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Original Paper

Exploration of a Full Life Cycle model for Ideological and Political Education in Curriculum Based on Educational Big Data in the Context of Emerging Engineering Education—Taking General Education Courses in Information Technology as an Example

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Abstract

The construction of emerging engineering disciplines has raised higher requirements for the ideological and political literacy of engineering students, and ideological and political education in curriculum serves as an effective means to enhance their ideological and political literacy. Based on an analysis of the characteristics of ideological and political education integrated into information technology general education courses, this paper proposed a full lifecycle model for such education. It designs implementation methods for this model, including a three-dimensional integration approach based on educational big data and a quantitative evaluation method based on teaching and learning big data. Furthermore, using information technology general education courses as a carrier, this paper tests the effectiveness of the full lifecycle model for ideological and political education integrated into courses.

Keywords

ideological and political education in curriculum, full lifecycle, educational big data, three-dimensional integration, emerging engineering education

1. Introduction

At the National Conference on Ideological and Political Work in Colleges and Universities, the

President clearly stated: “All types of courses should move in the same direction as ideological and political theory courses, forming a synergistic effect.” (Xi, 2016) Curriculum-based ideological and political education refers to a form of ideological and political education that relies on the curriculum as a medium and organically combines the principles, requirements, and content of ideological and political education with course design, textbook development, course implementation, and course evaluation through implicit educational methods. (Lu, 2018) By embedding ideological and political education content into the teaching system of non-ideological and political courses, ideological and political education in curriculum ensures that college students form correct value cognition while acquiring professional knowledge, thereby achieving individual liberation and comprehensive development in the process of enhancing individual abilities. (Hu, 2019) Currently, the concept of ideological and political education in curriculum is increasingly gaining popularity, and conducting curriculum-based ideological and political education in non-ideological and political courses has become a necessary and important part of non-ideological and political course teaching.

The “Guide for Emerging Engineering Research and Practice Projects” emphasizes in the cultivation of new engineering talents that more attention should be paid to the guidance of concepts, adhering to the principles of cultivating students’ moral character and emphasizing both moral and academic education. It stresses the importance of enhancing engineering students’ patriotism, international vision, awareness of the rule of law, ecological awareness, and engineering ethics awareness, and focuses on cultivating the craftsman spirit of “striving for excellence and pursuing excellence” (Guidelines for the Construction of New Engineering Disciplines, 2017). The construction of emerging engineering has raised higher requirements for the ideological and political quality of engineering students, further highlighting the integration and penetration of ideological and political education in non-ideological and political courses in science and engineering majors. Chinese scholars have actively explored and practiced how to carry out ideological and political education in curriculum, construct an ideological and political education system, and combine it with the characteristics of school majors under the background of emerging engineering (Wu, Shen, & Xu, 2020; Huang, 2021; Zhou, He, Zhang et al., 2022). Educational big data, as a subset of big data in the field of education, includes data generated in teaching activities, data collected in educational management activities, data collected in scientific research activities, and data generated in campus life (Yang, Tang, & Li, 2016; Wang, Zeng, Liu et al., 2025). As an important part of teaching activities, ideological and political education in curriculum generates a large amount of data during its construction, management, and implementation. How to reasonably utilize these data to carry out research on the construction of ideological and political education in curriculum based on educational big data under the background of new engineering is of great practical significance for ideological and political education in curriculum under the background of emerging engineering.

2. Characteristic Analysis of Ideological and Political Education in Curriculum within General Education in Information Technology

Firstly, the broad coverage of students in the curriculum determines the sufficiency of implementing ideological and political education within information technology general education courses. As an important component of general education courses, information technology general education courses are compulsory basic courses for students majoring in science and engineering. With a wide range of students, implementing ideological and political education within these courses has a broad audience and can produce positive effects among the student population.

Secondly, the transitional nature of the start time of courses determines the necessity of implementing ideological and political education in general education courses in information technology. After entering university, freshmen face ideological, learning, and life transitions (referred to as the “three transitions”). It is particularly important to conduct ideological and political education during this transitional period. The start time of general education courses in information technology is during the first year of university, which is a golden period for college students to achieve the “three transitions”. Implementing ideological and political education in the teaching of general education courses in information technology is a deepening and expansion of ideological and political education, which can greatly promote students to improve their ideological and political quality through learning and practice, and better achieve the “three transitions”.

Thirdly, the construction of the Emerging Engineering Initiative requires more extensive and in-depth ideological and political education in general education courses related to information technology. The curriculum system of the New Engineering Initiative consists of general education and professional education. General education includes general basic courses and discipline-specific basic courses. The general basic courses mainly provide students majoring in the New Engineering Initiative with a wide range of humanities and social sciences, mathematics, and computer fundamentals [12]. The construction of the New Engineering Initiative requires students to possess good ideological and political qualities. As the basic education courses in the curriculum system of the New Engineering Initiative, general education courses related to information technology aim to cultivate students’ information literacy, computational thinking ability, and ractical ability in comprehensive computer application. They are the preferred courses for strengthening ideological and political education in the teaching ofNew Engineering Initiative courses.

Based on the higher requirements for students’ ideological and political quality in the construction of new engineering disciplines, this article explores the full lifecycle model and implementation methods of ideological and political education in information technology general education courses, combining the characteristics of such courses.

3. The Full Lifecycle Model of Ideological and Political Education in Curriculum

The full lifecycle is defined and applied differently across various industries or fields. Product

Lifecycle Management (PLM) refers to the management of information and processes throughout the entire lifecycle of a product, from demand, planning, design, production, distribution, operation, use, maintenance, to recycling, reuse, and disposal (Shen & Zhou, 2003). Building Lifecycle Management (BLM) encompasses information and processes throughout the entire construction process, including design, production, construction, operation and maintenance, as well as demolition and reuse (Qi & Li, 2014). Life Cycle Cost (LCC) refers to the total cost of research, design and development, production costs, use and support costs, and final disposal costs incurred throughout the entire lifecycle of a product, from its inception, through demonstration, research, design, development, production, use, to final disposal (Chen & Fang, 2022). This article posits that the full lifecycle refers to the entire process of a thing from its inception or birth to its end or demise.

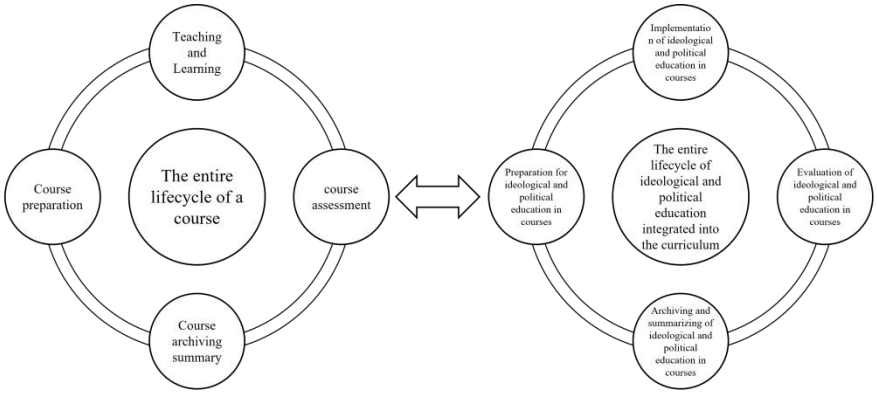


Figure 1. Schematic Diagram of the Integration of the Entire Life Cycle of Courses and the Entire Life Cycle of Ideological and Political Education in Curriculum

As shown in Figure 1, the full life cycle of a course refers to the entire process from course preparation, teaching and learning, assessment, to course summary and archiving. Ideological and political education based on the full life cycle of a course is implemented by teachers, targeted at students, carried out through courses, and implemented throughout the entire process of the course. The full life cycle model of ideological and political education in curriculum is a model where teachers prepare, implement, or summarize and improve ideological and political education at various stages or links of the course's full life cycle. It is a model where students actively participate throughout the entire process of course learning, assessment, and summary. It is a model where ideological and political education is organically integrated into the full life cycle of courses.

The entire lifecycle of ideological and political education integrated into the curriculum is highly integrated with the entire lifecycle of the curriculum. During the entire lifecycle of ideological and political education integrated into the curriculum, teachers carry out ideological and political education-related work in conjunction with course teaching throughout the entire lifecycle of the curriculum; students cultivate and enhance their scientific and technological literacy, innovation ability, and ideological and political quality through learning activities throughout the entire lifecycle of the

curriculum.

The full lifecycle model of ideological and political education in curriculum features full participation and closed-loop control throughout the entire process. Full participation means that both teachers and students are fully engaged in ideological and political education in curriculum, and neither is dispensable. Closed-loop control throughout the entire process indicates that the implementation of ideological and political education in curriculum is a dynamically evolving process that deepens as the course progresses.

4. Method for Carrying out Ideological and Political Education in Curriculum Based on the Full Life Cycle Model

4.1 Preparation for Ideological and Political Education in Curriculum

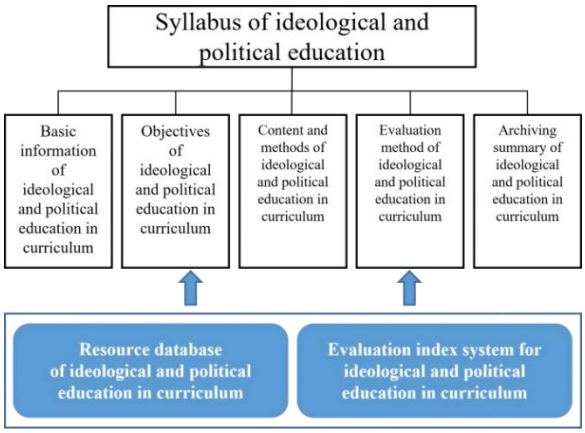


Figure 2. Schematic Diagram for Formulating the Curriculum Ideological and Political Education Syllabus

This stage primarily involves the formulation of the curriculum ideological and political education syllabus, the improvement of the curriculum ideological and political education resource library, and the revision of the curriculum ideological and political education evaluation index system. As shown in Figure 2, the curriculum ideological and political education syllabus encompasses four aspects: basic information, objectives, content and methods, as well as evaluation methods for the effectiveness of curriculum ideological and political education. Among these, the content and methods of curriculum ideological and political education are the focus when formulating the syllabus. This includes not only selecting appropriate content from the curriculum ideological and political education content library but also developing integration methods between the content of curriculum ideological and political education and the course teaching content, to avoid issues related to “coarse integration methods” (Cui & Ma, 2022). The evaluation methods for curriculum ideological and political education rely on the evaluation index system to quantitatively assess the effectiveness of such education. The improvement of the curriculum ideological and political education resource library provides case studies and data

resources to support the specific implementation of curriculum ideological and political education, while the revision of the curriculum ideological and political education evaluation index system provides quantitative standards for evaluating such education.

4.2 Implementation of Ideological and Political Education in Three-dimensional Integrated Curriculum Based on Educational Big Data

When implementing ideological and political education in curriculum, the foreign language teaching team at Yangzhou University adopts a blended teaching model that combines explicit and implicit methods, online and offline activities, and in-class and out-of-class learning. This model involves online guidance and preview before calss, offline intensive teaching and research during class, and consolidation and improvement after class (Yang & Zhang, 2022). This article believes that when implementing ideological and political education in curriculum through an online and offline blended model, it is necessary to grasp the overall planning of pre-class ideological and political education content, in-class ideological and political education content, and post-class ideological and political education. It is also important to integrate pre-class ideological and political education with pre-class online and offline blended preview and guidance, integrate in-class ideological and political education with in-class online and offline blended teaching conducted, and integrate post-class ideological and political education with post-class online and offline blended learning.

4.2.1 Coordinate the Pre-class, In-class and Post-class Ideological and Political Education Content

From a timeline perspective, ideological and political education integrated into the curriculum permeates the entire process and cycle of course teaching, encompassing pre-class ideological and political education, in-class ideological and political education and post-class ideological and political education. Furthermore, the rapid development of current artificial intelligence technology and network information technology has made online/offline blended teaching a norm. While paying attention to offline classroom teaching, ideological and political education in curriculum needs to consider the impact and impact of online learning on ideological and political education, and then make overall planning and integration of ideological and political education in curriculum for online/offline learning.

4.2.2 Integration of Pre-class Ideological and Political Education and Pre-class online and Offline Blended Preview and Guidance Based on Educational Big Data

Pre-class ideological and political education primarily focuses on the preparation for teaching and learning pre-classroom instruction, encompassing both teachers' preparation for pre-class ideological and political education and students' pre-class learning. For teachers' preparation, it involves utilizing educational big data to outline students' ideological and political quality profiles, and then preparing curriculum-based ideological and political education resources and designing curriculum-based ideological and political education plans based on this data. It is important to note that if flipped classroom teaching is adopted, teachers need to incorporate ideological and political content into the learning materials provided to students in advance. This content should primarily be online learning resources to facilitate students' learning. Student pre-class learning mainly involves a blended online

and offline pre-learning of classroom teaching content, ensuring full coverage of the entire learning period for curriculum-based ideological and political education.

4.2.3 Integration of In-class Ideological and Political Education with in-class online and offline Blended Teaching Based on Educational Big Data

In-class ideological and political education focuses on the classroom teaching period, taking into account various factors such as student distribution, teaching mode, and social objective environment. Online and offline blended classroom teaching has increasingly become the preferred mode of curriculum teaching. In terms of the design and implementation of in-class ideological and political education, based on big data in the education field such as teaching data and educational management data, combined with course content and ideological and political education requirements, methods such as case analysis are adopted to integrate ideological and political education content into teaching design. Ideological and political education content is smoothly introduced into classroom teaching without any abruptness, and combined with professional knowledge teaching, teaching and learning that integrates professional knowledge and ideological and political content is carried out. In terms of online and offline blended teaching, based on the data generated and collected during teaching activities, considering the low constraints of online teaching and the tendency of students' attention to be easily distracted, the targeted design and implementation of ideological and political education within the classroom are optimized, thereby enhancing the effectiveness of online teaching. Considering the student experience and teaching environment in offline teaching, teaching resource data and teaching environment data is analyzed and explored, highlighting the comprehensive application of in-class ideological and political education to online resources and smart education technology, to carry out immersive ideological and political education, enhance students' experience and sense of gain in in-class learning, and thus improve the effectiveness of in-class ideological and political education.

4.2.4 Integration of Post-class Ideological and Political Education with Post-class Online and offline Blended Learning Based on Teaching Data

Post-class ideological and political education primarily manifests in teachers' review, summarization and improvement of the implementation effectiveness of ideological and political education in the curriculum based on educational data, as well as students' consolidation and enhancement of ideological and political literacy in post-class learning. As teachers, while summarizing and improving the substantive content and process of curriculum teaching after class, they also carry out the summarization and improvement of the content of ideological and political education in the curriculum. Based on the objectives of ideological and political education in the curriculum, and utilizing teaching and learning data, teachers comprehensively employ big data cleaning methods, feature extraction engineering, and other means to refine the indicator features of curriculum teaching and ideological and political education. They introduce an evaluation system for ideological and political education in the curriculum, assess the effectiveness and shortcomings of ideological and political education in the curriculum, trace back to the crux of ideological and political education in the curriculum, propose

targeted improvement measures for ideological and political education in the curriculum, and construct a closed-loop feedback control model for ideological and political education in the curriculum. As students, based on quantified learning data, they generate learning content portraits to comprehensively measure their individual learning outcomes. At the same time, they extract learning feature indicators of ideological and political education in the curriculum, compare learning needs of ideological and political education in the curriculum, complete the evaluation of learning effects of ideological and political education in the curriculum, and carry out targeted consolidation of post-class ideological and political learning.

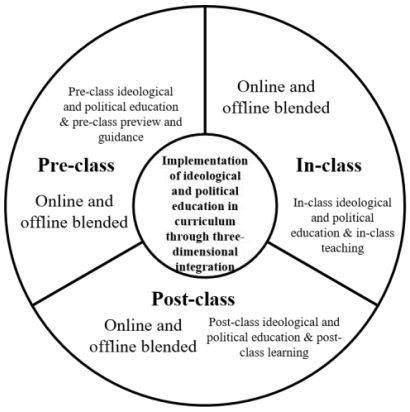


Figure 3. Schematic Diagram of the Implementation of Ideological and Political Education in Curriculum through Three-dimensional Integration

As shown in Figure 3, based on the coordination and integration of the above four aspects, the integration of three dimensions has been achieved: time (before, during, and post-class), online and offline, as well as the integration of ideological and political education content and course teaching content.

4.3 Quantitative Evaluation of Ideological and Political Education in Curriculum Based on Big Data from Teaching and Learning

The evaluation method for ideological and political education in curriculum is based on the evaluation methods outlined in the syllabus for ideological and political education in curriculum, with quantitative assessment. The evaluation of ideological and political education in curriculum is conducted with reference to the evaluation index system. The data for the evaluation of ideological and political education in curriculum comes from big data on course teaching and learning, including big data on pre- class learning activities and results, in-class learning activities and results, post-class learning activities and results, as well as course assessments. The evaluation of ideological and political education in curriculum is conducted after the completion of course assessments.

4.4 Archiving and Summarizing of Ideological and Political Education in Curriculum

After the evaluation of ideological and political education integrated into the curriculum is completed, the ideological and political education materials should be archived, and an analysis report on the

ideological and political education integrated into the curriculum should be formed. This will achieve a closed-loop control of experience summary and quality improvement in ideological and political education integrated into the curriculum, providing useful feedback for the subsequent development of ideological and political education integrated into the curriculum, and promoting a gradual spiral upward cycle of enhancing the effectiveness of ideological and political education integrated into the curriculum.

5. Practice and Reflection on the Full Life Cycle Model of Ideological and Political Education in Curriculum

5.1 Selection of Course Medium

In terms of the curriculum carrier, the information technology general education course "Computer and Internet" is selected as the practical carrier for the full lifecycle model of ideological and political education in the curriculum. The semester in which "Computer and Internet" is offered is the first semester of freshman year, which is a critical period for university freshmen to complete the "three transformations". It is of great significance to carry out ideological and political work among students during this stage.

5.2 Application and Effectiveness of the Full life Cycle Model

In terms of preparation for ideological and political education integrated into courses, emphasis is placed on the integration of ideological and political content into course teaching. When revising the course syllabus, the three-dimensional integration characteristics of ideological and political education implementation are fully considered, distinguishing between three periods: pre-class, in-class and post-class. The course teaching content is organically integrated with ideological and political education, and online teaching resources are fully utilized for further learning and consolidation, achieving the integration of online and offline learning.

Table 1. Design of Some Teaching Contents and Methods in the Teaching Syllabus of "Computer and Internet" Course

Teaching content	class hour	Learning achievement	Teaching segment	Support course objectives	teaching method	Ideological and Political education in curriculum cases
Overview of computers (1) Computer		1. Understand the history, classification,	**pre-class**: Watch online self-learning videos related to the computer overview	Goal 1 Goal 2	Problem-driven, lecture-bas	Sunway TaihuLight The story of

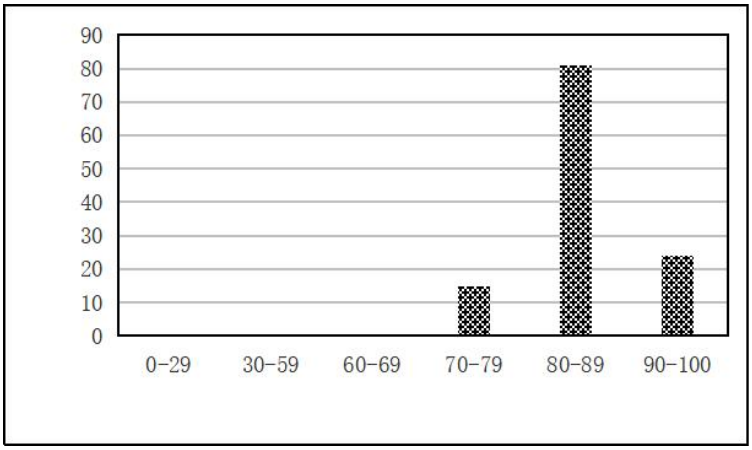
development and trends (2) Computer classification (3) Computer aplications	applications, and hot technologies of computers. 2. Stimulate students' interest in learning information technology. 3. Popularize information culture.	module, as well as videos expanding knowledge **(integrating ideological** and **political cases)**. **post-class**: Participate in online discussions (**incorporating ideological** and **political cases)** and complete online post-class exercises.		ed	a scientist
Representation of information in computers (1) Number system and its conversion (2) Representation of numerical data (3) Representation of non-numeric data	4	1. Understand the basic principle of using binary to represent information in computers. 2. Familiar with the representation of information in computers. 3. Master the conversion rules between different number systems.	**Before class:** Watch online self-study videos related to the information representation module in computer science, as well as videos for expanding knowledge. **During class:** Introduce the scenario and present the task (integrating ideological and political cases). First, teach the theory of information representation in computers. Then, analyze and discuss the task, and conduct classroom exercises and tests. **After class:** Complete the online post-class exercises and post-class thinking questions (integrated with ideological and political cases).	Goal 1 Goal 2 Goal 4	Classroom teaching, group teaching	The secret of mind reading

As shown in Table 1, this is part of the syllabus for the course "Computer and Internet". In formulating the course objectives, the requirements of the new engineering construction for the curriculum and

student abilities have been incorporated into the scope of the objectives. The course objectives are divided into multiple sub-objectives, among which the keywords in Objectives 1 and 4 include law-abiding, national interests, collective interests, teamwork, communication and autonomous learning, which are the requirements of the new engineering construction for students' ideological and political literacy. The teaching classes used in this article to examine ideological and political education in curriculum based on the full life cycle model are divided into four classes, with a total of 120 students.

Table 2. Distribution of Overall Scores in Students' Final Assessment Results

	Overall evaluation score and grade (Score)	number of students	Ratio (%)
Distribution of overall scores	0-29	0	0
	30-59	0	0
	60-69	0	0
	70-79	15	12.5
	80-89	81	67.5
	90-100	24	20



As shown in Table 2, no student's overall score in the final assessment was below 70 points. The rate of excellence reached 87.5%, the rate of excellence reached 20%, and the rate of good reached 67.5%. Compared to students who did not receive ideological and political education in curriculum adopting a full lifecycle approach, these students exhibited better learning outcomes, with significant improvements in their autonomous learning abilities and team collaboration skills.

6. Conclusion

In the context of the new engineering discipline construction, the implementation of ideological and political education reform in the form of a full life cycle model in general education courses on information technology in universities has innovated the mode of carrying out ideological and political education in curriculum, promoted the innovation of online and offline blended teaching models and enhanced students' comprehensive abilities such as political moral quality, team collaboration skills, and autonomous learning capabilities.

Acknowledgments

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References

Chen, X. C., & Fang, M. L. (2002). Overview of research on product life cycle cost in manufacturing industry. *Journal of Mechanical Engineering*, *2002*(11), 17-25.

Cui, Z. X., & Ma, W. L. (2022). Research on the functional utility, problem cruxes, and focus directions of ideological and political curriculum construction in the new era. *China Educational Technology*, *2022*(11), 82-89.

Guidelines for the Construction of New Engineering Disciplines ("Beijing Guidelines"). (2017). *Research in Higher Education of Engineering*, *2017*(04), 20-21.

Hu, H. B. (2019). Ideological and Political Education in Curriculum: From Theoretical Basis to Institutional Construction. *Chongqing Higher Education Research*, 7(1), 112-120.

Huang, Z. W. (2021). The Era Implication and Development Path of Ideological and Political Education in "New Engineering" Courses. *Journal of Southwest University (Social Science Edition)*, *47*(03), 162-168.

Lin, J. (2020). Reform and Construction of the Curriculum System for New Engineering Specialties. *Research in Higher Education of Engineering*, *2020*(01), 1-13+24.

Lu, D. K. (2018). Some Core Issues and Solutions in the Implementation of ideological and political education in curriculum - Based on the Discussion of Ideological and Political Education in Professional Courses. *Ideological & Theoretical Education*, *2018*(3), 64-69.

Qi, B. K., & Li, C. F. (2014). Research on the Whole Life Cycle Management of Prefabricated Buildings Based on BIM. *Construction Technology*, *43*(15), 25-29.

Shen, J. X., & Zhou, R. R. (2003). Research on the Framework and Key Technologies of Product Lifecycle Management System. *Journal of Nanjing University of Aeronautics and Astronautics (Natural Science Edition)*, *2003*(05), 565-571.

Wang, T., Zeng, Y. J., Liu, Q. T. et al. (2025). Governance System and Practical Path for the Circulation of Educational Data Elements Based on Trustworthy Data Space. *e-Education Research*, *46*(10), 39-46.

Wu, B. H., Shen, Y., & Xu, R. (2020). Exploration and Practice of Ideological and Political Construction in New Engineering Courses in Universities. *The Party Building and Ideological Education in Schools*, (21), 61-62+65.

Xi, j. P. (2016). *Integrating ideological and political work throughout the entire process of education and teaching*. http://www.xinhuanet.com//politics/2016-12/08/c_1120082577.htm

Xia, C. M., Jin, X. Y., & Zhang, H. (2022). Exploration and Practice of "ideological and political

education in curriculum" in Local Application-oriented Universities under the New Engineering Education Background. *Journal of Southeast University (Philosophy and Social Science)*, *24*(S2), 5-7.

Yang, X. C., & Zhang, Z. S. (2022). The Connotation, Issues, and Practical Paths of Ideological and Political Education in College Foreign Language Courses in the Context of Digital Transformation. *China Educational Technology*, *2022*(11), 75-81.

Yang, X. M., Tang, S. S., & Li, J. H. (2016). Developing Educational Big Data: Connotation, Value, and Challenges. *Modern Distance Education Research*, (01), 50-61.

Zhang, R., Wen, J. Y., & Li, H. B. et al. (2023). Design and Implementation of the Ideological and Political Education System in Courses under the New Engineering Education Background. *Transactions of China Electrotechnical Society*, *38*(11), 3094-3100.

Zhou, C. J., He, D. X., Zhang, Y. et al. (2022). Design and Implementation of Ideological and Political Education in Practical Courses for Automation Major in the Context of New Engineering Education. *Research in Higher Education of Engineering*, (04), 31-37.