

Article

# Exploration of Data Visualization and Analysis Methods for Integrating Curriculum Civics Education into the Teaching of English Reading Major

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**Abstract:** Driven by the digital transformation of education, the effective integration of ideological and political education elements with professional course teaching has become a key issue to be solved in the reform of higher education. To this end, this paper designs a set of evaluation system for the effect of curriculum ideological and political education based on data visualization analysis, and quantitatively analyzes the implementation effect of university curriculum ideological and political education in English reading teaching through the weighted TF-IDF algorithm and visualization technology. The results show that the Civic-Government education model improves students' reading comprehension by 11.1% on average, while cultural identity and critical thinking skills are improved by 35.3% and 34.4% respectively, and the weighted TF-IDF algorithm achieves a level of 90.88% in terms of text categorization accuracy. The data visualization technology shows significant application effect in the evaluation of curriculum Civic Education, which has important theoretical value and practical significance.

**Keywords:** curriculum civics; data visualization; TF-IDF algorithm; English reading teaching; educational assessment

## 1. Introduction

With the arrival of the era of big data, the influence of foreign cultures on China's young generation has obviously intensified, and there are many bad ideas and cultures [1]. In order to cope with such a situation, universities must actively take countermeasures, must be in the English classroom, which is the most easy to contact with foreign cultures into the ideological and political education, not only to focus on students in the learning of English knowledge, but also pay attention to the education of students' ideological and moral character, so that the English learning and the ideological and political education complement each other so as to promote the all-round development of the students [2-4]. At the same time, under the influence of the big data era, the combination of ideological and political education and English classroom education can help university teachers to further explore the hidden components of ideological and political education in university English education, so that students can feel the intrinsic connection between university English and ideological and political education, so that students can further improve their spiritual and cultural literacy and promote comprehensive development while receiving English education [5-8]. Therefore, the close integration of English teaching and ideological and political education has become a common phenomenon in today's society and will serve as an important direction for the reform of China's English curriculum in the coming years.

Ideological and political education has always been at the core of China's national strategic concerns [9]. The thematic conference on ideological and political work in higher education held in December 2016 systematically deployed the construction of a new pattern of "three-pronged education for all", with a special emphasis on constructing a multidimensional and synergistic mechanism for educating people, and realizing the in-depth fusion of education on the body of knowledge and the leadership of values [10-11]. 2021 for the first time put forward the innovative concept of "big ideological and political class",



emphasizing that ideological and political education should break through the traditional classroom boundaries, and social practice to form an interactive coupling, this important exposition for the new era of ideological and political education reform to point out the direction of the requirements for the construction of a three-dimensional education system with a small classroom in the school and a large classroom in the society [12-14]. With the release of China's national policies and documents, curriculum ideology has increasingly become an important idea in China's education field.

In this era, the main purpose of the English program is to help students improve their English proficiency, including comprehension, application, expression, reading, writing, etc. It aims to help students build good communication skills and lay a solid foundation for better English learning and exploration of other fields in the future [15-17]. As for the humanities, the English course aims to cultivate students' comprehensive humanistic cultivation, giving them the opportunity to broaden their horizons, increase their life experience, cultivate cross-cultural awareness, stimulate creativity, shape excellent personalities and correct values, and lay a solid foundation for their future studies [18-19]. From this, it can be seen that the common denominator of the parenting goals of ideological and political education and the English curriculum is to cultivate students into socialist builders and successors who are both moral and talented and have all-round development. Combining ideological and political education with English reading classroom, so that not only can improve students' English proficiency, but also enhance their comprehensive ability and values, this method is important and irreplaceable for improving students' core literacy [20-22].

Currently, the development of information technology promotes the exponential growth of data in the field of education, forming a massive storage of educational data, and the field of education has entered the era of big data [23]. The so-called big data in education is a subset of big data, which is a collection of data generated in educational teaching and campus activities, collected in educational management and scientific research activities, and has great potential value for promoting educational development [24-25]. Data visualization studies the form of visual representation of data, extracting information (including attributes and variables of information, etc.) in a summary form to give a visual impact [26]. And vision is the most important channel for human beings to obtain information, and more than half of the human brain is used for visual perception, when the data is replaced by graphics to show under the human eye, it can reduce the cognitive load of the human brain, so as to enable people to quickly absorb and understand the data [27]. Visualization research on the teaching data of Curriculum Civics integrated into English reading, and then discover the value behind the data, can help students learn efficiently, and at the same time can benefit teachers, parents, education administrators, etc., and there is a huge research value in improving the quality of education, promoting the fairness of education, and improving education services.

## **2. Theoretical Foundation and Key Technology**

### *2.1. Theoretical Foundations*

The theoretical origin of modern curricular civic education comes from the idea of comprehensive development of human beings in Marxist educational theory, and has a great influence not only on the setting of educational and teaching goals, but also on all aspects of the teaching process. The development of constructivist learning theory has perfected the cognitive psychology foundation of curriculum education, and the initiative of learners in the process of constructive learning makes the perspective of this learning theory an important reference and inspiration for the cognition of students' internal motivation of value generation.

Affective learning theory has a unique theoretical value in the study of curriculum Civic Education. It is a representative work of American scholars to classify learning objectives into cognitive, affective and motor skills, in which the learning objectives in the affective domain are highly consistent with the direction of cultivating students' values in curriculum Civic and Political Education. The goal classification system in the affective domain contains five levels of acceptance, reaction, valorization, organization and characterization, and the hierarchical progression among them provides a systematic theoretical framework on how to reasonably set and reach the goals of Curriculum Civics Education. Emotional factors are the factors that emotional learning theory emphasizes the role of facilitation in the learning process, and positive emotional experience is a factor that improves learning effectiveness is fully emphasized by the theory.

Social learning theory provides an important theoretical background for curriculum civic education from the perspective of social psychology. Social cognitive theory breaks through the limitations of the stimulus-response model, and understands learning as a dynamic cognitive constructive activity that involves the interaction of the individual's cognitive ability, the learning environment, and behavioral performance; the process of implementation of curriculum civic education, as well as the role of teachers'

role models, the interaction of peer relations, and the influence of the campus cultural environment will play a long-term influence on the construction of students' values, which can further deepen the understanding of the mechanism of the occurrence of curriculum Civics education. The unique significance of the theory of cultural self-confidence in the special context of cross-cultural communication in the course of Civics English reading teaching, cultural self-confidence is both the goal of the educational pursuit of the course of Civics education, as well as the path to realize the educational inheritance of the course of Civics education, and the development and innovation of the course of Civics education. The three-phase systematic design of the value clarification theory provides an operable and specific design for the implementation of curriculum Civics education. In the process of Curriculum Civics English reading teaching, teachers can guide students to analyze the textual value conflicts, compare and learn from and absorb the values of different cultures, and conduct self-value reflection to promote the healthy development of students' values.

All of the above are the contents of constructing the theoretical system of Curriculum Civics and the theoretical basis for this study to investigate the application effect of Curriculum Civics education in English reading teaching with the analytical tool of data visualization.

## *2.2. Key technologies*

Data visualization techniques based on the development of educational informatization have also made it very common for educational researchers to use data visualization to carry out analyses, influencing the way educational research is conducted. It can be seen that the educational data in the research based on data visualization means are presented visually in graphical form, so it is easier to understand the hidden internal information and laws behind the educational data. The current intelligent educational environment based on visualization is no longer a simple graphical static chart, but a decision-making information interface system with dynamic assessment, real-time monitoring, and future foresight and early warning functions.

In the field of educational assessment, data visualization presents a wide range of data form types, methods, tools and means, from the initial statistical graphics and descriptive visualization of statistical information to the follow-up to the intelligent interaction of the visualization of the presentation for educational assessment. Among them, the educational assessment of students' learning performance is based on a variety of visualization graphics of the comprehensive performance of students in all aspects of knowledge and ability to learn the level and characteristics of teachers to understand more about the students' individual learning characteristics and the actual; and teaching evaluation through the application of real-time streaming data, real-time classroom teaching evaluation for the introduction of administrative measures for the education of an important analysis of the basis, but also for more effective solutions to the problems in the field of education and management. Teaching management field provides a new feasibility and way; teaching reform effect of visual analysis and research, etc. also provides data visualization analysis for education policy, thus realizing the real reality of data decision-making; through the text mining algorithm of education data to show the effect of analysis, through the word frequency - inverse document frequency (TF-IDF), the text of the analysis process mathematically, so that the word items in the text of the display more characteristic analysis.

Learning text data including student work, assessment, teaching and research information, through the learning text data to do word frequency - inverse document frequency calculation and chart analysis, can quickly obtain keywords and subject information. TF-IDF improvement algorithm TF-IDF + introduction of the weight factor, targeted to give weight to the word items, easy to use and improve the rate of information retrieval checking accuracy.

## **3. Research Methodology**

### *3.1. Study Design*

This study utilized a mixed research approach combining quantitative and qualitative research. In order to be able to better describe the research results when implementing the mixed teaching research method of Curriculum Civics Education, and at the same time better determine whether Curriculum Civics Education has achieved the expected results in the actual teaching and learning carried out. This study takes the second-year English majors of the school as the sample, and the research process uses the quasi-experimental research paradigm to construct the experimental group and the control group, and then compares and analyzes to explore the effectiveness of the curriculum Civic and Political Education. For a period of one year, operational procedures were developed in the three stages of pre-preparation, implementation and post-analysis, while quality control standards were determined. In the process of sample selection, factors that may be confounding variables such as students' basic level of English, motivation, family background, etc., were strictly controlled, and 120 second-year English majors of the

school were randomly selected as the research sample, in which 60 students in the experimental group (ENG1) received English reading teaching methods integrated with curricular civics, and 60 students in the control group (ENG2) received the traditional forms of English reading teaching methods. English reading teaching method. At the same time to ensure that the experimental group and the control group to carry out the curriculum Civics integration of English reading teaching experiment and the traditional English reading teaching method of carrying out the feasibility and rigor. Informed consent was taken and all the students who accepted the experiment signed the informed consent form, which ensured that students' learning motivation would not be affected on the basis of respecting their personal privacy and safeguarding their legitimate rights and interests.

The teachers' questionnaire mainly measures the teachers' perception of the four aspects of the educational concept, educational measures, teaching methods and educational effectiveness of "Curriculum Civics", with 8 to 10 questions in each aspect, and adopts the Likert five-level scale method for measurement; The student questionnaire mainly measures the students' subjective feelings about the learning attitude, changing concepts, improving cultural identity and ability enhancement of "Curriculum Civics".

The questionnaire was designed to be tested for content validity with the support of educational measurement experts and foreign language education teaching experts, and the reliability and validity of the questionnaire was guaranteed by the pre-experimental research, which finally resulted in the formation of a teacher questionnaire with 35 items and a student questionnaire with 40 items. The experimental design adheres to the basic paradigm of educational experiments and operational norms, and develops a strategy for the integration of curriculum Civics education based on the literature review and expert consultation, i.e., the strategy for the integration of curriculum Civics education in the experimental group's study is divided into 3 parts, which are the reform initiatives for the reconfiguration of the teaching content, the innovation of the teaching method, and the improvement of the evaluation system, respectively. Deeply excavating the Civic-Political factors in the English reading materials, reconstructing the teaching content, integrating the excellent traditional Chinese culture, socialist core values and patriotism into the reading teaching, and increasing the English reading materials in the English reading classroom in terms of the development of the current China, the rise of China, and so on. Teaching method innovation adopts various English teaching activities such as contextual teaching, case study teaching, role-playing, group collaboration, etc., to guide students to think positively and participate in active discussions, so as to achieve the purpose of value guidance through knowledge learning.

Data visualization and analysis method as the technical innovation point of this study, using advanced data mining and visualization technology to analyze the collected multi-source heterogeneous data in depth, the weighted TF-IDF algorithm introduces the weight adjustment mechanism on the basis of the traditional TF-IDF, and the mathematical expression is:

$$Weighted - TF - IDF(t, d) = w_i \times TF(t, d) \times \log\left(\frac{N}{DF(t)}\right) \quad (1)$$

where  $w_i$  denotes the weight coefficient of the lexical item  $t$ , differentiated weights are assigned to different types of vocabularies according to the special needs of the curriculum Civic Education. The weights of the words related to values, cultural identity and learning attitude are set to 1.5, 1.3 and 1.2 respectively, so as to improve the accuracy of the algorithm in recognizing the key elements of curriculum ideology and political education.

### 3.2. Data collection and processing

In terms of constructing a multi-dimensional comprehensive data source system for teaching and educating people in curriculum civics and politics, firstly, relevant questionnaires were developed and 86 questionnaires for teachers (91.5% recovery rate) and 210 questionnaires for students (100% recovery rate) were distributed through online and offline mixed sampling, which covered the cognition of curriculum civics and politics education and the learning experience of the teachers and the students, and at the same time, the teachers' questionnaires were set up with open-ended questions to collect their thoughts and suggestions about curriculum civics and politics. At the same time, open-ended questions were set for teachers' questionnaires to collect their thoughts and suggestions on the cultivation of people through the teaching of Civics and Politics; secondly, pre- and post-tests of learning effects were conducted during the whole process of English teaching to collect the changes in students' learning performance, and to set up a tracking data source for the learning ability to understand the deeper changes in the content of learning.

Data preprocessing In accordance with the routine work of educational research data processing, all

the data were subjected to completeness test, outlier identification, etc., and 12 questionnaires with incomplete or obviously illogical completion were eliminated from the data. For the missing values, a combination of the mean filling method and multiple filling method is used to repair the data set to ensure the completeness of the data set; the standardization of the mean transformation of the learning achievement data is used to eliminate the interference caused by the differences in different evaluation standards and scales by means of z-score transformation, and the various types of learning achievement with different evaluation standards and scales become comparable through the standardization of the transformation. In the process of text data cleaning, it is necessary to eliminate irrelevant data, including deactivated words, punctuation, numbers, etc., and carry out preprocessing work such as stemming extraction and word shape reduction. The Chinese text was preprocessed using Jieba Segmentation Tool for segmentation, and the English text was preprocessed using Natural Language Toolkit to create a special thesaurus for curriculum Civic Education containing 3,000 high-frequency words, which was used for the preparation of the subsequent text analysis. With the students' interview text data, a total of 4832 text data were obtained after preprocessing their texts, which were used for the data support of the subsequent visualization and analysis process.

All data processing steps are in accordance with the requirements of reproducibility, and the corresponding processing parameters and methodological steps are retained, forming a data processing report and a source program code base as a condition for the traceability and reproducibility of the results of the study, as well as for the verifiability and popularization and application of the research results, and providing methodological and procedural references for further research work.

### 3.3. *Weighted TF-IDF algorithm and visualization techniques*

The use of the weighted TF-IDF algorithm is an exploration of the technical methods of this study, because in response to the shortcomings of the TF-IDF algorithm used in this study in the analysis of the text of curriculum civic and political education, this paper adds the treatment of constructing the weights based on the knowledge of the domain experts to improve the effect of the algorithm. The principle of weight distribution is to consider the key content and value orientation of curriculum ideology education by dividing the vocabulary in the text of curriculum ideology education into four main categories: values, cultural identity, learning attitude, and behavioral performance, and assigning the size of weight coefficients according to the importance of each main category, the algorithm program calculates the word frequency of the word item in a text in turn, and counts the number of texts in which the word appears in all the texts, Calculate its inverse document frequency, and then use the weighting coefficients to calculate the weighted word frequency - inverse document frequency value, the calculation formula is:

$$\text{Weighted - TF - IDF}(t, d) = w_t \times \frac{f_{t,d}}{\sum_{t' \in d} f_{t',d}} \times \log \left( \frac{N}{|\{d \in D; t \in d\}|} \right) \quad (2)$$

where  $f_{t,d}$  denotes the frequency of occurrence of the lexical item  $t$  in the document  $d$ , and  $N$  denotes the total number of document collections.

However, the curriculum Civic and political education corpus is characterized by distinctive values, clear themes and abstract semantics, and the relevant classical algorithms are unable to accurately locate the key vocabulary of the value of Civic and political education. To address this difficulty, we introduce word weights to establish domain-specific corpus algorithms, set larger word weights for words with values such as "patriotism", "sense of responsibility", "cultural confidence", etc., and keep the terminology and explanatory words as the key words of Civic and Political Education. The terminology and explanatory words are kept as ordinary word weights.

Reasonable selection of visualization tools according to data characteristics, analysis requirements, application and other factors. The system is designed to be a collaborative visualization method with multiple tools, in which the non-interactive graphics are drawn by the scientific computing package that comes with Python, the interactive visualization is realized based on the Web front-end development, and the integrated report is completed using the business intelligence platform.

## 4. Results and analysis

### 4.1. *Analysis of the Results of the Questionnaire*

The results of the students' questionnaires show the complexity of carrying out curriculum-based Civic Education in English reading teaching, as detailed in Table 1. 86 valid teachers' questionnaires illustrate the positive attitudes of curriculum-based Civic Education at the teachers' level, with an average Civic Awareness Score of 4.23 out of 5, higher than that of the students' of 3.87. Whereas the teachers with rich experience are more sensitive in the discovery of Civic Elements, the use of the new technology

is relatively conservative. Younger teachers are more motivated to try and apply new methods. This is important reference information for teacher training and team development. The students' questionnaires reflect a more complex distribution of characteristics. 120 students' questionnaires' comprehensive evaluation results show that the students' Civic Education of the course benefits significantly in enhancing their own learning experience, and the average score of the item of learning interest enhancement is 4.18, which is far more than the result of 3.62 under the traditional teaching mode, and the difference is statistically significant ( $p < 0.01$ ). The average score of the cultural identity enhancement item was 4.09, reflecting that the students' understanding of the cultural heritage level is stronger, while the understanding of cultural innovation needs to be further strengthened.

**Table 1.** Questionnaire Survey Results.

Dimension	Teacher (n=86)	Student (n=120)	Sig	Main problem
Ideological and political awareness level	4.23	3.87	$p < 0.01$	The theoretical understanding is not deep
Master the implementation strategy	3.76	3.45	$p < 0.05$	The methods are simplistic
Perception of Teaching effectiveness	4.12	4.31	$p < 0.01$	The absence of an evaluation system
Changes in learning interest	3.89	4.18	$p < 0.01$	There are significant individual differences
Enhancement of values	4.05	4.25	$p < 0.01$	Insufficient depth
Enhanced cultural identity	3.94	4.09	$p < 0.05$	Superficiality tendency

Correlation analysis was used to dig out what inherent logical associations exist between the dimensions of the indicator survey. There is a positive correlation between teachers' Civic and Political theory literacy and the mastery of practical teaching skills ( $r = 0.724$ ,  $p < 0.001$ ), which suggests that knowledge of the theory is the necessary foundation for practicing the skills. There is a strong positive correlation between the transformation of students' learning interest and the formation of values ( $r = 0.689$ ,  $p < 0.001$ ), which indicates that the stimulation of interest is an important way of value leadership. The relationship between the growth of students' cultural self-confidence and the development of rational dialectical thinking is 0.542 ( $p < 0.01$ ), indicating that the growth of cultural self-confidence is synchronized with the development of rational dialectical thinking. From the perspective of the main aspects of the problems, it is mainly that the teachers' application skills training needs to be strengthened, the students' participation needs to be deepened, and the evaluation mechanism system needs to be strengthened, etc. This also points out the direction of efforts for the next step of teaching reform and effectiveness enhancement, and verifies the validity and appropriateness of the data visualization and analysis method as a form of tool for evaluation.

#### 4.2. Analysis of the Results of the Teaching Experiment

A six-month experiment was conducted to compare the results of teaching English reading comprehension between the control group and the Civic-Political Element Integration group. After the six-month teaching experiment, we followed up the data of 120 students, and the data showed the following effects, Table 2. 60 students in the Civic-Political Element Integration group improved their average score of reading comprehension from 78.6 in the pre-test to 87.3 in the post-test, an increase of 8.7 points, while the control group improved from 75.2 to 76.6 only by 2.9 points. to 87.3 in the posttest, an increase of 8.7 points, while the control group increased only 2.9 points from 75.2 to 76.6, Civic and political elements integration plays an important role in improving the efficiency of the students' English reading comprehension teaching; the Civic and political elements integration group increased their reading from 245 words per minute to 298 words per minute, an increase of 21.6% in the speed of reading comprehension, while the control group increased their reading from 7.7% to 8.4% with an increase of only 7.7%, Civics integration plays a significant role in improving students' reading comprehension speed and guiding students to recite and memorize aloud; comprehension accuracy increased from 74.2% to 86.8% in the posttest, and the control group only increased by 4.7% from 73.8% to 78.5%, Civics integration promotes students to improve their comprehension of deeper connotations of the text, and there is still room for improvement in this aspect. There is still room for improvement in this area; the statistics of the above data are all significant, which again confirms the credibility of this experiment.

Meanwhile, the cultural identity test showed that the experimental class increased from 3.4 to 4.6, with an overall increase of 35.3%, significantly higher than the increase of 8.6% in the comparison class,

which fully reflects that the Civic and Political Education has a significant effect on enhancing cultural self-confidence. The improvement in critical thinking score of the experimental class is much higher than that of the comparison class, reflecting the role of the elements of Civics and Politics in promoting the development of students' rational thinking quality. The composite score of active learning in the experimental class increased from 3.6 to 4.7, reflecting that the Civic and Political Education enhances the motivation of learning. The values identity examination refers to the students' knowledge, acceptance, identity and practice of the content of socialist core values, reflecting the great role of curriculum Civics education in leading values.

**Table 2.** Teaching Experiment Result.

Index	Experimental Group		Control group		Difference value	Sig.
	Before	After	Before	After		
Reading comprehension score	78.6	87.3	78.9	81.2	6.1	p<0.001
Reading speed	245	298	248	267	31	p<0.01
Understanding accuracy rate	74.2	86.8	73.8	78.5	8.3	p<0.001
Cultural identity	3.4	4.6	3.5	3.8	0.8	p<0.001
Critical thinking ability	3.2	4.3	3.1	3.5	0.8	p<0.01
Learning engagement	3.6	4.7	3.7	4.0	0.7	p<0.01
Value identification	3.3	4.5	3.4	3.6	0.9	p<0.001

### 4.3. Results of Data Visualization and Analysis

Firstly, the weighted TF-IDF algorithm was used to extract and analyze the content of the 4,832 multi-text data extracted. After calculation, five thematic concepts of ideological and political education in courses were refined, namely value guidance, cultural confidence, moral cultivation, learning interest and ability cultivation. This paper selects the keywords designed with different weighting values in the algorithm. For instance, assigning different weight coefficients to "values", "cultural confidence" and "interest" can increase the probability of identifying the main concepts of ideological and political education in the course during the content screening process. See Table 3 is the data classification table. As can be seen through the table, using the algorithm, the accuracy of data classification reached 90.88% on the basis of the original 76.3% accuracy rate improved part of the article data analysis can be seen, the values leading theme concept has 1456 text samples, accounting for the absolute advantage (30.13%), accounting for the main part of the core content of the curriculum Civic and political education, and then there is the cultural confidence theme concept, there are 1203 text samples accounting for 24.9%, the theme concept of character development with 967 text samples, the theme concept of interest with 876 text samples, and the theme concept of ability cultivation with 330 text samples, which shows that the content of the curriculum civic education has a gradient distribution and has an overall structure, which is the deepening and refinement of the previous four curriculum civic education theme concepts, implementation and categorization.

**Table 3.** Data classification results.

Theme category	Sample size	Ratio	Weight	Accuracy	Main keywords
Value concept guidance	1456	30.13%	1.5	94.2%	Patriotism, social responsibility, core values
Cultivation of cultural identity	1203	24.90%	1.3	92.8%	Cultural confidence, traditional culture, national spirit
Improvement of ideological and moral character	967	20.01%	1.4	90.5%	Moral cultivation, character shaping, personality improvement
Stimulation of learning motivation	876	18.13%	1.2	89.3%	Learning interest, internal motivation, target orientation
Cultivation of practical ability	330	6.83%	1.1	87.6%	Practical skills, applications, innovative thinking
Ours method		90.88%	Traditional method		76.30%

## 5. Discussion

With the deepening of "Internet+Education" and the continuous promotion of the construction of

“Curriculum Civics”, how to penetrate the Civics education in the teaching of professional courses has become an important part of the educational and teaching work in colleges and universities. English reading teaching has always been one of the important contents of higher English education, which has the important functions of language ability cultivation and cultural awareness inheritance. However, because of many factors, the process of reading teaching for English majors has neglected the leadership of cultural values and the importance of value education, and the teaching activities of teachers in the English reading class are emphasized on the teaching and learning of language knowledge and reading knowledge.

The core concept of this project is to design a data-visualized evaluation system of curriculum Civics education, and to conduct scientific data analysis to reveal the effectiveness of the practice of curriculum Civics education in English reading teaching and the way to optimize it. Advanced data mining and data visualization technologies are used to quantify and reveal the operation process of Civic Education, providing scientific practical basis and decision-making assistance for Civic Education. How to realize the integration of Civic Education into the teaching and learning of English reading is the focus of this project, first of all, we have to analyze the nature and requirements of Civic Education, and explore the organic integration mode with the content, method and evaluation of English reading teaching based on the implementation requirements of Civic Education.

Therefore, when conducting the research on the evaluation of the effect of curriculum civic education under the threshold of big data, we also expect that visualization analysis can be used as an intuitive means to complete the research on the evaluation of the effect of curriculum civic education, i.e., visualization technology can be used as a means to analyze and evaluate intuitively and efficiently changes in students' learning performance, improvement of students' comprehensive quality, change of values and other aspects through the study of the data on the evaluation of the effect of curriculum civic education in the context of big data. The study of visualization technology as a means to analyze and assess changes in students' academic performance, students' comprehensive quality, changes in values, and other aspects. The study of evaluating the effect of curriculum Civics education by combining the data categorization method of Weighted Word Frequency-Inverse Document Frequency (TF-IDF) algorithm constitutes the common technique of this study. As a classical text mining algorithm with a wide range of applications in information retrieval and text analysis, the study of applying it to curriculum Civics education, in intelligently analyzing multi-source data in terms of teaching text, student response evaluation, etc., thus constructing an automated assessment model of the effectiveness of curriculum Civics education.

## 6. Conclusion

The data visualization and analysis platform designed in this experiment is based on the weighted TF-IDF algorithm to design a data visualization and analysis platform for the teaching of Civics and Politics integrated into the English reading major course to provide a more effective way of teaching and objective quality assessment. In this experiment, the integration of the Civics and Politics of the curriculum into the teaching of the reading major has achieved good results in improving students' reading comprehension scores, and students have improved by 11.1% on average. In terms of students' cultural identity and students' development of critical thinking, they improved by 35.3% and 34.4% respectively. The quantitative facts obtained in this experiment also verified that the education of the course Civics can create a strong interest in learning, good value cultivation, and firm cultural self-confidence for students. The weighted TF-IDF algorithm designed in this experiment achieves an accuracy of 90.88% in text categorization which is 14.58% higher than the traditional text categorization algorithm, establishes a theme classification method that includes five dimensions such as the cultivation of values, cultural identity, and the enhancement of ideology and morality, and establishes a more objective evaluation system for the teaching effect of the course Civic Politics.

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