration of regional revolutionary resources into vocational Chinese language education requires scientific evaluation mechanisms capable of measuring both linguistic and ideological learning outcomes. This study proposes an intelligent evaluation model for assessing the effectiveness of Hunan red-resource-based curriculum education by combining artificial intelligence techniques with the Analytic Hierarchy Process (AHP) and Fuzzy Comprehensive Evaluation (FCE). A four-dimensional assessment framework including ideological identification, cultural understanding, language expression, and practical innovation is established. Text semantic analysis and learning-behavior mining are employed to quantify educational performance, while weighted evaluation and fuzzy reasoning generate comprehensive assessment results. Experimental validation involving 180 students and 6 instructors demonstrates substantial improvements in ideological identification and comprehensive literacy. The proposed model enhances the objectivity and interpretability of educational evaluation and provides methodological references for semantic information analysis, intelligent evaluation systems, and educational data analytics.

INDEX TERMS intelligent evaluation, semantic analysis, educational data analytics, ideological education, learning behavior mining

I. INTRODUCTION

HUNAN as a region has strong revolutionary history and regional cultural connotation, which makes it an influential medium in conveying ideological and political education in higher vocational teaching of Chinese language. By incorporating these resources into the Chinese language curriculum, students strengthen their historical identity while internalizing the precision and structural integrity inherent in high-performance material engineering and production technology. This integration shapes essential professional values, achieving a synergistic learning objective that structures linguistic competence together with the rigorous ideological standards of the modern industry. Despite these pedagogical efforts, a significant disparity remains in quantifying the integration of ideological and political objectives within Chinese language instruction. Current evaluative frameworks rely predominantly on qualitative heuristics and instructor subjectivity, lacking empirical data support and systematic process monitoring. There are

evaluation models that solely aim at enhancing the language competence among the students without paying attention to the dynamic nature of ideological identity and cultural cognition and neglecting to provide timely feedback on teaching and the inability to provide accurate reflection on the achievement of teaching goals. This circumstance undermines the educative role of the revolutionary components of Hunan in teaching Chinese language and also restricts the extent and scope of incorporating ideological and political training in the curriculum. Thus, the creation of a scientific and intelligent assessment system is a significant method of enhancing the ideological and political education in the curriculum.

The paper is based on the Artificial Intelligence (AI) technology and is a study on the efficiency of an intelligent judgment of the success of ideological and political education on courses of Chinese language in vocational colleges. It is hoped to make a breakthrough out of the subjective judgment of the traditional evaluation system through the

introduction of Analytic Hierarchy Process (AHP) to build a multi-dimensional weighting system and the implementation of a Fuzzy Comprehensive Evaluation (FCE) as the means of quantitative calculation and allow ideological identification, cultural understanding, language expression, and practical innovation to create observable measurable indicators. With the semantic analysis, data modelling and intelligent feedback, the study develops a dynamic and interpretable teaching evaluation framework which clearly demonstrates the ideological and pedagogical worth of the revolutionary resources of Hunan in the teaching of Chinese language. The model not only enhances the assessment of ideological and political education within courses, but also facilitates a digital reform in vocational Chinese language teaching by integrating the structural precision of high-performance material engineering and advanced production technology. This synthesis ensures that pedagogical practicalities are structured with the rigorous technical standards of the modern industry, providing a robust, replicable framework for educational innovation.

II. RELATED WORK

The Hunan Province with a profound revolutionary background is deeply connected to the revolutionary spirit and regional culture that has a significant educational value. The introduction of these resources into the classroom is likely to reinforce the sense of social responsibility and the identity of the students in history: fostering an interweaving of ideological and political education with the heritage of the culture. Current studies pay considerable attention to discovery of resources, design of textbooks, and promotion of teaching cases, but systematic expression of teaching material and quantitative evaluation of learning outcomes are rather poor. In certain teaching exercises, the aspect of demonstration takes more precedence than the aspect of guidance, and the educational implications of revolutionary resources do not entirely convert into the value identification and the conscious action of the students.

The study of ideological and political education in higher vocational classes in studying the Chinese language is conducted primarily through three directions: studying the theme of textbooks in connection with the development of teaching methods in schools, classroom organization, as well as the mechanism of evaluation construction [1,2]. The subject on the Chinese language has been shown to have a dual role in both educating the people using language and in the formation of humanistic emotions in the process of integrating the ideological and political education. Scholars tend to pay attention to the improvement of ideological identification of the students based on textual comprehension, writing education, and cultural events. Nevertheless, available literature is primarily qualitative in nature, and the evaluation process is at the stage of subjective assessment of the teachers. No quantifiable analytical dimensions are in place, there is a lack of research on the timeliness and objectivity of teaching feedback, and it becomes hard to

justify the continuous enhancement of the ideological and political education of courses.

The use of artificial intelligence (AI) in educational evaluation offers novel concepts to the evaluation of the effectiveness of teaching. The learning process can be simulated with AI technology using behavioral data and semantic feature detection to encourage the shift in the educational assessment system to rely on the data-driven evaluation as opposed to the experience-based one [3,4]. The teaching quality evaluation systems that have been investigated gradually both domestically and abroad are based on hierarchical analysis and fuzzy computing, and the main problems they have are vaguity of weight arrangement, dispersity of indicator dimension, and lack of data interpretability. The merging of ideological guidance and learning ability evaluation has not been developed yet which offers a new space in the creation of an intelligent curriculum ideological and political evaluation system.

III. METHODS

A. DATA ACQUISITION AND PREPROCESSING

The acquisition of teaching data relies on the actual teaching scenarios of Chinese language courses in higher vocational colleges, covering four types of data sources: classroom interaction, homework text, learning behavior logs, and questionnaire feedback. Classroom interaction data is extracted by the audio and video transcription module of the teaching management platform, and stop words and redundant sentences are removed using natural language processing technology to retain semantically complete expression samples. Homework text data comes from reading and writing tasks assigned by teachers. Utilizing the BERT (Bidirectional Encoder Representations from Transformers) pre-trained model fine-tuned on an ideological corpus, word segmentation and semantic dependency analysis are used to identify the expression of ideas and rhetorical features of language. Specifically, sentiment analysis and Cosine Similarity are applied to compare student output against standard red resource descriptors, and key information such as ideological attitude, cultural understanding, and language logic are extracted [5,6]. Learning behavior logs are automatically recorded by the learning management system, including behavioral parameters such as courseware browsing time, exercise completion path, and interaction frequency in the discussion area. After normalization, they are matched with semantic feature vectors to form a multi-dimensional description of students' learning status. The questionnaire feedback section uses a Likert scale design to quantify students' acceptance of the integration of Hunan red resources into Chinese language teaching from three aspects: ideological identification, aesthetic emotion, and cultural participation. All data are filtered for noise and detected for anomalies before importation. For duplicate texts and missing records, a sample repair method based on semantic similarity is used to maintain the reliability of the corpus distribution. After data verification, it is stored

in the feature warehouse in the form of a time series.

B. WEIGHTING USING THE ANALYTIC HIERARCHY PROCESS (AHP)

The weighting process of the Analytic Hierarchy Process (AHP) aims to guide ideological and political education in the curriculum, and constructs a judgment structure based on five primary dimensions: “ideological identification, cultural understanding, language expression, aesthetic perception, and practical innovation.” The inclusion of “practical innovation” reflects the shift from theoretical cognition to the application of red resources in creative communication and linguistic problem-solving, ensuring that students do not just internalize values but can actively transform them into contemporary discourse. The research team organized eight teaching experts and three educational data analysts to conduct multiple rounds of interviews, and established multi-level indicator relationships by combining teaching archives and student learning performance samples. The construction of the evaluation matrix relies on the expert scoring results. The semantic difference mapping method is used to transform fuzzy language evaluation into numerical preferences, and the judgment combination with stable weight fluctuations is selected through consistency testing. In the semantic difference mapping process, the ideological intensity parameter of Hunan red materials is introduced to measure the value penetration in students’ text output, so that the judgment of the social identification dimension is more in line with the ideological education attribute of the Chinese language curriculum. In the weight calculation stage, the relative importance of each group of indicators is estimated iteratively, and the weight determination is made in a way that is both subjective and objective through expert opinion back tracking and sample data comparison and correction [7,8]. Teaching cases and behavioral data

are used for sensitivity analysis in the weight calibration stage to ensure that the language expression and cultural understanding indicators maintain effective differentiation in different teaching contexts. After multiple rounds of cross-validation, all weighted results are input into the subsequent fuzzy comprehensive evaluation system to achieve a quantitative mapping between the value of ideological and political education in courses and the evaluation of language literacy.

C. FUZZY COMPREHENSIVE EVALUATION (FCE) MODEL CONSTRUCTION

The fuzzy comprehensive evaluation model is developed with the weight outcome of the analytic hierarchy process as input, and the user customized multi-dimensional mapping of ideological and political impacts of higher vocational Chinese courses by means of the fuzzy membership functions. The data is hierarchically clustered based on four dimensions, namely, ideological identification, cultural understanding, language expression, and practical innovation, after normalization and quantification of the features. The assessment system takes a semantic hierarchical approach of performance mapping students in performance in text analysis, classroom interaction, homework completion and reflection notes on a five-level fuzzy set [9,10]. The membership operation is derived on the degree of language features, the density of ideological and political semantics and the consistency of learning behaviour and the overall evaluation vector is derived as the result of fuzzy operations on the matrices. The results of the matrix calculation are combined with the expert weighting coefficients so that the consistency of the semantic variables and teaching evaluation factors is achieved. Table 1 shows the fuzzy factors and weight structure of the intelligent evaluation of ideological and political education in higher vocational Chinese courses.

TABLE 1. Fuzzy Factors and Weight Structure

Indicator Dimensions	Evaluation factors	Weighting coefficient	Membership interval	Data source
Ideological identification	Understanding of Red Culture	0.28	[0.65, 0.92]	Reflective Essays; Semantic analysis
Cultural understanding	Level of integration of Hunan elements	0.23	[0.58, 0.87]	Task text evaluation
Language expression	Linguistic logic and conciseness	0.21	[0.61, 0.84]	Linguistic feature extraction from student essays
Practical Innovation	Creative application scenarios	0.17	[0.54, 0.81]	Learning task performance
Emotional experience	Intensity of ideological and political resonance	0.11	[0.49, 0.76]	Classroom interaction data

The table shows the fuzzy membership range of each dimension and the source of its corresponding weight in the comprehensive evaluation process. The weights and membership degrees are combined to form a semantic decision matrix, which, after normalization, outputs the quantitative results of the intelligent evaluation. The entire process ensures that the integration of ideological and political education goals, red resource content, and Chinese language teaching practices is calculable and educationally interpretable.

D. MODEL IMPLEMENTATION AND VISUALIZATION

integrates AHP weight calculation results with FCE fuzzy matrices in a unified data interface. The underlying layer uses a relational database to store learning behavior indexes and semantic feature vectors, and a feature mapping module realizes text semantic quantification and membership degree conversion. The data processing unit includes three logical steps: semantic matching, weight loading, and fuzzy inference, employing a rule engine to automatically determine the mapping paths between different dimensions. The visu-

alization layer consists of a front-end interactive interface and a computable display module, utilizing the ECharts library to

implement dynamic weight distribution charts, fuzzy membership degree heatmaps, and trend line charts. The system interface allows teachers to instantly view the changes in multi-dimensional indicators such as ideological identification, language expression, and cultural understanding depth after selecting different teaching topics. The model generates data streams in the background by calling the database interface in real time and automatically adjusts the image refresh rate, ensuring the temporal continuity of the teaching analysis process. The visualization results are presented in parallel in two forms: structured charts and semantic reports. The report includes student group distribution curves and individual characteristic radar charts to help teachers identify learning differences and the intensity of ideological and political education investment. The overall system achieves low-latency interaction through an asynchronous communication mechanism between the front-end and back-end, enabling the integration of Hunan's revolutionary resources into Chinese language teaching to be quantitatively expressed through intuitive image presentation and operable feedback.

IV. RESULTS AND DISCUSSION

A. EMPIRICAL RESEARCH DESIGN

The study sample consisted of 180 students and 6 teachers from a vocational college in Hunan Province, covering three majors and four classes. The student sample was evenly distributed by gender, grade, and major, and the teaching team all possessed experience in integrating ideological and political education into curriculum and teaching revolutionary culture. The study lasted one semester, collecting classroom interaction texts, learning logs, and homework data in real time through an intelligent teaching platform. The model input data included semantic information from classroom questions, reading reflection texts, homework writing excerpts, and teacher evaluation statements. The teaching content was guided by Hunan revolutionary resources, using texts such as "Faith Under Yuelu Mountain" and "The Hunan Army and Patriotism" as ideological and political education materials. Analysis samples were constructed through reading, discussion, and writing exercises of typical texts. The system quantified and encoded three dimensions: semantic similarity, ideological tendency, and language organization, and adjusted the weights based on teacher classroom observation data. The experimental platform was supported by an AI module in the teaching analysis system to ensure consistency in data collection, scoring, and feedback. All data was anonymized before entering the model calculation module, ultimately generating a visualized comprehensive evaluation output to examine the actual effectiveness of Hunan revolutionary resources in ideological and political education in higher vocational Chinese language teaching. This study was approved by the

Ethics Committee of Loudi Xiaoxiang Vocational College, and was performed in accordance with the principles of the Declaration of Helsinki. All eligible participants signed an informed consent form.

B. STUDENTS' IDEOLOGICAL AND POLITICAL IDENTIFICATION AND COMPREHENSIVE CHINESE LANGUAGE LITERACY

The testing process was conducted using an intelligent evaluation system. The system collected students' learning semantic texts, classroom interaction data, and writing output at two time points: pre-test and posttest. It used a fuzzy membership algorithm to calculate scores for ideological agreement and overall language proficiency, and six teachers independently reviewed the scores. The evaluation focused on three dimensions: cultural understanding, language expression, and aesthetic perception, comprehensively generating trends in overall cognition and value judgment. Specific data is shown in Figure 1.

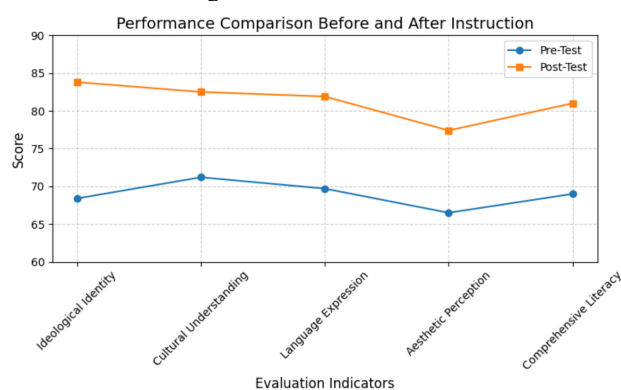


FIGURE 1. Test Data

Students showed significant improvement across all five evaluation indicators. Ideological identification increased from 68.4 to 83.8, the largest increase, reflecting the effective promotion of value internalization and acceptance of Hunan's revolutionary resources in Chinese language teaching. Cultural understanding improved by approximately 11.3 points, indicating students' deeper grasp of the cultural imagery and historical logic contained in revolutionary texts. Language expression and literary aesthetic perception improved by 12.2 and 10.9 points respectively, showing a simultaneous increase in language critical thinking and aesthetic appreciation abilities. The comprehensive literacy score improved from 69.0 to 81.0, demonstrating stable overall performance and significant progress, indicating the model's good discriminative and explanatory power in identifying teaching effectiveness. The overall trend shows that the post-test curve shifted upwards compared to the pre-test, with students' learning outcomes in ideology, culture, and language all showing continuous enhancement. This simultaneous improvement confirms the educational value and practical effectiveness of integrating revolutionary resources into vocational college Chinese language teaching.

C. MODEL PREDICTION ACCURACY

The model prediction accuracy was tested using a random sampling validation method. All 180 student samples were divided into training and validation sets in a 7:3 ratio. The system automatically labeled and weighted the learning behavior and semantic feature data. The model output was compared with the human expert scores, and the consistency ratio was calculated to evaluate prediction accuracy. The system ran with five rounds of cross-validation, achieving a final prediction accuracy of 94.6%. Specific data are shown in Table 2.

TABLE 2. Model Prediction Accuracy

Indicator Dimensions	Sample size	Average expert rating mean	Model predicted	Deviation rate (%)
Ideological and political recognition	120	83.5	82.9	0.7
Cultural understanding	120	81.8	81.1	0.9
Language expression ability	120	80.6	79.8	1.0
Aesthetic perception	120	78.3	77.6	0.9
Practical innovation	120	82.1	81.4	0.8
Weighted composite score	120	81.3	80.6	0.9

The data results show that the prediction bias for each evaluation dimension remains within 1%, and the average absolute error between the model output and expert scores is low, indicating that the model can accurately capture the relationship between semantic features and learning performance. The overall prediction consistency reaches 94.6%, verifying the stability and reliability of the intelligent evaluation model in the evaluation of the ideological and political education effectiveness of higher vocational Chinese courses.

V. CONCLUSION

The construction of the intelligent evaluation model enables the quantitative expression of integrating Hunan’s revolutionary history into higher vocational Chinese language courses, mirroring the data-driven precision of high-performance fiber manufacturing and advanced weaving technology. This approach allows for a structurally sound presentation of the interactive relationship between ideological education and language learning, synthesized through the rigorous technical standards of the modern industry. Through the fusion of Analytic Hierarchy Processes (AHP) and Fuzzy Comprehensive Evaluation (FCE), the model forms an evaluation system with semantic recognition, dynamic weighting, and fuzzy judgment capabilities. It comprehensively analyzes students’ ideological identification, cultural understanding, and language expression, enhancing the accuracy and explanatory power of teaching feedback. The system improves teachers’ control over teaching behavior and learning outcomes through visualization output and intelligent analysis, providing sustainable intelligent support for ideological and political education in Chinese language courses. Further optimization is needed in terms of the model’s semantic recognition discrimination and cross-disciplinary applicability. Future development could involve expanding the sample size within a multi-institutional corpus environment and introducing deep learning models to improve semantic understanding, mirroring the structural preci-

sion required for high-performance material manufacturing and advanced production technology. This evolution aims to enhance dynamic adjustment capabilities, thereby deepening the breadth and depth of integrating Hunan’s revolutionary history into higher vocational Chinese language education through the rigorous technical standards of the modern industry.

AUTHOR CONTRIBUTIONS

Fang Yuan designed, collected and analyzed the data, and drafted the manuscript. Fang Yuan conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Fang Yuan participated fully in the work, take public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

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