Research Article

Analysis of Realistic Problems and Practical Paths of “Three-Wide Education” in Higher Education Based on Text Analysis and Mining

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As the basic concept of higher education, the three comprehensive education is a reliable guarantee for strengthening and improving moral work in higher education, which is a complex of talents meeting the requirements of the times, and “universal education” is a comprehensive training for students to improve their cultural and spiritual moral level to meet the requirements of future social consumption. In order to study the comprehensive reform and development of moral education in universities, this paper reviews and standardizes the formation and development of comprehensive reform in universities, which is closely related to the development of comprehensive reform: strengthening the interconnection of systems in the process of training all employees, strengthening the effective interaction between cultures in the whole process, and ensuring the complete organic integration of cultures. The authors propose a solution for the comprehensive reform of “three-completion education” in universities. The authors offer some reasonable suggestions for the development of moral education in colleges and universities.

1. Introduction

The impact of multiple ideologies in the international society on the moral education of universities needs to be addressed urgently [1–3]. The continuous development of China’s economic globalization, cultural pluralism, network informatization, and big data application has made college students suffer from the impact of various western cultural trends in the context of globalization. In the stormy international environment, if we want to guide college students to continue to carry forward positive ideology and discard negative and backward corrupted ideas, we must establish a full-range and all-round work mechanism of moral education [4].

The state places high hopes on students. The younger generation is the future of the motherland, the central force of society, and an important force for the future progress of the country. The vast number of young people have proved by their actions that in the new century, Chinese youth are excellent and shoulder heavy responsibilities and extend my cordial greetings to you and to the vast number of young people fighting on all fronts of the antiepidemic war [5]. If the young generation has dreams, skills, and responsibilities, the country has a future and the people have a future. She is to make the party and the state attach importance to young students in real life, and all teachers should attach importance to youth work and work together for good moral education [6].

As the basic concept of higher education, “three comprehensives” is a reliable guarantee to strengthen and improve the moral work of higher education [7]. With the rapid dissemination of information on the Internet, some selfish hedonism thoughts have penetrated into students’ consciousness, changed their values and behaviors, made moral education difficult, and made the traditional moral education model difficult to adapt to the changing environment.
In the traditional higher education system, students’ learning mainly depends on universities. In universities, teaching, management and logistics are carried out separately, which leads to the separation of students’ study, life, practice, and employment and hinders their all-round development [9, 10]. The “education for all” model can effectively connect and integrate the educational resources of different sectors of higher education. In addition, educational subjects, including family and social forces, will actively participate in the development of students’ comprehensive education.

2. Related Work

The three whole education includes: (1) The whole staff education. The “four-in-one” nurturing mechanism is composed of college staff, family members, social forces, and students themselves [11]. First of all, as the primary position of teaching and educating, students, teachers, and staff should cooperate with each other to implement teaching, management, and service education [12]. Secondly, families have an irreplaceable role in cultivating and shaping students’ correct three views and developing good habits and character [13]. Finally, all sectors of society, including the government, enterprises and institutions, and outstanding individuals, also need to take responsibility for the cultivation of students [14]. (2) Whole process nurturing. The whole process of nurturing people means that the nurturing work should accompany the whole process of students’ study and life in the four years of university until they reach lifelong education. In a long time, the focus should be on the adaptation of education, so that students can adapt to college life as soon as possible. The second task is to prevent ideological and behavioral deviations. The focus of work in the past three years should be to cultivate students’ professional skills and accumulate more professional theory, practical experience, and technical skills. In the fourth year period, attention should be paid to students’ internship career selection education to enhance employment awareness, improve employability, and career competitiveness, so as to ideally select a career [15]. (3) All-round education. All-round education means that the educational work should stand at a global and strategic level and be expanded and extended continuously [16, 17]. In addition, nurturing work should penetrate into all aspects of college students’ life, study, and work, and cultivate students from multiple perspectives and levels so as to finally make them talented, thus realizing the goals pursued by higher education [18, 19].

There are many research studies on the three holistic education. In [20], it is pointed out that under the concept of “adult-achieving” education, the “Three Associations and Two Guides” education mode and “Adult-achieving Integration” education mode should be explored. In the article, it was pointed out that under the concept of “adult-achieving” education, the “Three Whole Education” system was constructed on the basis of the “integrated adult-achieving” education system. In [21], they propose “Building a ‘three-wide education’ system with the foundation of moral education,” it is proposed that in the construction of the three-wide education model, “first of all, we should implement the spirit of the National Education Conference,” take the foundation of moral education as the foundation, integrate moral theory courses with general education courses through the means of information technology, and integrate students’ education with the general education courses. The “Three Whole Nurturing Model” is proposed to “firstly, implement the spirit of the National Education Conference,” and to build a whole person, full-range, and all-round nurturing mechanism by integrating moral courses with general courses, combining students’ moral work with campus culture, and combining classroom teaching with extracurricular quality development platform through information technology [22].

In [23], it listed how universities should build a working pattern of “three-wide cultivation” in the cultivation stage of graduate students, and she believed that we should build a pattern of “three-wide cultivation” by integrating resources from three aspects: teaching, management, and service. She thinks that we should integrate resources from teaching, management, and service to build a comprehensive education pattern, build a comprehensive education pattern from the main channel of two courses, academic activities of professional courses, “three self” education of postgraduates and social practice, build an ideal and belief education before enrollment, education of world view, life view and value after enrollment, and education of professional ethics before graduation. The whole-range education mechanism in [24], it is pointed out in “Theoretical Implications, Realistic Problems, and Practical Paths of ‘Three-Wide Education’ in Higher Education” that in order to promote “Three-Wide Education” in higher education, the first thing is to lead the “Three-Wide Education” with collaborative linkage. In the article, it is pointed out that in order for higher education to advance the “three whole education,” firstly, we should lead the “three whole education” practice innovation by synergistic linkage, integrate educational resources, strengthen collaborative research, form a system, and open the “last mile” of “three whole education.” Secondly, the system construction should guarantee the “three comprehensive education” to take root. Universities should promote the construction of the five-in-one thinking pattern of discipline thinking, curriculum thinking, network thinking, cultural thinking, and daily thinking. Thirdly, to create a good atmosphere of “three-wide education” with cultural influence, it is necessary to create a multidimensional and inclusive education culture to promote “three-wide education,” so as to convince people with reason, educate people with culture, nurture people with learning, and educate people with beauty.

3. Methodology

Text analysis and mining is a process of obtaining information from text data, which is usually not structured. Researchers obtain information according to needs or
values. It is generally believed that text mining is a process of extracting unknown and available knowledge from a large number of texts, which can interpret information and provide help and reference for research.

The principle of text mining is similar to that of digital mining, but it is different from traditional data mining in some aspects. The object of data mining is mainly composed of structured data in the database, and some data mining methods are not applicable in text mining. The characteristic of text mining is that the text it studies is semistructured or unstructured, and there is no certain form, so it is difficult for machine tools to understand the content contained therein. In short, we need to extract features from the text, analyze meaningful information, and establish useful models. Chinese text search includes the following steps as shown in Figure 1.

The first step is input of the data source text; the second step is text preprocessing subword semantic analysis; the third step is intermediate data set stored in Database Excel; the fourth step is analysis; and then visualization analysis.

This study adopts a standardized qualitative research methodology to develop qualitative coding in the context of China’s education informatization 2.0 era, conducts cluster analysis and multidimensional scale analysis based on the research method of text co-word analysis, and follows the logic of thinking from theory to practice and from the particular to the general.

Representing text is an important part of the task. Computer encoding of natural language solves problems such as transferring and storing natural language, but the encoding itself does not contain semantic information. If the natural language encoding is used directly for processing tasks, it will result in a lack of semantic information. This is where a language model is needed to transform the text into a specific input containing semantic feature information.

One of the common language models is the statistical language model, which is essentially a probabilistic model for computing sentence probabilities, and the construction of such a model also needs to rely on a corpus. Suppose $W(w_1,w_2,...,w_T)$ denotes a corpus of $T$ words $w_1,w_2,...,w_T$ a sentence text composed in order. Then $w_1,w_2,...,w_T$ have the joint probability of

$$p(W) = p(w_1^T) = p(w_1,w_2,...,w_T). \quad (1)$$

This is the probability of the text $W$. Using the Bayesian formula, the above equation can be decomposed as

$$p(w_1^T) = p(w_1) \cdot p(w_2|w_1) \cdot p(w_3|w_1^2) \cdots p(w_T|w_{T-1}). \quad (2)$$

The implementation idea of the above measurement method is simple, but there are two such problems in practical application.

(1) The number of model parameters tends to increase exponentially with the growth of the text length. For example, equation (2) calculates the probability of a text of length $T$, which requires $T$ parameters. Now suppose there is a corpus corresponding to a dictionary $D$, and consider any text of length $T$. Theoretically, there are $N^T$ possibilities, each of which requires the calculation of $T$ parameters. In total, $TN^2$ parameters need to be computed without considering duplicate parameters. This results in huge computational and storage overheads when dealing with larger text sizes.

(2) The data sparsity is more serious. This will lead to a probability result of 0 for most of the sentences we finally compute. The N-gram model is a typical statistical language model, currently more commonly used are the binary Bigram model and the ternary Trigram model, which provide feasible methods to calculate the model parameters and solve both problems. First, considering the approximate calculation of $p(w_k|w_{k-1}^{k-1}) (k > 1)$ using the Bayesian formula yields

$$p(w_k|w_{k-1}^{k-1}) = \frac{p(w_k)}{p(w_{k-1}^{k-1})}. \quad (3)$$

According to the large number theorem, when the corpus size is large enough, $p(w_k|w_{k-1}^{k-1})$ can be approximated as

$$p(w_k|w_{k-1}^{k-1}) \approx c(w_k)|c(w_{k-1}^{k-1}), \quad (4)$$

where $c(w_k), c(w_{k-1}^{k-1})$ indicate the number of occurrences of word strings $w_k, w_{k-1}^{k-1}$ in the corpus, respectively. When $k$ is large, the time overhead of counting the number of these two strings is also large.

$$p(w_k|w_{k-1}^{k-1}) \approx p(w_k|w_{k-1}^{k-1}) \approx \frac{c(w_k)}{c(w_{k-1}^{k-1})} \quad (5)$$

When $n = 2$, equation (5) becomes

$$p(w_k|w_{k-1}^{k-1}) = p(w_k|w_{k-1}) = \frac{c(w_k)}{c(w_{k-1})} \quad (6)$$

Such simplification makes the matched word strings shorter for statistics and shortens the statistical time. It also makes the total number of model parameters smaller, which solves the first problem mentioned above. The second problem is solved by smoothing the data.

The Neural Network Language Model (NNLM), which solves the problems of traditional statistical language models, but has difficulties in obtaining context-dependent long time and lacks sufficient generalization ability, the model captures contextual information and obtains similarities between words by training distributed word vectors. Figure 2 shows the network structure of the model.

The above parts constitute the overall word vector training model. The word vector parameters during training are shared by these three parts, and the overall training process is completed by the joint training of these three...
Algorithm: word vector update
Input: the $i$th sentence in the dataset $s_i$ and the central word $w$ containing $m$ characters
Output: word vector matrix

Begin
(1) Obtain the vector representation $e_w$ of the word $w$ in the word vector matrix and the vector representation of each character that makes up $w$. The vector representation of the $k$th character is $c_k$.
(2) Calculate the vector representation of word $w$ at training time using equation (12), $x_w$.
(3) Select the context word $v$ of $w$ according to the set window size, and obtain its negative sampling result $\text{NEG}(v)$, and then merge the two sets to form a new set $T = \{v\} \cup \text{NEG}(v)$.
(4) Initially define the update intermediate quantity $p$ such that $p = 0$.
(5) Sequentially traverse the set $T$ and select word $u \in T$.
(6) Combining auxiliary vector $\theta^u$, indicator function $L'_u(w)$, learning rate $\eta$, and activation function $\sigma$, compute the intermediate quantities $q = \sigma(x_w^u \ast \theta^u)$, $g = \eta(L'_u(w) - q)$.
(7) Compute $p = p + g\theta^u$ and then $\theta^u = \theta^u + gx_w$ based on the intermediate quantity $g$.
(8) If the set $T$ has not been traversed, then turn 5.
(9) Update word vector $e_w$ of $w$, make $e_w = p + e_w$, then update all character vectors of word $w$, update character vector $c_k$ of the $k$th character to $c_k = p + c_k$, end of one update of word vector.
End

Algorithm 1: Word vector training algorithm incorporating contextual information.
parts. In the specific implementation, the stochastic gradient ascent method is used for training, and the negative sampling method is used to optimize the three parts. Therefore, the core algorithms of the three parts have the same idea. Taking the first part as an example, the word vector update algorithm incorporating contextual information is described as follows:

(1) Preprocessing the training set with the text preprocessing method described in 3.1.2 and constructing the seed sentiment lexicon.

(2) Initialize the training parameters of the model, such as the window size of the interception context, the dimensionality of the training vector, the auxiliary vectors of each part, and the learning rate.

(3) Input the training set data into the model for training.

(4) After the training of the model is completed, the completed word vectors are obtained to complete the exact word vector pretraining process.

The co-word analysis method can visualize the network formed by the keywords and the sparsity characteristics, which can grasp the structure and characteristics of the research object more completely and accurately in the study. The preliminary keyword word frequencies were obtained by counting the class keywords derived from the root category, and the keyword word frequencies were imported into Excel for data processing to obtain the keyword co-word matrix (the number of occurrences of every two keywords in the same policy). Then SPSS is used to further process it into a similarity matrix, and the high-frequency keywords are clustered and analyzed through the similarity matrix. The keywords are grouped into large and small clusters by the clustering algorithm, so as to obtain a clustering dendrogram, and the structural model of the policy is constructed again according to its development, and the optimal one is selected in comparison with the model obtained from the zapping theory.

The clustering analysis of keywords can only reflect the structural information of the policy structure system, and the relationship between various types of structures cannot be accurately judged; further analysis of the relationship between structures can provide a deeper understanding of the characteristics of the policy structure. In order to understand the structural characteristics and interrelationships of China’s education informatization policy, a multidimensional scale analysis is further conducted on the basis of cluster analysis using the research method on keywords in bibliometrics to analyze the interrelationships among the structures in addition to the structural components of the policy and to grasp the structural characteristics of the policy more comprehensively.

The process required constant sampling, repeated reading of the data, and revision and comparison of the codes until no new concepts or classes were found. In the process of coding the 73 policy texts, starting from the 57th text, the 58th to the 73rd text, the coding process did not extract any new concepts or genera, and the codes were all able to be grouped into the previously coded genera, indicating that the current codes were saturated.

After the axial coding is completed, the word frequency of keywords can be counted according to the coding. 27 keywords of policy texts are obtained here (e.g., the word frequency of “education equity” is 12, which means that the keyword appears in 10 policy texts, and only once is counted when it appears in the same policy several times), and the keywords are counted and organized. Table 1 shows the keywords.

Based on the word frequency of the policy source material and keywords, the number of times every two

| Keywords | Frequency |
|----------|-----------|
| Regulatory coordination | 42 |
| Resource development and sharing | 38 |
| Three communication project | 37 |
| Teachers training | 33 |
| Education management and government | 29 |
| Policy environment | 29 |
| Campus network construction | 24 |
| Teacher education informatization | 22 |
| Platform construction | 23 |
| Information technology education applications | 22 |
| Informatization support services | 21 |
| Public service system | 21 |
| Investment and financing support | 15 |
| Information security | 16 |
| Rural education | 16 |
| Pilot demonstration | 13 |
| Education reform | 13 |
| Dedicated funds | 11 |
| Cross-border integration | 12 |
| Educational equity | 12 |
| National network construction | 12 |
| Information capacity | 6 |
| Talent development | 5 |
| Cultural development | 4 |
| Distance education | 4 |
| Smart education | 4 |
| Teaching materials construction | 4 |

| Keywords | Frequency |
|----------|-----------|
| Public service system (PSS) | 1 6 0 11 10 7 |
| National network construction (NNC) | 6 1 0 7 4 4 |
| Textbook construction (TC) | 0 0 1 1 2 0 |
| Teacher education informatization (TEI) | 11 5 2 0 14 4 |
| Teacher training (TT) | 10 6 0 12 1 6 |
| Education reform (ER) | 5 4 0 6 5 1 |
The prerequisite for performing clustering analysis is the need to convert the co-word matrix into a similarity matrix that represents the correlation between word pairs. In this paper, we use cosine similarity, and in text mining each keyword is also given dimensions, and each dimension can be represented by a vector, and the frequency of the keyword in each dimension is also its frequency in the document. Therefore, the similarity between keywords can also be derived using cosine similarity. Some of the results of the similarity matrix obtained by cosine similarity in this paper are shown in Table 3.

### 4. Case Study

#### 4.1. The Current Situation

The investigation is carried out from three perspectives: the overall development of personality, the development of the whole process, and the overall development on which the moral education work is based. The content of the questionnaire is also designed around these three aspects. By asking a series of questions, we can obtain real information from students and staff about the overall composition of the university, the entire process, and the entire scope of education.

Respondents to this survey included students and teachers from multiple institutions, including 585 students and 173 teachers from China, whose institutions covered finance, politics and law, teacher training, science and technology, medicine, and vocational education. The subjects of the respondents include science and technology, literature and history, and art, and the academic level includes undergraduates, masters, and doctoral students.
As shown in Figure 3, this chart reflects the gender situation of the survey respondents. From the data, the proportion of men and women is relatively balanced, with 287 male respondents and 298 female respondents, accounting for 49% and 51%, respectively. From Figure 4, we can see that among all the respondents, there are 150 specialists, accounting for 25.64%; 292 undergraduates, accounting for 49.91%, the largest number and the highest percentage; 137 master students and 6 doctoral students, accounting for 23.42% and 1.03%, respectively.

From Figure 5 that this study focuses on the work of moral education of college students, so the political outlook of the respondents is also crucial. Among the 585 students surveyed, 387 were members of the Communist Youth League, accounting for 66.32%, followed by 105 members of the Communist Party of China, accounting for 17.88%, and including 14.51% of the masses and 1.29% of the democratic parties, with 85 and 8 members, respectively.

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Among the surveyed teachers, the distribution of men and women is roughly balanced, with 92 male teachers and 81 female teachers, accounting for 53.18% and 46.82% respectively, and the gender distribution of the survey is reasonable, see Figure 6.

Among these 173 faculty members, they come from three categories of posts, teaching and research posts, administrative posts, and logistic service posts, including 55 teachers of general and specialized courses in terms of categories, accounting for 31.87%. In terms of categories of teachers interviewed the most, including full-time teachers of various majors and teachers of general courses, the number of teachers of moral theory courses interviewed 40 people, accounting for 23.15%. The number of interviewed teachers of moral theory courses is 40, accounting for 23.15%, and also includes 28 party and administrative managers, accounting for 16.32%, as well as 15 logisticians, accounting for 8.62%. In terms of political orientation, all teachers in universities are basically CPC members, with the proportion of party members reaching 82.78%, and some democratic parties and masses, which account for less than 20% in total; see Figure 7.

4.2. Analysis of the Implementation Results of the “Three Comprehensive Education” Strategy in the New Environment, Taking a University as an Example. In the past two years, the “multidimensional” thinking and government work
system have strongly promoted the development of a university into “a research university with interdisciplinary characteristics and integrated development of arts, science, medicine, and engineering,” which has greatly expanded the university’s schooling pattern and made its contribution to “four leading positions.” At the same time, the school has also driven the rapid development of various educational work through the “multi-dimensional” thinking and government work system, and achieved remarkable results.
4.2.1. Evaluation of the Effectiveness of Education. A university actively explores the mode of improving the mechanism of thinking and government work, and deepens the system of coordinated education through the “multi-dimensional” thinking and government work system, and has achieved remarkable results. For example, the Whole Person Development Inventory (WPDI) of Hong Kong Baptist University and the Self-Assessment of Whole Person Development Inventory of Nanjing University of Aeronautics and Astronautics. Based on the years of implementation of the “Three dimensions” Civic and Political Work System, the survey respondents were divided into two groups: former students of 2014 and 2015 who had graduated, hereinafter referred to as Group A; and current students of 2016 and 2017 who were in their senior year, hereinafter referred to as Group B. The questions of this questionnaire mainly involved the following 7 dimensions and indicators (see Figure 8) and were randomly distributed to the target group by using the 6-point Likert scale questions. In this study, students’ self-ratings of the assessment indicators under each dimension will be counted according to their groups, and the mean value of the total score of each dimension will be taken for group comparison as in Table 4.

4.2.2. Comparison of the Effectiveness of Education. In this study, 400 questionnaires were randomly distributed to each of the two groups of students, A and B. A total of 800 questionnaires were returned. There were 687 questionnaires returned. Among them, 326 valid questionnaires were returned from group A, with a recovery rate of 81.50%; 361 valid questionnaires were returned from group B, with a recovery rate of 90.25%. The overall comparison results of the survey on the effectiveness of human education were obtained (see Figure 9).

The comparison results in Figure 9 show that, except for the physical health dimension, the scores of the two groups were similar in the four dimensions of political identity, humanistic qualities, social interaction, and psychological adjustment.

On the basis of actively exploring the “three-party co-construction” of a high-level university and building the “multi-dimensional” thinking and government work system around the main line of “three-wide education,” a university has integrated. Based on the international standard full credit system that has been successfully implemented for many years, we have explored the management system and education model that meet the international standard and innovated the mechanism of cultivating multidisciplinary cross-composite talents, built a mature integrated talent cultivation system with Outcome-Based Education (OBE), and formed a unique Shantou University characteristic. The “three comprehensive education” model is unique to Shantou University. On the premise of actively exploring the “three-wide education” model and education path that is suitable for China and its own reality, a university’s “multi-dimensional” political work system is designed, to cultivate students with international vision, independent personality, inquisitiveness, and innovation.

5. Conclusion
In recent years, moral education in universities has been paid more and more attention. As the basic concept of moral education in universities, the “three-wide education” emphasizes the importance of establishing a new national, whole process cultivating the all-round and continuous development of socialist construction. The comprehensive reform of “triple education” is an increasingly profound and gradual process. In practice, universities should, according to their own conditions and students’ characteristics, strengthen the cooperation of the education system for all, strengthen the effective interaction of the whole process of education, ensure the organic connection of high-quality education, and establish a long-term education mechanism. It has its own characteristics. Establish an effective mechanism for long-term education characterized by self-development.

Data Availability
The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest
The authors declare that they have no conflicts of interest to report regarding the present study.

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