

Research on the Optimization of Civics Content and Practical Path of Western Economics Course in Applied Colleges and Universities Based on Machine Learning

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ABSTRACT

The combination of the content of Civics and professional courses in colleges and universities is one of the important contents of general education in colleges and universities in recent years. The article introduces machine learning algorithms into this field to explore the optimization path of western economics course civics in colleges and universities. After developing the resources of western economics course civics, the content generation model of western economics course civics is constructed by using the content generation algorithm based on pre-training model and keyword-awareness, respectively. Then the text generation performance of the proposed content generation model is examined. The results of the teaching experiments of the experimental group and the control group are compared to explore the effectiveness of this paper's machine-learning-based content optimization and practice path of western economics course civics on improving students' performance. The F1 values of this paper's content generation model on the ROUGE-1, ROUGE-2, and ROUGE-L indicators are 39.06%, 24.79%, and 36.65%, respectively, which is the optimal performance among all models. The students in the experimental group and the control group had the same level of Civics in Western Economics course before the experiment. After the experiment, the two groups produced a score difference of about 5 points on the 8 content dimensions, and the p-values were all less than 0.05. The experimental group's postexperimental performance in course civics were all significantly improved ($p < 0.05$), while the control group basically remained at a level similar to that of the preexperiment ($p > 0.05$). The content optimization and practice path of western economics course Civics based on machine learning can significantly improve the learning effect of students.

Keywords: machine learning, content generation algorithm, curriculum Civics, content optimization

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1. Introduction

In today's deepening globalization, the importance of western economics as a basic theoretical course revealing human economic phenomena is self-evident. With the development and change of social economy, the teaching content and method of western economics also need to be updated and improved, especially the integration of “curriculum ideology and politics” into the reform and innovation of western economics teaching is the basic requirement to adapt to the development of higher education in the new era, and is also the realistic need to effectively reform the ideological and political education and teaching of western economics [1-4]. In addition, this integration is also an inevitable choice to resist Western neo-liberal economics and prevent the serious westernization of economics education, and it is also the mission of building socialist political economy with Chinese characteristics [5-8]. Therefore, it is of great practical significance and historical mission to integrate “curriculum politics” into the reform and innovation of Western economics teaching.

Western economics is a system of economic theories born and developed by bourgeois economists in the historical development of western capitalist countries in order to publicize the rationality of the capitalist system and advocate the superiority of the capitalist system [9-10]. Macroeconomics and microeconomics together constitute Western economics [11]. Western economics is essentially an economics that defends and serves the interests of the bourgeoisie, and Western economics generally avoids talking about the class nature of Western economics, but sees it as a super-class “neutral” economic theory [12-14]. Therefore, in the education and teaching of western economics, we should insist on learning and borrowing but also analyzing and criticizing, insisting on taking me as our master, using for me, and not copying the contents that reflect the attributes and values of the capitalist system and the contents that have the color of western ideology [15-18]. This is the importance of the reform of the ideological and political teaching of the Western economics course.

This paper combines the content of western economics with the content of civic politics to explore the path of optimizing and practicing the civic politics content of western economics courses. The Civics resources of the Western economics course are developed, and then the Civics content generation model of the Western economics course is constructed by the content generation algorithm based on the pre-training model and keyword-awareness, so as to realize the optimization of the Civics content of the Western economics course. The content generation model of this paper is compared with other models in terms of text quality, so as to test the performance of the machine learning content generation algorithm of this paper. Through the teaching experiment method, the changes in the Civics performance of the Western economics course of the experimental group and the control group before and after the experiment are compared, so as to verify whether the optimization of the Civics content of the Western economics course and the practical path of this paper are effective.

2. Optimization of the content of machine-learning-based curricular ideology

2.1. *The Path of Generating and Implementing Civics Content in Western Economics Courses*

1) Establish a new educational concept. Western economics course philosophy should actively adapt to the development of society, educators should focus on the content of western economics course philosophy about people's livelihood, and apply network means to make horizontal communication between western economics course philosophy collection and society. With the development of the network and the change of teaching mode, the school's western economics program should make appropriate innovation. First of all, the school should help students to establish the concept of keeping pace with the times, and introduce modern information technology to help personnel improve the efficiency and quality of teaching, and deeply understand the concept of innovation as a countermeasure in line with the current economic development. The task of the school's Western Economics Course Civics is not only to provide information, but also need to meet the multiple needs

of students and social development, so the school in carrying out and Western Economics Course Civics, should expand the target content of the Western Economics Course Civics, so that the teaching process can be exposed to a more comprehensive information. Educators need to guide students to establish innovative concepts, gradually improve the school's Western economics curriculum ideology system, and better cope with the challenges of the new economic era.

2) Innovative ways of thinking and politics in western economics courses. Under the informationization environment, many countries and regions have promoted new educational development measures. The application of various new technologies promotes the innovation of multimedia technology teaching mode, which plays a vital role in enhancing the comprehensive ability of students. The Western economics classroom has a wide range of knowledge and involves numerous information screening. In order to better carry out educational and teaching activities, teaching workers make more use of Internet science and technology to collect more learning materials and integrate learning materials. The development of economy and science and technology has gradually promoted the progress of education. The change of education teaching methods and space has also become the focus of the development of education. Relevant workers need to master network information technology, and at the same time need to combine the teaching objectives to carry out educational activities. At the present stage of the western economics course ideology and politics work needs to keep pace with the times in the teaching method, in the process of western economics course ideology and politics, we should establish a new education mechanism, focusing on the western economics course ideology and politics, and the dialectical education mechanism centered on hotspots and difficult issues, constantly expanding the scope of education and management thinking, and avoiding the negative thoughts to affect the effect of education and management.

2.2. Development of Civics Resources for Western Economics Courses

Curriculum Civic and Political Resource Development is a systematic project [19], this section focuses on the strategy of Civic and Political Resource Development for Western Economics courses in colleges and universities, and the process of curriculum Civic and Political Resource Development is shown in Figure 1.

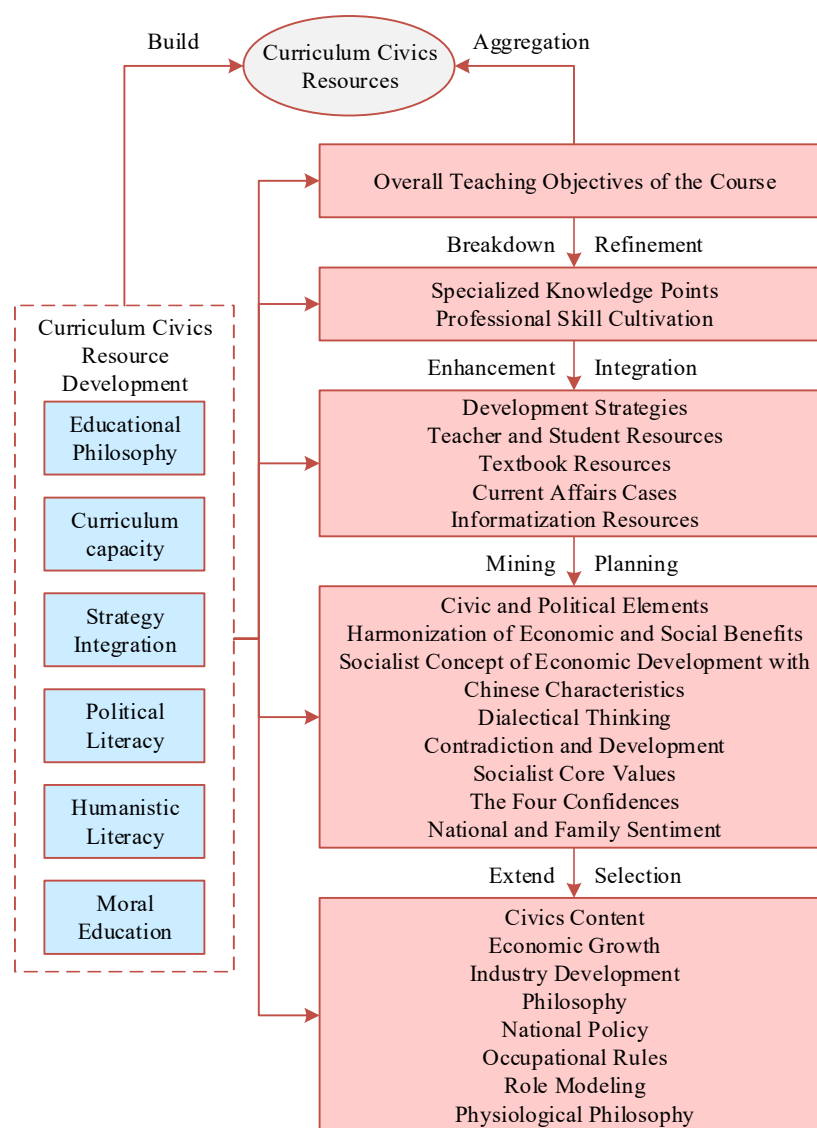


Fig. 1. Curriculum political and ideological resource development flowchart

1) Emphasize the development of the resources of teachers and students in the western economics course. Teachers as an important part of the development of the curriculum Civics resources, the quality of teachers plays a decisive role in the quality of the development of curriculum resources. In the process of developing curriculum Civics resources, teachers will carry out activities such as textbook development and comprehensive inquiry development, but they often neglect the fact that teachers themselves are also very valuable resources. Teachers' unique life experience, interpersonal experience, knowledge system, thinking level, and values are also valuable resources that can be developed to effectively enrich the content of classroom teaching. Teachers' expressions and thinking patterns are the objects for students to imitate, which will have a subtle influence on students' language expressions and ways of life.

In addition, some of the current "Western Economics" teaching materials in being edited and written, although has tried to use the latest current cases, but the international economic and social situation is unpredictable, from the development of teaching materials to write the textbook content and then to proofreading and publishing, to go through a very long period of time, after a series of complex processes, the content of the published teaching materials is no longer up-to-date and timely, and if you wait for the second revision, it is not only costly, manpower, material resources, but also to spend

a lot of money. If we wait for the second revision, it will not only consume manpower and material resources, but also take more time. Therefore, the role of teachers becomes apparent. Teachers can sift and process real-life information related to economics to ensure that the teaching of Civics and Politics in the curriculum is in line with the economic and social development. Therefore, we should focus on the development of teachers themselves as a valuable subject resource, so that their position in the development of curriculum Civics resources is emphasized. The flow chart of teacher and student resource development is shown in Figure 2.

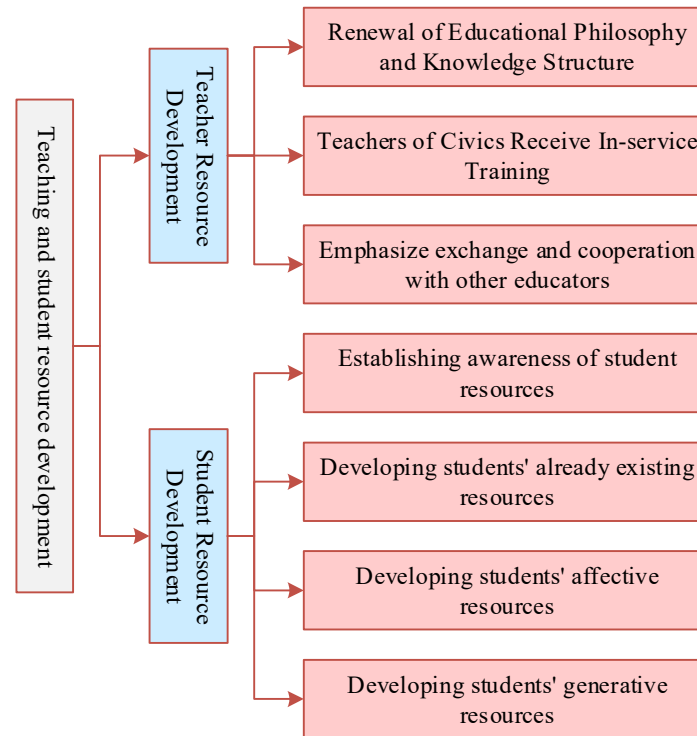


Fig. 2. Teacher and student resource development flowchart

2) Improve the integration of Western Economics textbooks with Civic Politics. The most commonly used resources for Civics in colleges and universities are textbooks. Western Economics is theoretical, difficult and low in interest, so the newly revised textbooks, from the outline to the content, to the way of presenting, and even the language style, should focus on the integration of Civics and enhance the interest, so as to make the preparation of textbooks serve the Civics of the curriculum.

To build a teaching material system based on academic knowledge and supported by ideological and political elements. With the gradual change in the goals and training modes of universities and the expansion of their scales of operation, the structure of the student population is also very different from that of the past, not only in terms of the scale of the student population, but also in terms of the quality of the student population. Therefore, it is all the more necessary to adjust and optimize the resources of teaching materials, re-plan the difficulty of the knowledge points in each chapter of the teaching materials to make them more suitable for the cultivation of the current quality and level of the student population, and to change the teaching material system that only focuses on the cultivation of disciplinary knowledge in the past and ignores the setting of ideological and political education. Based on the students' real life, fully explore the elements of ideology and politics in life, and put the theories of disciplines into the theme of ideology and politics elements, so as to play the role of the two complementing each other.

3) Fully develop current political news and case resources. In the process of developing the resources of course politics, current news resources and case resources are an important way of development. Taking current political news and cases as materials, this kind of development on the one hand regulates the atmosphere of the classroom of Western Economics, which is easy to arouse students' empathy, and on the other hand, it is also conducive to enriching students' knowledge.

The process of developing current political news, that is, the development of social hot news in the process of the course of political thinking resources. Teachers should take students' cognitive ability as the main focus, combine students' age level social experience and points of interest, and select current political information that can enhance students' professional ability and Civic and political literacy.

4) Strengthening the development of informatization resources of the Civics and Politics curriculum. The development and utilization of informatization resources of curriculum Civics and politics means to improve the ability of collecting, organizing and processing the information of curriculum Civics and politics with the help of informatization, so as to better serve the development of curriculum Civics and politics resources. The scope of informatization resources is very wide, including static webpage text and photos, dynamic audio and video, computer-based informatization platforms and mobile applications.

2.3. Western Economics Course Civics Content Generation

Neural network based generative tasks are using end-to-end based models. The model consists of an encoder and a decoder, and a self-attention mechanism is used in the encoder and the decoder, which enables the model to attend to the relationship between any words in the sentence, giving the model a better performance in understanding the text.

In this paper, a sequence-to-sequence based pre-trained model is used for the generation task, however, the text generated by existing methods is prone to words that are not semantically related to the original text, this study considers the importance of the keywords in the text sequences and incorporates the keyword sequences into the model for training to improve the quality of the content generation.

The content generation algorithm can be described as follows: input an original text sequence T and generate a series of question sequences related to it. The input text sequence T is defined as $T = [t_1, t_2, t_3, \dots, t_N]$, the output text sequence is defined as $Q = [q_1, q_2, q_3, \dots, q_M]$, N and M denote the lengths of the input and output, usually the text is partitioned into multiple words, and the multiple words are represented as vectors when they are inputted into the model, and T and Q can be understood as word embeddings, and then the natural language text generation can be defined as Equation (1):

$$\bar{Q} = \arg \max_Q P(Q|T) \quad (1)$$

where maximizes the probability of the output text sequence Q given the input sequence T . P is the maximized log-likelihood function.

2.3.1. Content generation algorithms based on pre-trained models:

1) Model Overview. In this paper, a Transformer-based encoder-decoder structure is designed, and the multi-head attention mechanism in Transformer enhances the model's ability to capture textual information. The pre-training phase uses the Bert model [20], but the bidirectional attention mechanism in Bert does not have the ability to generate, so the idea of UniLM model is combined and optimized when doing downstream task fine-tuning, so that the Bert's encoder layer is transformed

from the original bidirectional language model to a sequence-to-sequence language model. The model structure diagram is shown in Fig. 3.

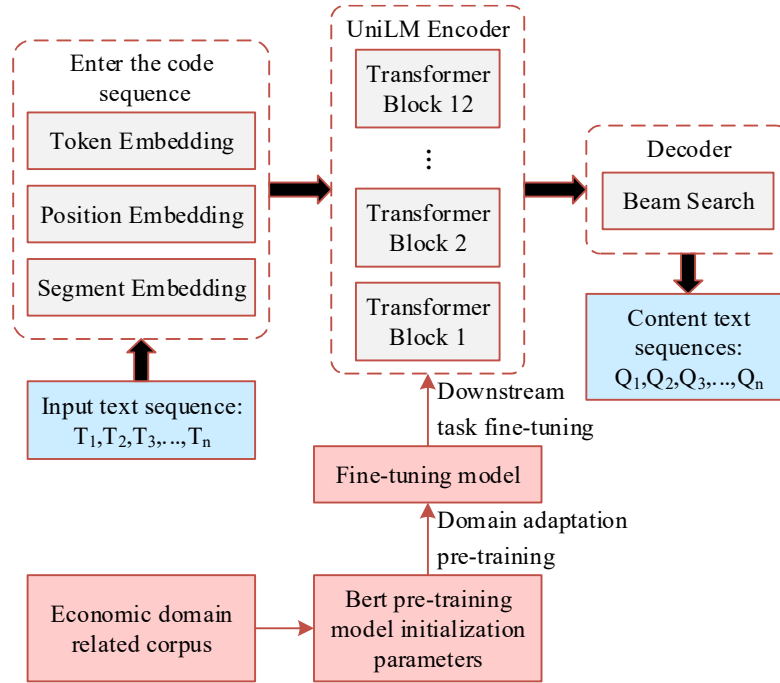


Fig. 3. Content generation model structure

The model is pre-trained-fine-tuned. In the pre-training phase, the model parameters are first initialized using the Bert pre-trained base model, and then adaptive pre-training is carried out on the unsupervised dataset in the domain. The pre-training is implemented by using the Masking Masking Strategy (MLM), a strategy which allows the Bert pre-trained model to acquire the general knowledge information in the domain. In the fine-tuning stage, the pre-trained fine-tuned model is used to initialize the UniLM model parameters, and the text sequences of the supervised corpus are encoded as inputs to the UniLM model, which is used for text sequence generation using Beam Search after an encoder-decoder-like structure.

2) Model Output. In the model fine-tuning training phase, the model input text format is processed and input to the model for training, the model training to get the last layer of the output vector so that each position of the vector can be used to represent the semantic information of the sentence, according to the position of the word to capture the word in the sentence to represent the deep semantic information, the model input and output as shown in Equation (2):

$$(E_{CLS}, E_1, E_2, \dots, E_n) = \text{UniLM}([CLS] \text{Text} [SEP] \text{Content } 2 [SEP] \text{Content } 1) \quad (2)$$

where E_{CLS} represents the deep semantic vector of the input text, which is fed as an input vector to the fully connected neural network for classification, the size of the hidden layer of the fully connected layer is set to 768, and the size of the output vector is the size of the word list, which is expressed as the probability of the candidate word in the final output of the model. The word probability of the model decoding output is used to cross entropy calculation with the original problem vector to get the loss, the goal of training is to minimize the loss value, and the loss value will be optimized through the optimizer for training to save the best model parameters.

In the model inference stage, the model input and output are shown in equation (3):

$$(E_{CLS}, E_1, E_2, \dots, E_n) = \text{UniLM}([CLS] \text{Text} [SEP] \text{Content text} [SEP]) \quad (3)$$

Using the saved model for inference generation, the Beam Search method is used to generate the content [21]. Since the model outputs each word of the target text in turn, the word with the highest probability in the final output probability of the model is selected as the first word in the generated target text y_1 . The word with the highest probability in the probability distribution based on the second output of the model is selected as the second word in the target content text y_2 . The process is repeated until a complete sequence of one text is generated $[y_1, y_2, \dots, y_n]$. Beam Search Not only considering the word with the highest probability in the probability distribution, but also using a cluster width K , representing the first Top-K words in the probability distribution, will eventually generate K questions, selecting the one that generates the probability of the text as the final generated text sequence.

2.3.2. Keyword-aware content generation algorithms. There are two steps for content text generation incorporating keyword information: keyword generation and content text generation. The details are as follows: firstly, the keywords are extracted from the original paragraphs and answers, the keywords are converted into text vectors and then the keyword vectors are combined with the output information of the model, and then the text is generated by the content generation model. For example, this paper proposes a keyword extraction method based on TextRank [22], which extracts key passages as well as keywords from the original text and fuses them into the model as features.

1) Keyword extraction. The keywords are extracted using the traditional TextRank algorithm with the following process:

(1) Text processing. Extract important textual information from the learned knowledge and process it to split the text into multiple sentence lists in sentence form.

(2) Extract candidate keywords from sentences. Firstly, the jieba library in Python is utilized to perform word splitting as well as lexical annotation for each sentence, eliminating stop words and retaining only nouns, verbs, adjectives, etc. in the text as candidate words.

(3) Candidate Keyword Sorting. Use TextRank algorithm to calculate to get the most important N word as a candidate keyword, and sort the keywords by importance.

(4) Determine input text keywords. The top K keywords are selected as the knowledge points to be included in the text.

TextRank uses the keyword co-occurrence based relationship used to construct the candidate keyword graph, the nodes in the graph are the candidate keywords, and the importance of each word is expressed by the formula for measuring the importance using (4), and then iteratively calculates the weight of each word until convergence:

$$S(v_i) = (1 - d) + d * \sum_{(j,i) \in \mathcal{E}} \frac{w_{ji}}{\sum_{v_{jk} \in \text{Out}(v_j)} w_{jk}} S(v_j) \quad (4)$$

2) Sequence-to-sequence generative model design incorporating keyword features. Incorporating keyword features on the basis of the pre-trained model, the process of designing the improved network structure includes:

(1) Preprocessing the raw text into the form of text-content text pairs and representing them as four embedding vectors as inputs to the network model.

(2) Changing the bidirectional self-attention mechanism, which is not generative, into a sequence-to-sequence self-attention mechanism containing an attention mask.

(3) Converting keywords into text vectors and combining them with the output of the model, and then generating content.

3. Analysis of practical effects

3.1. Content optimization effect

In order to investigate the quality of the text generated by the content generation model for the Western Economics course of Civics in this paper, we compare the text generation algorithms, such as Markov Chain Model (MCM), Recurrent Neural Network (RNN), Variational Auto-Encoder (VAE), Sequence to Sequence Model (Seq2Seq), and Bi-directional Long and Short-Term Memory Network (BiLSTM) with the content generation algorithms constructed in this paper. This paper adopts ROUGE, an assessment metric in the field of text content generation, to quantitatively evaluate the similarity between the generated content text and the ideal state, which is widely recognized for its high correlation with human subjective evaluation of text quality. Specifically, the metrics used in this paper include ROUGE-N (N=1,2) and ROUGE-L. The automated evaluation metrics, such as Precision, Recall, F1, Accuracy, etc., are used to evaluate and compare the quality of the texts obtained by different algorithms, and the experimental data are shown in Table 1. The ROUGE scores range from 0 to 100, and a higher score indicates that the content generated by the model is more similar to the ideal state. The higher the score, the stronger the consistency of the content generated by the model, thus reflecting the effectiveness and accuracy of the content generation process. With these objective evaluation criteria, the performance of the proposed method on the content text generation task can be comprehensively evaluated.

As can be seen from the experimental results in Table 1, the content generation method proposed in this paper significantly outperforms other models in all evaluation metrics. Among all the compared methods, the best performance in content text generation is the Seq2Seq model and the worst performance is the MCM model. Compared with Seq2Seq model, this paper's method achieves 10.34%, 19.93% and 15.07% improvement in ROUGE-1, ROUGE-2 and ROUGE-L metrics, respectively. The method of this paper achieves 44.29%, 65.60% and 42.33% improvement over the MCM model, respectively.

Table 1. Comparison of content text generation performance

Evaluation index		MCM	RNN	VAE	Seq2Seq	BiLSTM	Ours
ROUGE-1	Precision	29.40%	30.52%	32.04%	34.86%	33.12%	36.88%
	Recall	28.74%	32.04%	31.63%	35.17%	32.41%	39.58%
	F1	27.07%	30.05%	30.72%	35.40%	33.87%	39.06%
	Accuracy	28.51%	29.28%	30.58%	33.54%	30.76%	37.03%
ROUGE-2	Precision	17.94%	19.58%	18.35%	22.64%	19.42%	24.38%
	Recall	14.77%	18.64%	16.27%	20.32%	18.84%	24.90%
	F1	14.97%	18.13%	19.77%	20.67%	17.88%	24.79%
	Accuracy	18.56%	19.33%	21.18%	22.66%	19.77%	27.45%
ROUGE-L	Precision	25.25%	27.41%	30.07%	31.59%	30.86%	33.32%
	Recall	26.92%	28.22%	30.63%	33.58%	31.06%	38.71%
	F1	25.75%	29.52%	30.94%	31.85%	31.61%	36.65%
	Accuracy	27.74%	28.66%	30.84%	31.05%	29.14%	37.93%

3.2. Effectiveness of Civics Practice in the Curriculum

In this paper, we optimize the teaching content of the western economics course Civics through the content generation model constructed in the previous paper, and explore the practical teaching based on the generated teaching content. Two sophomore classes majoring in economics in Z school are selected as the objects of the teaching experiment, and one of them is randomly chosen as the experimental group and the other as the control group. The teaching experiment lasted for one

semester, during which machine learning algorithms were used to optimize the teaching content of the western economics course in the experimental group, while the teaching content of the control group was not adjusted in any way. By comparing the results of the western economics course civics of the two groups (new era microeconomics, new era macroeconomics, demand and supply, resource allocation, market failure and government regulation, inflation and deflation, macroeconomic policy, and the reality presentation of economic theory), we verify the effect of the optimization of the content of the civics of the western economics course and the practical path based on machine learning proposed in this paper.

3.2.1. Comparison between groups before the experiment. Before conducting the teaching experiment, an independent samples t-test was conducted on the performance of the experimental group and the control group in the Civics and Politics of Western Economics course to ensure that the performance of the two groups before the experiment was at the same level. The test results are shown in Table 2, where E and C represent the experimental and control groups, respectively.

The t-test results show that before the experiment, there is no significant difference between the test indicators of microeconomics in the new era, macroeconomics in the new era, demand and supply, resource allocation, market failure and government regulation, inflation and deflation, macroeconomic policy, and the presentation of the reality of economic theories between the students in the experimental group and the control group ($P > 0.05$), which means that the students of the randomly selected experimental group and the control group of the experiment are in the same level of achievement in the Civics and Politics of the Western Economics course before the experiment of their Western Economics Course Civics level is at the same level, which has no effect on the experimental effect.

Table 2. Comparison of pre-test western economics curriculum politics and ideology of 2 groups

Content	Group	N	Mean	SD	T	P
New era microeconomics	E	45	8.78	2.10	-0.248	0.625
	C	45	8.93	2.36		
New era macroeconomics	E	45	9.97	1.30	0.384	0.584
	C	45	9.71	1.99		
Demand and supply	E	45	8.90	1.60	0.352	0.742
	C	45	8.78	1.68		
Resource allocation	E	45	9.50	1.42	-0.304	0.693
	C	45	9.68	1.91		
Market failure and government regulation	E	45	9.67	2.57	-0.847	0.523
	C	45	10.05	2.23		
Inflation and deflation	E	45	9.37	2.42	0.157	0.723
	C	45	9.36	2.43		
Macroeconomic policy	E	45	8.96	3.01	0.625	0.812
	C	45	8.81	2.90		
The presentation of economic theory	E	45	9.37	2.78	0.372	0.831
	C	45	9.25	2.38		

3.2.2. Comparison between groups after the experiment. After one semester of teaching experiment, independent samples t-test was conducted again on the performance of western economics course Civics in the experimental group and control group, and the test results are shown in Table 3.

Observing Table 3, it can be found that there is a large gap between the experimental group and the control group in the eight content dimensions of the ideological and political performance of Western economics courses, and the scores of the experimental group are significantly higher than those of the control group, and the scores of the two groups in the eight dimensions of microeconomics in the new

era, macroeconomics in the new era, demand and supply, resource allocation, market failure and government regulation, inflation and deflation, macroeconomic policy, and the reality of economic theory are 6.28, 4.66, 6.06, 6.12, 4.83, and 5.64, respectively, 5.42 and 5.28 points, and the P values in the eight dimensions were all less than 0.05, which showed that there was a significant difference in the ideological and political performance of Western economics courses between the two groups.

Table 3. Comparison of post-test western economics curriculum politics and ideology of 2 groups

Content	Group	N	Mean	SD	T	P
New era microeconomics	E	45	15.84	4.55	3.578	0.001
	C	45	9.56	3.31		
New era macroeconomics	E	45	14.52	3.95	2.942	0.003
	C	45	9.86	2.05		
Demand and supply	E	45	15.92	5.06	3.853	0.001
	C	45	9.86	2.89		
Resource allocation	E	45	16.04	5.87	5.945	0.000
	C	45	9.92	2.79		
Market failure and government regulation	E	45	15.37	4.26	4.065	0.002
	C	45	10.54	3.32		
Inflation and deflation	E	45	15.62	3.89	5.726	0.001
	C	45	9.98	2.32		
Macroeconomic policy	E	45	14.88	3.27	4.205	0.002
	C	45	9.46	3.82		
The presentation of economic theory	E	45	15.29	6.04	4.385	0.003
	C	45	10.01	3.46		

3.2.3. Presentation of the teaching effect of the experimental group before and after the experiment. In order to more intuitively reflect the changes of the experimental group before and after the teaching experiment, the ideological and political performance of the experimental group was compared and the independent sample T-test was compared, and the results are shown in Table 4.

It can be seen from Table 4 that the ideological and political performance of Western economics courses in the experimental group has been significantly improved after the experiment, and the P values of each dimension are less than 0.05, and the experimental group has obtained 7.06, 4.55, 7.02, 6.54, 5.70, 6.25, 5.92, and 5.92 in the eight dimensions of microeconomics in the new era, macroeconomics in the new era, demand and supply, resource allocation, market failure and government regulation, inflation and deflation, macroeconomic policy, and the reality of economic theory, respectively. With an increase of 5.92 points, the content optimized by machine learning algorithm was used to teach, which effectively improved the ideological and political performance of the experimental group in Western economics courses.

Table 4. Comparison of western economics curriculum politics and ideology of experimental group

Content	Period	N	Mean	SD	T	P
New era microeconomics	Before	45	8.78	2.10	-9.585	0.002
	After	45	15.84	4.55		
New era macroeconomics	Before	45	9.97	1.30	-5.042	0.004
	After	45	14.52	3.95		
Demand and supply	Before	45	8.90	1.60	-8.974	0.002
	After	45	15.92	5.06		
Resource allocation	Before	45	9.50	1.42	-8.468	0.001

	After	45	16.04	5.87		
Market failure and government regulation	Before	45	9.67	2.57	-6.481	0.003
	After	45	15.37	4.26		
Inflation and deflation	Before	45	9.37	2.42	-5.948	0.003
	After	45	15.62	3.89		
Macroeconomic policy	Before	45	8.96	3.01	-5.964	0.003
	After	45	14.88	3.27		
The presentation of economic theory	Before	45	9.37	2.78	-6.438	0.003
	After	45	15.29	6.04		

3.2.4. Presentation of teaching effects in the control group before and after the experiment. The same within-group pre- and post-test comparisons of the control group's Civics scores in the Western Economics course were conducted to visualize the differences between the control group before and after the teaching experiment. The comparison results are shown in Table 5.

As can be seen from Table 5, the eight dimensions of the control group's western economics course Civics performance were improved after the experiment, but the improvement was small, with the dimensions improved by 0.63, 0.15, 1.08, 0.24, 0.49, 0.62, 0.65, 0.72 points, respectively, with $P > 0.05$. Thus, it can be seen that the control group's course Civics performance has not been significantly improved.

Table 5. Comparison of western economics curriculum politics and ideology of control group

Content	Period	N	Mean	SD	T	P
New era microeconomics	Before	45	8.93	2.36	-0.642	0.841
	After	45	9.56	3.31		
New era macroeconomics	Before	45	9.71	1.99	-0.895	0.685
	After	45	9.86	2.05		
Demand and supply	Before	45	8.78	1.68	-1.052	0.598
	After	45	9.86	2.89		
Resource allocation	Before	45	9.68	1.91	-0.342	0.879
	After	45	9.92	2.79		
Market failure and government regulation	Before	45	10.05	2.23	-0.528	0.736
	After	45	10.54	3.32		
Inflation and deflation	Before	45	9.36	2.43	-0.723	0.542
	After	45	9.98	2.32		
Macroeconomic policy	Before	45	8.81	2.90	-0.795	0.827
	After	45	9.46	3.82		
The presentation of economic theory	Before	45	9.25	2.38	-0.762	0.763
	After	45	10.01	3.46		

In summary, the experimental group optimized the content of western economics course through machine learning algorithms, which had a significant positive effect on its teaching effect, and its course Civics performance was significantly improved. In contrast, the control group did not achieve significant improvement in their performance in the course of Civics and Politics due to the use of traditional teaching content for teaching. It can be seen that the optimization of the content and practice path of western economics course based on machine learning is beneficial to the improvement of students' Civics learning effect.

4. Conclusion

The article combines the traditional western economics course with the course ideology, develops the

western economics course ideology resources, and constructs a machine learning-based course ideology content generation model to optimize the western economics course ideology content. After checking the text quality of the content generation model in this paper, we adopt the teaching experiment method to check the teaching effect of the practical path of course Civics in this paper.

The text quality generated by the content generation model of this paper is significantly better than other models. The F1 values on the ROUGE-1, ROUGE-2 and ROUGE-L indicators are 39.06%, 24.79% and 36.65%, respectively, which are 10.34%, 19.93% and 15.07% higher than those of the better-performing Seq2Seq model.

There is no heterogeneity in the level of Western Economics course Civics between students in the experimental and control groups before the experiment. After the experiment, the score difference between the experimental group and the control group in the eight content dimensions of the Western economics course Civics performance is around 5 points, and the differences in each dimension show significance. The experimental group's postexperimental course Civics scores all gained more than 5 points, and the p-value is less than 0.05, while the control group's scores in most of the dimensions gained less than 1 point, and the difference is not significant. The optimization of the content and practice path of western economics course Civics based on machine learning is much better than the traditional teaching path of western economics course Civics in terms of improving the learning effect.

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