ingegneria sismica
International Journal of Earthquake Engineering
Anno XLIII - Num. 1 - 2026

Construction of Immersion Teaching Content Generation Mechanism for Party History Education Integrated into Civics Courses of Colleges and Universities

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SUMMARY: *This paper intends to create an immersive teaching content generation path based on knowledge mapping and knowledge ontology to promote a high degree of fit between party history education and the Civics and Political Science curriculum. In the visualization of knowledge points of party history events, concepts and inter-concept relationships and related attributes are defined based on the information resources of party history events to construct a knowledge ontology. Based on the different mapping between knowledge concepts to establish the knowledge semantic model, and import nodes and node relationships in the knowledge graph library to build the knowledge graph of party history events. In addition, an ontology model in the form of a network is used to store the knowledge, encode the knowledge semantic information into a domain knowledge ontology based on the hierarchical relationship of the course, formally represent the knowledge ontology of the course, and divide, extend and extract the course concepts by using the top-down method. The method of calculating the amount of knowledge assists in adjusting the structure of courseware, generating the content of courseware based on the knowledge points of chapters, and forming the automatic generation model of courseware based on the domain ontology. By integrating the formalized course knowledge ontology and automatic courseware generation, we build an immersive teaching content generation model suitable for integrating Party history and Civic and political thinking. In the teaching application based on the immersive teaching content generation model, the students' experimental scores are concentrated in the interval of (60,95), which show statistically significant differences with the normative scores (P=0.000), indicating that the model can provide a solid tool support for the in-depth fusion of Party history and Civic and Political courses' teaching content generation in colleges and universities.*

KEYWORDS: *knowledge mapping; party history education; civic politics courses; teaching content generation; domain knowledge ontology*

1 Introduction

In February 2021, the Circular on Carrying Out Party History Study and Education in the Whole Party made arrangements for the deployment of Party history study and education. In April 2021, the General Office of the Ministry of Education issued the Circular on Strengthening the “Four Histories” Education Focusing on Party History Education in Civics and Political Science Courses, which put forward clear requirements for the development of the “Four Histories” education focusing on party history education in ideological and political science courses in universities, middle schools and elementary school. The Circular puts forward clear

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https://doi.org/10.65102/is2026018 Published: 30 April, 2026

requirements for carrying out education on the Four Histories in ideological and political classes in primary and secondary schools, focusing on education on Party history. It is especially important for colleges and universities to pay attention to the Party history education of young college students, so that they can learn history to understand reason, learn history to increase faith, learn history to advocate morality, and learn history to practice. Ideological and political theory course is the main channel to comprehensively implement the party's education policy and the key course to implement the fundamental task of establishing moral education, taking the party history learning and education as an opportunity to promote the integration of the party history education with the ideological and political courses in colleges and universities is a necessary initiative to strengthen the party history education for young college students [1-3]. Party history contains the richest, most vivid and persuasive teaching resources for ideological and political courses, and it is of great significance to promote the integration of party history education and ideological and political courses in colleges and universities to promote the reform and innovation of ideological and political courses in colleges and universities.

The history of the party is the most vivid and persuasive textbook, party history education integrated into the teaching of Civics can further enrich the teaching content of Civics courses in colleges and universities, help college students to establish a correct view of the party's history, promote college students to grow up as the new man of the times, and guide young students to be the strivers, pioneers, and dedicators who walk in the forefront of the times [4-6]. However, at present, there are still dilemmas and short boards in the integration of party history education into the ideology and politics courses in colleges and universities. For example, the Party history elements integrated into the educational content of the ideological and political courses in colleges and universities are not sufficiently mined, and the traditional methods of ideological and political education in colleges and universities are not rich enough [7, 8]. With the development of student-oriented teaching, college and university civic education is turning to new teaching modes such as interactive teaching and immersion teaching. Immersion teaching, as a new type of teaching mode, has the characteristics of subject participation, process practice, element interactivity, experience authenticity, immersion interactivity, etc. It follows the law of student cognition, which helps to practically promote the teaching reform and enhance the effectiveness of soul-casting and nurturing in practice [9-12]. In the stage of cognitive reconstruction, students gradually realize the organic integration of instrumental rationality and value rationality through information processing of the elements of Civics and Politics in the immersion experience and the stimulation of cognitive conflict [13-15]. In the process of information processing, teachers need to transform the abstract theories of Civics and Politics into figurative symbols of meaning in order to promote the effective transmission of the value of Civics and Politics education [16]. Therefore, it is of great value to promote the integration and development of Party history education and Civic and political education by constructing an immersive teaching content generation mechanism for Party history education to be integrated into the Civic and political education courses in colleges and universities.

In this paper, we first carry out the modeling of the knowledge ontology data of party history events, establish the semantic model and demonstrate the visualization process of the knowledge graph of party history events. Then, based on the Civics and Political Science course in colleges and universities, we design the formal representation of the course knowledge ontology, and propose the hierarchical extraction method of the course ontology in combination with the nature of the course. The calculation formulas of knowledge quantity of knowledge points and knowledge quantity of teaching modules are listed, and the ideas and realization methods of courseware content generation are constructed to comprehensively form an immersive teaching content generation model. Subsequently, the experimental teaching materials are selected based on the knowledge map of party history events, and the collection of textual event information of the teaching materials is subjectively visualized to complete the experimental setup. By evaluating the generalization ability of the model and the ablation experiment, the operation effect of the immersive teaching content generation model is verified. Finally, the teaching application experiment is carried out to generate corresponding teaching courseware using the immersive teaching content generation model, and the overlap between the courseware corpus is calculated to determine its feasibility. By comparing the students' normative Civics scores in Party history education with the experimental scores, the model's effect on content generation and even teaching is reflected.

2 Construction of Knowledge Graph of Party History Events

2.1 Data modeling

In the ontology design, it is necessary to clarify the keywords that can be extracted from the information resources of the party history events, define the concepts and inter-conceptual relations and related attributes after abstracting the keywords into concepts in the domain, and then describe them through the normalized language and constraints. After the ontology construction is completed, the concepts and relations of the ontology need to be transitioned to the graph database.

The hierarchical mapping between classes/attributes and the hierarchical mapping between relations need to be considered when the data of party history events are stored according to the form of graph database. Considering the subsequent knowledge reasoning, some of the core concepts are attribute split and reorganized, and the split and reorganized attributes are set as the new class/attribute hierarchical mapping. For example, the collection of event time, organization establishment time, and historical document publication time is set as a time entity table separately, and entity relationships are established with the party history events, historical documents and organizations respectively, so that the time is associated with the three, and the events or organization establishment or the publication of a certain document that happened at the same time can be queried through the time points during the subsequent knowledge discovery; also merged are the event occurrence At the same time, the location of the event, the location of the establishment of the organization and the location of its birth, and the characters of party history (i.e., the characters involved in the event) and the authors of the documents are also merged.

Based on the above mapping, establish a semantic model and conduct data organization and cleaning again. The semantic model is shown in Figure 1, where the "event" category is associated with the "person" category through the attribute "involved person", the "Historical document" category is associated with the "person" category through the attribute "author", and the "Party History figure" category is associated with the "place of birth" category through "place of birth". These attributes are all extracted as keywords based on text analysis. They include verbs and gerunds with a relatively high occurrence probability in the text, such as "born", "published", "proposed", "in..." In this model, "location occurrence" is transformed into attributes such as "birth and death time", "publication time", and "proposer of ideas and concepts".

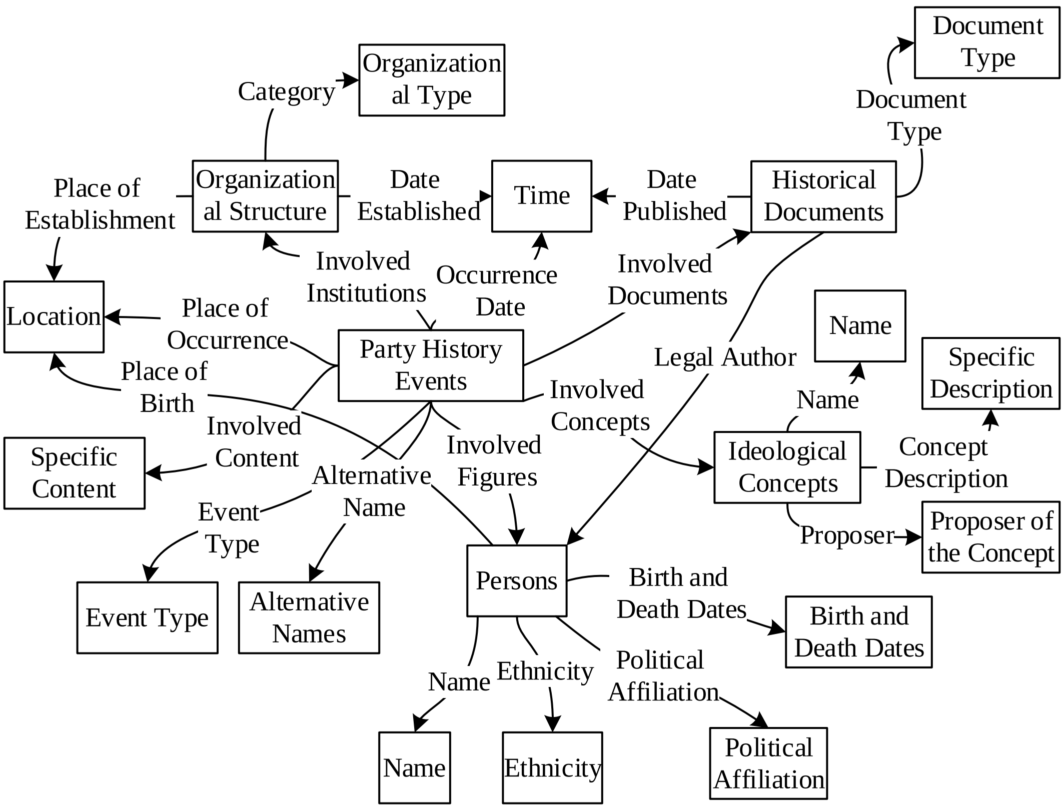

Figure 1: Semantic model of Party history events

2.2 Knowledge graph visualization

Through the data import in the previous subsection, the class/attribute hierarchical mapping and relationship hierarchical mapping of the extracted data have been stored in the graph database, and the already constructed EVENT database was opened, and a total of 1,168,942 nodes and 1,579 node relationships were imported.

Due to the large amount of data in the database, the number of nodes, and is limited by the lack of equipment and hardware, here can only do a partial display of the full picture of the graph, and through the event type will be all the events unfolding enumeration, to do a simple "event type - event" of the visualization of the demonstration, the specific visual analysis will be expanded in the next section in detail. In the database, enter the code "MATCH (n: 'event type') RETURN n", the dark blue node is the event type entity, the light blue node is the event entity, and the connecting line is the node relationship. The return shows 9 event types, expanding each event type to show all significant events, and further expanding the graph through nodes and node relationships to show a partial full picture of the graph.

3 A model for immersive content generation

3.1 Course knowledge ontology

The ontology of course knowledge is a formal expression of the concepts contained in knowledge points and the relationships between them. Knowledge points are described by the ontology of knowledge, and the cognitive structure corresponding to the classification attributes of knowledge types is established in the ontology of knowledge. The knowledge storage structure in the human brain is a network structure of knowledge points. When analyzing and solving problems, it is not to search all the knowledge points in the human brain in sequence, but to recall certain knowledge points based on the enlightenment of the problem itself. This association can be regarded as a search on the network. Therefore, organizing the storage of knowledge in the form of a network ontology model is naturally more in line with the true nature of knowledge compared to adopting a linear text structure.

3.1.1 Methods of representing and organizing curricular knowledge

A good knowledge representation and organization method should not only consider the theories and characteristics of cognitive psychology, but also take into account the techniques and methods of artificial intelligence, and none of the existing knowledge representation methods can well combine artificial intelligence and cognitive psychology, so a new knowledge representation method is needed, which is the conceptual web model based on the course ontology.

A curriculum knowledge ontology provides a consensus understanding of domain knowledge and identifies a commonly recognized vocabulary within the domain. In general, a curriculum knowledge ontology consists of concepts (attributes), concept (attribute) containment relationships, and instances. Among them, there are primitive and complex concepts (attributes), and complex concepts (attributes) are compounded from primitive concepts by constructive operators.

Based on the Semantic Web as the theoretical foundation, according to XML, RDF, RDF(S), and OWL recommended standards, we use the life cycle-based Methontology ontology creation technology, and construct the domain knowledge ontology metadata model with reference to the IEEE software development life cycle standard. On the basis of the knowledge ontology metadata model, we use the ontology description language OWL, and on the basis of XML syntax, we add semantic primitives based on description logic to the knowledge ontology metadata by using RDF and RDF Schema to construct the domain knowledge ontology and establish the knowledge ontology library, so as to realize the complex structural relationship between the domain knowledge and the knowledge points to represent and reason about them.

3.1.2 Formalized representation of course knowledge ontology

R denotes the root node of the domain and C_i denotes the concepts (courses) below the root, as in equation (1):

$$R = \bigcup_{i=1}^{n} C_i \tag{1}$$

n is the number of concepts in the domain, and the concept C_i consists of child nodes, which denote the sub-concepts (chapters) (SC_{ij}) of the concept, as in equation (2):

$$C_i = \bigcup_{j=1}^{n1} SC_{ij} \tag{2}$$

$n1$ is the number of subconcepts in the domain, and the subconcept SC_{ij} consists of subnodes, which denote the atomic concepts (nodes) of the subconcepts (MSC_{ijk}), as in equation (3):

$$SC_{ij} = \bigcup_{k=1}^{n2} MSC_{ijk} \tag{3}$$

$n2$ is the number of atomic concepts in the domain, and the atomic concept MSC_{ijk} consists of sub-nodes, which denote the meta-atomic concepts (knowledge points) of the atomic concepts $(MMSC_{ijkl})$ as in equation (4):

$$MSC_{ijk} = \bigcup_{l=1}^{n3} MMSC_{ijkl} \tag{4}$$

Using the OWL language, the above semantic information is encoded into a domain knowledge ontology based on the hierarchical relationship of courses. The root node denotes the relevant domain, the child nodes denote the courses included in the domain, and the leaf nodes denote the domain resources.

3.2 Extraction of concepts

3.2.1 Conceptual learning

A concept is a reflection of the nature of an objective thing by abstracting and generalizing it, and it is the most basic unit of human logical thinking. In the field of cognitive science and artificial intelligence, concepts are used as models of human knowledge. Conceptual learning refers to the learner's mastery of the common essential properties of a certain thing, implying that the learner is able to recognize the essential and non-essential properties of a certain type of thing. Conceptual learning is a more advanced form of meaningful learning, the essence of which is to master the common key features of similar things. Conceptual learning is an important part of learners' knowledge learning.

According to modern cognitive psychology, an individual's knowledge can be categorized into declarative and procedural knowledge. Declarative knowledge, also known as mnemonic knowledge, is mainly used to distinguish and identify things, and this type of knowledge can be acquired through memorization. Procedural knowledge, or operational knowledge, is essentially a set of operational steps and processes for acquiring specific knowledge. After the primary stage of declarative knowledge, individuals mainly engage in the learning of procedural knowledge. Procedural knowledge is essentially composed of concepts and rules, according to the different directionality of the applicable concepts and rules, procedural knowledge can be divided into two subclasses, one used to process external information is called intellectual skills, and the other used for internal regulation is called cognitive strategies, which are both advanced forms of knowledge learning. The learning of concepts and rules is an integral part of procedural knowledge learning, and rule learning is essentially an example of inter-conceptual relationships, which shows the foundational nature and importance of conceptual learning.

3.2.2 Hierarchical extraction of concepts

Traditional teaching materials and now most online courses still use chapter structure to organize teaching materials, although this chapter structure is carefully designed by subject experts, it has certain limitations because it does not meet the expansive and net-connectivity characteristics of human thinking. In this paper, instead of dividing and extracting concepts according to chapters, the basic concepts are extracted by extension layer by layer, starting from the concepts with the strongest generalization and inclusion ability in the course and working downward. The concepts divided and organized according to this method are more in line with the habits of human thinking and cognition.

The concepts in the ontology are organized according to the taxonomic viewpoint, forming a systematic classification structure. There are many ways to define the hierarchical structure of concepts, the most commonly used are top-down, bottom-up and synthesis methods:

(1) Top-down method, which starts by defining the most conventional concepts in the field and then proceeds to define more specific concepts.

(2) Bottom-up method, which starts by defining the most detailed and lowest level concepts, i.e., the leaf part of the hierarchy, and then combines the concepts of this part into more generalized and higher level concepts.

(3) The synthesis method, which is a method that combines the top-down and bottom-up methods.

In this paper, the top-down method is mainly used to divide the concepts of the course, starting from the largest concept in the field, “computer system”, and then inputting the word into WordNet for searching to check its definition and its relationship with other words.

From the search results, the definition and synonyms of the term can be extracted, which can be used to define other concepts according to this method. Here, the search results in WordNet and the needs of the course are combined to divide “computer systems” into two components: computer hardware systems and computer software systems, which are then refined to define the basic concepts of the entire course, and so on.

3.3 Automatic generation of models for courseware

In this paper, we study the automatic generation of courseware based on domain ontology, and its basic ideas are: automatically extract concepts and relationships between concepts from textbooks to generate domain ontology; extract concepts from domain ontology with the guidance of syllabus; extract the labeled content from textbook documents according to the labeled attributes of the concepts as the content of courseware for the concepts; and determine where the content corresponding to the concepts should be placed in the courseware carrier file of specified format based on the teaching guidance information (teaching objectives, key points, and dependency relationships when learning the concepts) provided in the concepts' attributes. According to the teaching guidance information provided by the attributes of the concept (teaching objectives, important and difficult points) and the predecessor and successor dependency relationship when learning the concept, the courseware content corresponding to the concept is determined to be placed in the specified format of the courseware carrier file, and the automatic generation of courseware is finally realized. In this paper, we choose powerpoint (ppt) files as the carrier of courseware content, and ppt format files are the most commonly used file types in courseware production.

By automatically extracting courseware content from domain ontology, on the one hand, the reuse of domain ontology can be realized, and on the other hand, the workload of teachers in creating courseware can be reduced.

The model structure of automatic generation of courseware based on domain ontology is shown in Figure 2.

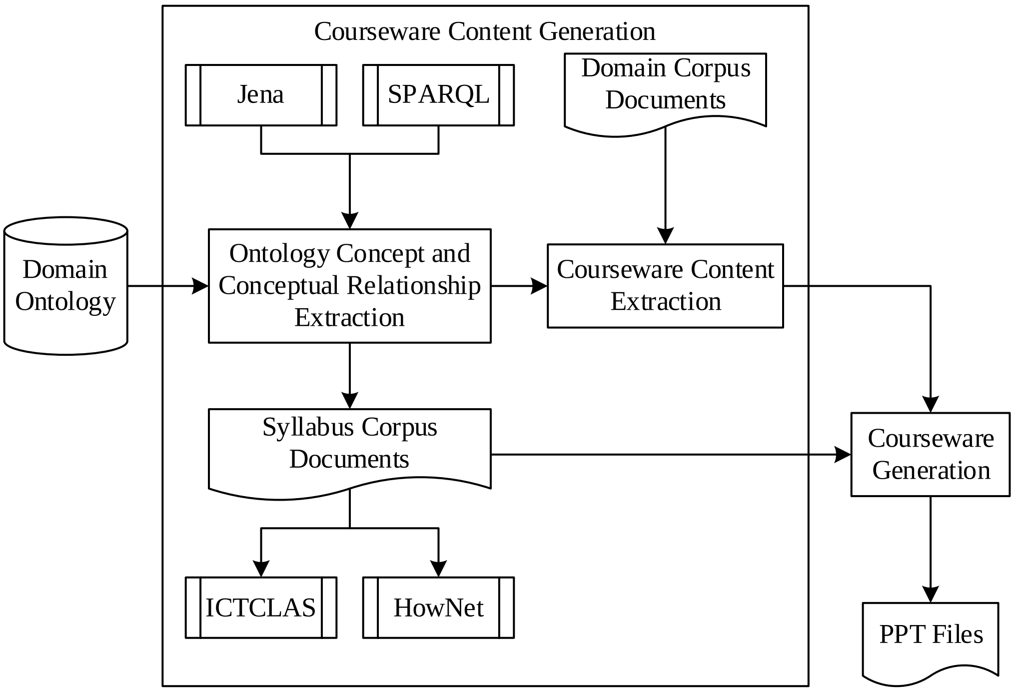

Figure 2: An automatic generation model of courseware based on domain ontology

As can be seen from the above figure, the automatic generation of courseware based on domain ontology consists of two main modules:

(1) Generation of courseware content. Study how to extract the corresponding concepts according to the knowledge points in the syllabus to the domain ontology, and obtain the courseware content of the concepts according to the relevant attributes of the concepts.

(2) Automatic generation of courseware. Study how to put the extracted courseware content into the courseware carrier file of the specified format according to the specified order.

3.3.1 Calculation of the amount of knowledge

The amount of knowledge has a very important impact on the placement of courseware content in the PowerPoint file.

However, in the actual teaching process, the measurement of knowledge quantity is affected by many factors: the teaching objectives of the knowledge points, the situation of the important and difficult points, the relationship between the knowledge points and so on. Due to the limitation of research time, this paper simplifies the measurement of knowledge quantity, and proposes a method of calculating knowledge quantity by combining the teaching objectives of knowledge points and the situation of important and difficult points.

The following describes various methods and formulas for calculating the amount of knowledge, which will be used in the section on automatic generation of courseware.

(1) Calculation of the amount of knowledge of knowledge points

In the definition of the teaching module M_i, the teaching objective of each knowledge point within the module is given through A_i, and the difficulty situation of each knowledge point within the module is given through D_i. If a knowledge point does not appear in the dichotomy of A_i, it means that the knowledge point has $a_k = 1$ and its teaching objective is to understand; if a knowledge point does not appear in the dichotomy of D_i, it means that the knowledge point has $d_k = 1$ and is a general knowledge point.

Since a knowledge point has both teaching goal attributes and difficulty attributes, the amount of knowledge to determine the knowledge point should be comprehensively considered these two factors. Moreover, the same knowledge point may appear in different sections of the same chapter, in which case the teaching objectives and key points of the knowledge point may also be different.

The binary relationship A_i between each knowledge point in K_i and its teaching objective, and the binary relationship D_i between each knowledge point and its difficult situation, can be expressed as a correspondence in Table 1.

Table 1: Teaching objective A_i and key and difficult points D_i

Know-ledge point	Teaching objective A_i			Key and difficult points D_i		
	Understand	Comprehend	Master	Ordinary	Difficult	Key
k_{i1}	…	…	…	…	…	…
k_{i2}	…	…	…	…	…	…
⋮	…	…	…	…	…	…
k_{ij}	…	…	…	…	…	…
⋮	…	…	…	…	…	…
k_{im}	…	…	…	…	…	…

The empty cells in the table above are filled in with the instructional objectives or emphasis measures that represent the knowledge points in the row in which this cell is located. Summing up the table by rows, you can get the amount of knowledge of the knowledge point in this row. For example, if the knowledge point k_{ij} of the teaching objectives for understanding, mastery, the difficulty of the situation for the difficult, key, then in the table above can be its representation in Table 2.

Table 2: Teaching objective A_i and key and difficult points D_i of knowledge point k_{ij}

Know-ledge point	Teaching objective A_i			Key and difficult points D_i		
	Understand	Comprehend	Master	Ordinary	Difficult	Key
k_{i1}	…	…	…	…	…	…
k_{i2}	…	…	…	…	…	…
⋮	…	…	…	…	…	…
k_{ij}	…	2	4	…	2	2
⋮	…	…	…	…	…	…
k_{im}	…	…	…	…	…	…

According to the set of teaching objectives A_i and the set of difficult points D_i, after filling in the metric values of the teaching objectives and difficult points that each knowledge point in the teaching module K_i has, the rows in the above table are cumulatively summed up and the knowledge quantity of the knowledge points represented by each row can be obtained.

The algorithm for calculating the knowledge quantity of each knowledge point in K_i can be described as follows:

1) $j=1$; $K_i=\{k_{i1},k_{i2},\cdots,k_{im}\}$; and m denotes the number of knowledge points in teaching module K_i;

2) Take out the knowledge point k_{ij} in K_i, $f_a(k_{ij})$ denotes the amount of knowledge of the knowledge point k_{ij} in terms of teaching objectives: $f_a(k_{ij})=0$; $f_d(k_{ij})$ denotes the amount of knowledge of the knowledge point k_{ij} in terms of the key points: $f_d(k_{ij})=0$; $f(k_{ij})$ denotes the amount of knowledge on knowledge point k_{ij};

3) Find the binary $\langle k_{ij},a_k\rangle$ in which k_{ij} occurs, element by element, in the set A_i that represents the pedagogical goal of the knowledge point, and for each time it is found, execute equation (5):

$$f_a(k_{ij})=f_a(k_{ij})+a_k \tag{5}$$

4) Find the binary $\langle k_{ij},d_k\rangle$ in which k_{ij} occurs, element by element in the set D_i that represents the case of knowledge point emphasis, and for each time it is found, execute equation (6):

$$f_d(k_{ij})=f_d(k_{ij})+d_k \tag{6}$$

5) $f(k_{ij})=1$ if both $f_a(k_{ij})$ and $f_d(k_{ij})$ are equal to 0; and Eq. (7) if $f_a(k_{ij})+f_d(k_{ij})\neq 0$:

$$f(k_{ij})=f_a(k_{ij})+f_d(k_{ij}) \tag{7}$$

6) $j++$;

7) If $j>m$, end; otherwise go to (2).

By the above algorithm, the knowledge quantity of each knowledge point k_{ij} in K_i can be calculated as $f(k_{ij})$.

(2) The calculation of the amount of knowledge of the teaching module

The cumulative summation of the knowledge amount of all knowledge points in K_i is shown in equation (8), and the knowledge amount of teaching module M_i can be obtained:

$$f(M_i)=\sum_{j=1}^{m} f(k_{ij}) \tag{8}$$

(3) Calculation of the total knowledge of the course

Cumulative summation of the knowledge of each teaching module is shown in equation (9) to get the total knowledge of the course:

$$f(M)=\sum_{i=1}^{n} f(M_i) \tag{9}$$

(4) Calculation of the amount of knowledge per credit hour

From the teaching module M_i of the definition of the 4-tuple can be taken from the proposed credit hours of this module L_i, take the amount of knowledge of the chapter $f(M_i)$ divided by the amount of credit hours L_i, you can get the amount of knowledge contained in each credit hour f_h, the calculation formula is as in equation (10):

$$f_h = f(M_i) / L_i \tag{10}$$

(5) Calculation of the amount of knowledge per ppt

Assuming that the number of ppt slides of the arranged courseware per credit hour is p_h, take the amount of knowledge contained in each credit hour f_h and divide it by the number of ppt slides per credit hour p_h to get the amount of knowledge contained in each ppt f_p, which is calculated as in equation (11):

$$f_p = f_h / p_h \tag{11}$$

3.3.2 Generation of courseware content

In the syllabus, the knowledge points are organized according to the teaching module, the teaching module where the knowledge point k_{ij} is located is M_i. There is a one-to-one correspondence between teaching modules and textbook chapters, there is always a textbook chapter B_k corresponding to teaching module M_i, and there is always a concept c_{kl} corresponding to knowledge point k_{ij} in textbook chapters.

The courseware content of a course consists of the courseware content of each chapter. When extracting courseware content by chapters, we first find the teaching modules corresponding to the textbook chapters in the syllabus. According to the learning sequence of each knowledge point in the teaching module, the concepts corresponding to each knowledge point are extracted, and according to the document labeling attributes of the concepts, the corresponding labeled contents are extracted from the textbook corpus document, which are the courseware contents.

The idea of extracting courseware content according to knowledge points is shown in Figure 3.

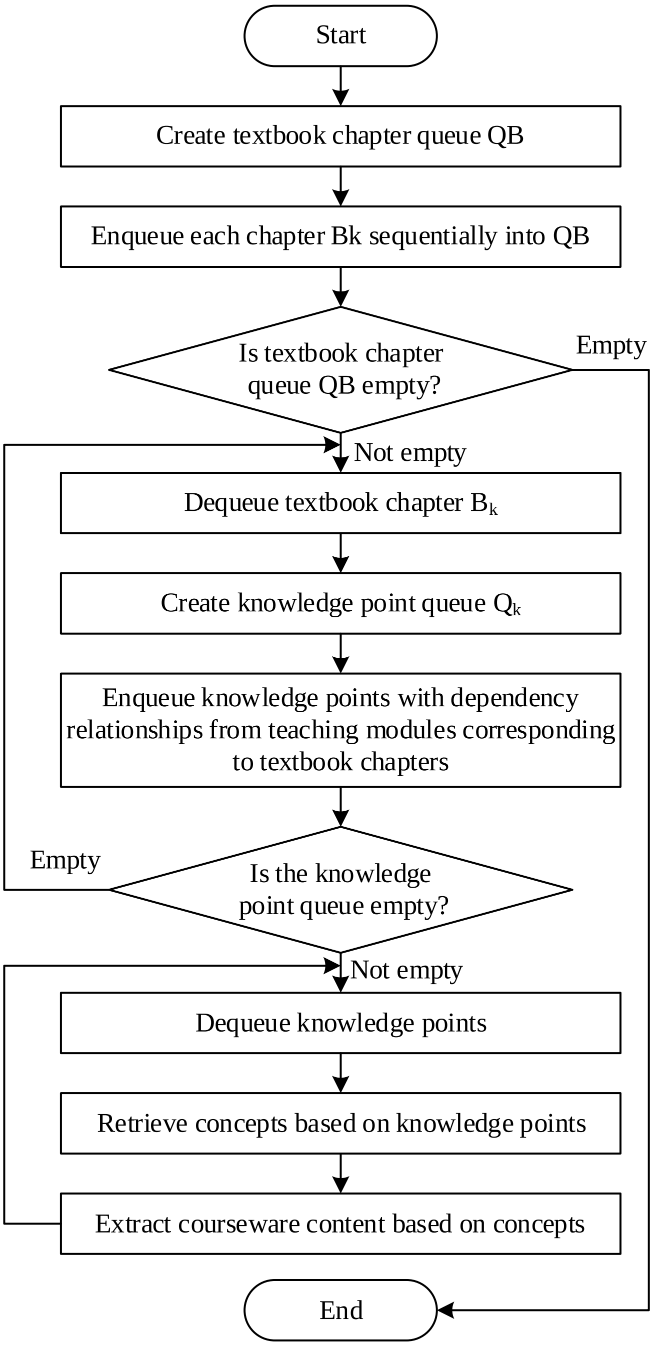

Figure 3: The process of extracting courseware content

4 Immersion Content Generation for Party History Education and Civics

In this paper, based on the knowledge graph of party history events constructed in the second chapter, the corresponding experimental teaching materials for the Civics and Politics courses in colleges and universities are selected, and the visualization of the topics of the experimental teaching materials is carried out in this chapter. Generalization ability and module ablation experiments are set up to verify the operational performance of the immersive teaching content generation model. Based on the model of this paper, we carry out immersive teaching content generation for Party history education and Civic and political courses, and test the overlap of the generated content and analyze the students' feedback.

4.1 Thematic Visualization

Analyzing the text data and the extracted time data in the experimental textbook, the content of the book is divided into 12 chapters based on different historical periods. According to the 12 chapters, the event data set is divided into 12 parts, and the number of extracted event data in each chapter is counted, and the distribution of the event data set is shown in Fig. 4. The number of extracted event data in each of the 12 chapters is in the range of (200,500), and the size difference is relatively small, i.e., the statistical values of the types of event data in each chapter have the feasibility of direct longitudinal comparisons.

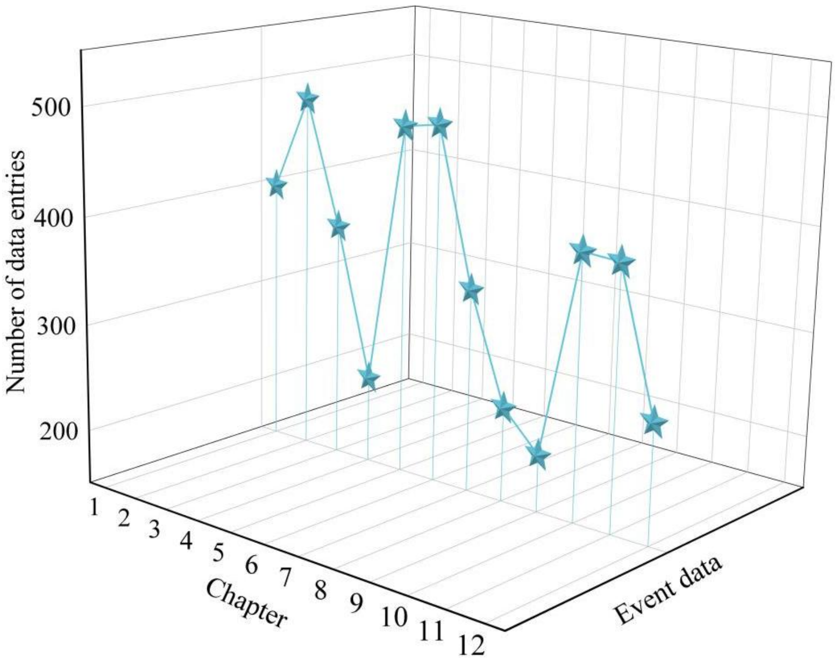

Figure 4: The distribution of event datasets

Add up all the statistical information to get the collection of event information of all chapter content texts, based on the total collection of events in the number of events sorted by the top 10 (U1-U10) types of events related to the theme of the times for the visualization is shown in Fig. 5. Through the change of the size of the circular scattering points, reflecting the overall development trend of the events along with the development of the times, which is the trend of development of the Party's history as well as the development of the red culture of the development of the vein is located.

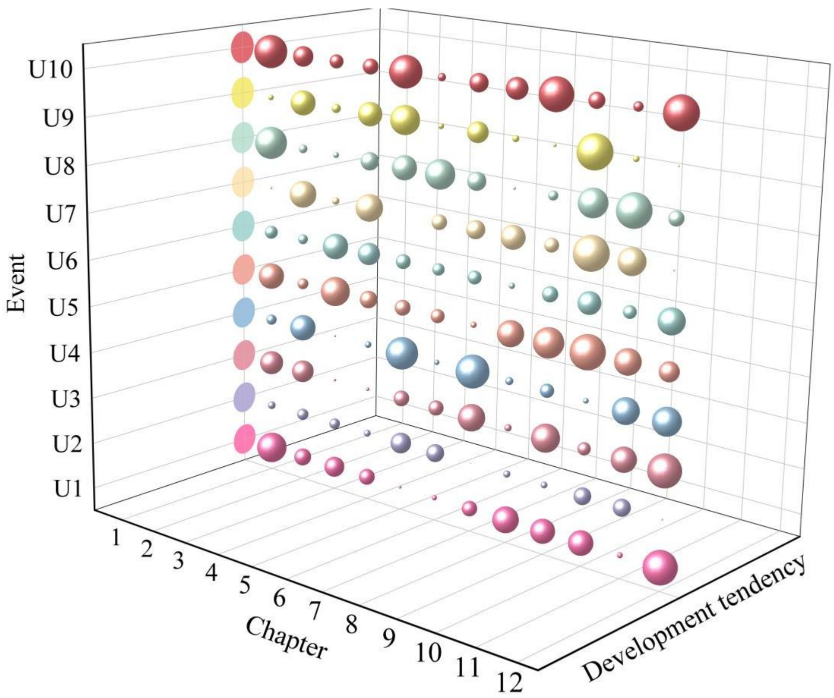

Figure 5: Visualization of event types

4.2 Analysis of the operational performance of the immersive instructional content generation model

As can be seen from Section 3, this paper constructs a model for immersive teaching content generation by formally representing the course knowledge ontology, hierarchically extracting knowledge concepts, and automatically generating teaching courseware based on domain generation. In this section, the model is applied to conduct knowledge extraction experiments on different base big language models, and its generalization ability is evaluated by calculating the missing rate (miss). Ablation experiments are also conducted for its Methontology technology module for knowledge ontology representation and organization, and its knowledge volume computation module to explore the impact of its technology components on the overall performance of the model.

4.2.1 Generalization capabilities

The selected base big language models are Qwen2-7B, Gemma2-9B, two medium scale models, and Qwen2-72B, Qwen-Max, Baichuan4, three larger scale models, of which Qwen2-7B, Qwen2-72B, Qwen-Max and Baichuan4 models use the same architecture. The knowledge extraction performance of this paper's model on the 12 chapters of the experimental textbook on the base big language model is shown in Table 3.On the whole, the big language model architecture and scale have less influence on the generalization ability of the immersive content generation model, and the immersive content generation model's missing rate in the five base big language models is 0.220~0.347, which is more adaptable and able to run stably in different scales of the big language models. Stable operation.

Table 3: The performance of large language models on different bases

Chapter	Total	Qwen2-7B	Gemma2-9B	Qwen2-72B	Qwen-Max	Baichuan4
1	66	12	16	8	14	5
2	21	23	1	4	3	11
3	28	0	0	6	7	1
4	33	34	9	4	2	7
5	17	0	4	1	12	5
6	18	2	0	16	1	4
7	61	12	3	0	33	10
8	18	2	1	12	8	2
9	25	25	4	0	3	6
10	25	4	5	8	6	30
11	14	2	17	19	0	15
12	11	1	14	2	18	2
Total	337	117	74	80	107	98
Miss	-	0.347	0.220	0.238	0.318	0.291

4.2.2 Ablation experiments

The impact of Methontology technology on the formal representation of the model's knowledge ontology is reflected by comparing the performance of the complete model with that of the removed Methontology technology module. The results of the Methontology technology module ablation experiments for the immersive content generation model are shown in Table 4, and the experiments are still carried out on the experimental textbook used above, and the experimental reference standard is the formal representation of the knowledge ontology of the original textbook. Percentage values are used to assess the model's ability to formally represent the knowledge ontology, with lower values indicating a weaker formal representation of the model.

Table 4: Ablation experiments of the Methontology technology module

Chapter	Standard	Complete model	-Methontology
1	40.00	85.42	39.48
2	45.00	89.12	46.42
3	32.00	89.34	55.69
4	38.00	91.21	53.38
5	55.00	91.77	71.46
6	30.00	89.03	48.91
7	44.00	95.87	55.68
8	57.00	93.13	47.01
9	50.00	86.24	69.94
10	46.00	86.21	67.08
11	55.00	93.73	74.54
12	54.00	89.37	45.54
Average	45.50	90.04	52.26

The ability of the complete immersive content generation model to formally represent the knowledge ontology for all 12 chapters of the experimental textbook is 85.00 and above, with an average ability value of 90.04, which is almost twice as much as that of the original textbook's knowledge ontology formalization (45.50). After removing the Methontology technology module, although the average knowledge ontology formalization ability of the model (52.26) is still higher than that of the original textbook knowledge ontology formalization, it shows a significant decrease compared to the full model, and the gap of knowledge ontology formalization between chapters is large and unstable.

The same steps as the ablation experiments of Methontology technology module, the results of the ablation experiments of Knowledge Volume Calculation module are shown in Table 5. 1-10 grades are used to indicate the reasonableness of the amount of knowledge generated by the model courseware, and the larger the value is, the stronger the reasonableness is, and the experimental reference is the manually-designed teaching courseware. On the whole, the reasonableness of the model generated knowledge volume after removing the knowledge volume calculation module (6.10) is not similar to that of manual design (6.86), but its reasonableness on different chapters fluctuates greatly and lags far behind the reasonableness of the complete model generated knowledge volume (9.04).

Table 5: The ablation experiment results of the knowledge volume calculation model

Chapter	Standard	Complete model	-Computing module
1	6.69	9.89	4.12
2	7.19	8.52	7.12
3	6.27	8.18	6.14
4	7.78	9.53	7.46
5	7.23	9.97	7.42
6	7.18	8.93	4.83
7	6.87	8.17	7.13
8	5.98	9.64	4.12
9	5.85	9.25	7.01
10	6.91	9.37	7.33
11	7.97	8.33	6.42
12	6.45	8.72	4.08
Average	6.86	9.04	6.10

4.3 Analysis of Teaching Effectiveness

4.3.1 Recombination test

Taking the second chapter of the experimental textbook as the theme, we set up 7 similar side points (V1-V7) related to the history of the Party, generated 7 pieces of corpus by using the model of this paper, and calculated the two-by-two overlap degree of the 7 pieces of corpus as shown in Fig. 6. It can be seen that the two-by-two overlap degree of the 7 pieces of corpus fluctuates from 10 to 30%, which is relatively low, and the differentiation between dialogues under the various side points is relatively high, and it can be presented as the teaching content directly. The dialogues can be presented directly as teaching content.

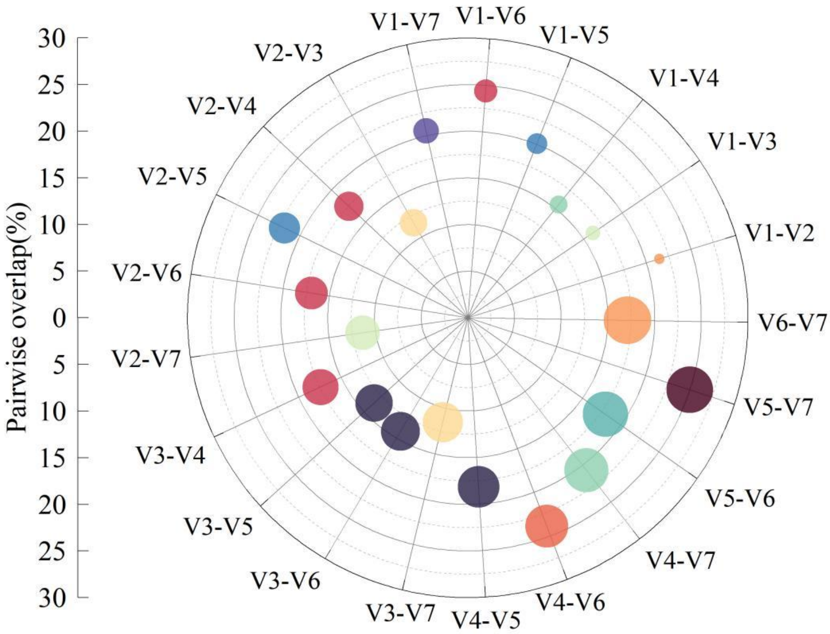

Figure 6: The degree of pairwise overlap of the corpus

4.3.2 Student feedback

In order to verify the matching degree of this paper's model in the integration of Party history education into the Civic and Political Science courses of colleges and universities, a model application experiment based on students' feedback is set up. A total of 3,436 students in the second year of a university were selected to start teaching and learning the Civics course with the theme of Party history education with the assistance of this paper's model, and after a six-month experiment, a test paper on the Civics course was issued to the students. The test paper is full of 100 points, a total of 3117 students test paper is valid, the effective rate of 90.72%, combing the sample of the distribution of the Civics normative scores and the distribution of the experimental scores are shown in Figure 7.

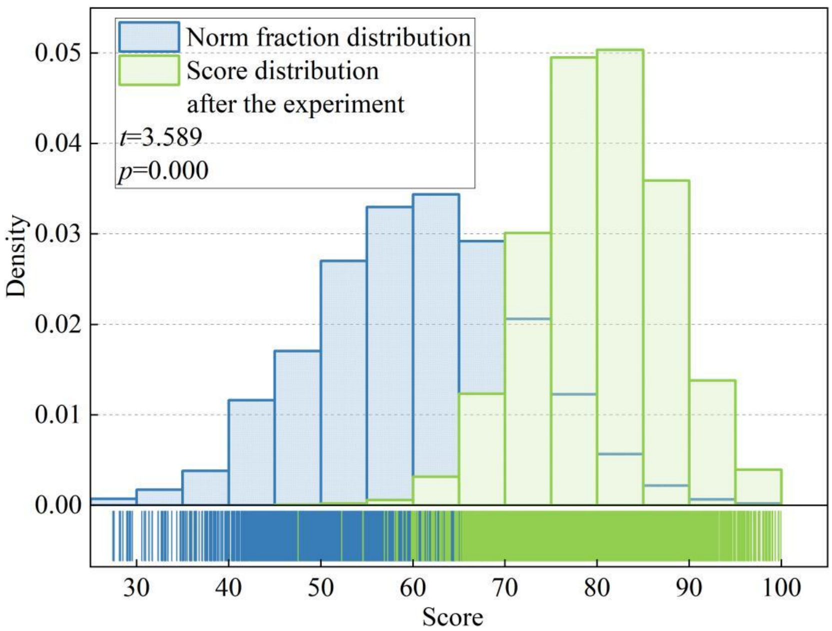

Figure 7: Distribution of experimental scores

The distribution of the sample's Civics lab scores is concentrated within the (60,95) interval and mostly within the 75~85 sub-section. On the other hand, the distribution of Civics normative scores is within the interval of (30,90), with a wide span of scores and mostly within the sub-section of 55~65. In the independent sample test between students' Civics normative scores and experimental scores, t=3.589, p=0.000, showing a statistically significant difference, which verifies that the immersive teaching content generation model is conducive to the formal representation of the knowledge ontology, the layering of knowledge concepts, the generation of classroom materials, and the control of the amount of knowledge, which is conducive to the effective integration of the Party's history education with the Civics courses in colleges and universities.

5 Conclusion

This paper proposes an immersive teaching content generation model, which innovatively uses Methontology ontology creation technology to construct domain knowledge ontologies and establish knowledge ontology libraries, and provides data references for the optimization of the content and structure of the courseware in the form of calculating the amount of knowledge. With the support of Methontology ontology creation technology, the model's formalized representation of knowledge ontology for 12 chapters of the experimental textbook has an average value of 90.04, and with the addition of the knowledge volume calculation module, the model generates courseware with an average knowledge volume of 9.04 for 12 chapters of the experimental textbook, which meets the teaching needs of the integration of Party history education and the Civic and Political Science course. And the overall model in a variety of base big language model of the missing rate are between 0.220 ~ 0.347, adaptability is strong, generalization ability is excellent.

Based on the constructed knowledge map of party history events and the immersive teaching content generation model in the actual teaching application, the overlap between two and two is between 10~30% in the seven pieces of corpus generated from seven different focuses under the same theme. And there is an overall sample of Civics scores concentrated in (60,95), compared with the normative scores (30,90) has an extremely significant improvement (p=0.000). By synthesizing the knowledge relationship between party history events to construct the course content knowledge map, and then automatically generating matching teaching courseware, it is a more successful attempt to construct an immersive teaching content generation mechanism for party history education and Civic and political courses.

About the Author

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References

[1] Sun, X. (2022). The Contemporary Meaning and Implementation Strategy of Integrating 100 Years of Party History into Ideological and Political Education System of Colleges and Universities. International Journal of New Developments in Education, 4(13).

[2] Yang, L., & Yang, F. (2022, December). Research on the Ways of Integrating Centennial

Party History Education into College Students' Ideological and Political Education. In 2022 6th International Seminar on Education, Management and Social Sciences (ISEMSS 2022) (pp. 542-549). Atlantis Press.

[3] WANG, J., SUN, F., YANG, Y., & YANG, Z. (2023). Exploration of integrating party history learning and education into ideological and political education in pharmaceutical colleges and universities. RESEARCHES IN HIGHER EDUCATION OF PHARMACY, 41(3), 1.

[4] Si, Y. (2022). On the influence of party history education on ideological and political education for medical students. Journal of Higher Education Research, 3(2), 141-145.

[5] Yan, G. (2024). Exploration of the Path for Undergraduate Party Organizations to Carry out Party History Learning and Education. Journal of Theory and Practice of Social Science, 4(02), 7-11.

[6] Jie, Z. (2025). Research on the Path of Integrating the Great Founding Spirit of the Party into Ideological and Political Education in Vocational Colleges. Journal of Social Science Humanities and Literature, 8(4), 55-60.

[7] Liu, X., Xiantong, Z., & Starkey, H. (2023). Ideological and political education in Chinese Universities: structures and practices. Asia Pacific Journal of Education, 43(2), 586-598.

[8] Ouyang, S., Zhang, W., Xu, J., Rashid, A. M., How, S. P., & Hassan, A. B. (2024). Unmasking the challenges in ideological and political education in China: A thematic review. Heliyon, 10(8).

[9] Phakamach, P., Senarith, P., & Wachirawongpaisarn, S. (2022). The metaverse in education: The future of immersive teaching & learning. RICE Journal of Creative Entrepreneurship and Management, 3(2), 75-88.

[10] LI, H. (2024). Construction of immersive teaching mode for. RESEARCHES IN HIGHER EDUCATION OF PHARMACY, 42(2), 26.

[11] Bai, J., & Li, H. (2019, January). Research on Project-driven Immersive Practical Teaching Style. In 3rd International Seminar on Education Innovation and Economic Management (SEIEM 2018) (pp. 517-520). Atlantis Press.

[12] Badilla-Quintana, M. G., & Sandoval-Henríquez, F. J. (2021). Students' immersive experience in initial teacher training in a virtual world to promote sustainable education: Interactivity, presence, and flow. Sustainability, 13(22), 12780.

[13] Zhao, J. (2022). Cognitive structure of college students and teaching strategies of ideological and political education under educational psychology. Frontiers in Psychology, 13, 892110.

[14] Aguayo, C., Videla-Reyes, R., & Veloz, T. (2023). Entangled cognition in immersive learning experience. Adaptive Behavior, 31(5), 497-515.

[15] Barrett, A., Zhang, N., & Wei, S. (2025). The Virtual Reality in Your Head: How Immersion and Mental Imagery Are Connected to Knowledge Retention. Educational

Psychology Review, 37(1), 9.

[16] Lyman, G. H. (2023). Perception, cognition and thought: part II symbolic processing and language. Cancer Investigation, 41(7), 617-620.