Study on Application of Information and Communication Technologies to Chinese Curriculum Ideology and Politics

Junxia Ma, Qilin Liu, Zhifeng Zhang*, Ming Chen, Peipei Gu and Bo Wang
Software Engineering College, Zhengzhou University of Light Industry, Zhengzhou, China

***Abstract*—In the era of "Internet +", many new information and communications technologies (ICT) are developed, and have been applied in various fields including higher education. In this paper, we focus on the application of ICT on the curriculum ideology and politics (CIP) education in Chinese higher schools. In China, CIP is to integrate the quality education into every course, where specialized courses are no longer just cultivating professional abilities, and they jointly develop quality competencies for students. In this paper, we review current research status on the CIP education that is implemented and improved by ICT. And based on the review results, we present several challenges and opportunities to provide promising research and practice directions on CIP education. We hope that our work can promote progress of CIP in China, to cultivate more talents with high quality.**

***Index Terms*—ICT, education, ideology and politics, curriculum ideology and politics**

I. Introduction

Since the reform and opening-up, there are high growths in all areas, including the higher education, in China. China has the most students (4.183 millions) at higher schools in 2020 [1], [2]. The higher school is an important aspect of national technological innovation, and plays a key role in promoting technological progress and scientific innovation [3]. But for a long time, higher schools focused only on developing students' professional skills and neglected the moral education. This can have some serious consequences, such as lack of confidences and easily arose psychological problems for students.

To this end, Xi Jinping (the Communist Party of China (CPC) Central Committee and Chinese president), the State Council of the People's Republic of China and the Chinese Ministry of Education have repeatedly stressed the importance of the curriculum ideology and politics, and announced "We should insist on making moral education a central part of the curriculum, and carry out ideological and political work throughout the whole process of education and teaching, so as to achieve the complete and comprehensive education of the people". In order to carry out General Secretary Xi Jinping's important instruction, all universities are committed to forming the education environment that "every course has ideology and politics education, everyone talks about educating people, and everything focuses on educating morals", and making efforts to promote the "Three-All Education" that is "all staffs' participation, all-stage, and all-around" education, so as to fully carry out the fundamental task of moral education.

The curriculum ideology and politics (CIP) is to integrate the quality education into every courses, where specialized courses are no longer just cultivating professional abilities and they jointly develop quality competencies for students. However, the construction of the current CIP is still have some problems, such as the content homogenisation of CIP in different courses, lack of innovation and personalisation of the educational path, and insufficient cooperation among education subjects. These issues limit the role that CIP plays in Chinese universities.

In the new era of "Internet+", Internet and information technologies provide people with efficient ways for the resource sharing, integration, analysis, etc. For example, on online learning platforms or by new media (live webcast etc.), teachers can upload their teaching resources and students can learn with these resources anytime and anywhere. These technologies and platforms provide a strong support to effectively solve the problems in the construction of CIP. Based on the analysis of the influencing factors of online teaching platforms under the Internet background, it has been argued that curriculum ideology and politics will be vigorously combined with modern information technology integration to achieve better education effects, and curriculum ideological and political concepts will be more deeply rooted in the hearts of the people, and curriculum ideological and political teaching reforms will be more systematic and scientific [4].

Therefore, in this paper, we review the works studying the application of Internet and information technologies on the construction and improvement of CIP, to help relevant researchers to understand the research status of CIP improved by Internet and information technologies. In addition, based on the research status, we summarize several chances and challenges on CIP in the era of "Internet+", to provide some promising directions for researchers.

II. Literature Retrieval Method

To conduct a thorough and comprehensive review of the curriculum ideology and politics, we use the following litera-

The research was supported by Henan Higher Education Teaching Reform Research and Practice Project (Grant No. 2021SJGLX194, 2021SJGLX035, 2021SJGLX116Y, and 2021SJGLX197)

*Corresponding author

979-8-3503-9547-1/23/$31.00 ©2023 IEEE

ture retrieval method to try not to miss any high-quality related research work.

1) Retrieving the relevant papers by querying the Engineering Village Compendex database [5] and the Web of Science Core Collection [6] with the searching conditions (in the form of the query statement in Engineering Village Compendex database), **((curriculum ideology and politics) OR (ideology and politics in curriculum) OR (course ideology and politics) OR (ideology and politics in course)) AND (Internet OR online OR network OR communication OR (artificial intelligence) OR (data mining) OR (machine learning))**, to cover all high quality research papers;
2) the relevant references of the papers obtained in (1), (2) and (3) (a recursive procedure);
3) and the relevant literatures citing the papers obtained in (1), (2) and (3), which were achieved by Google Scholar [7] (a recursive procedure).

III. Literature Review

By the above literature retrieval method, we achieve 48 related works, by excluding researches not concerning the integration of ideology and politics education into specialized courses or public courses in Chinese colleges or universities. After reviewing these related works, these works studied the CIP in the era of "Internet+" from the following five aspects, as shown in Fig. 1. Due to the limitation of the paper length, we only present part of related works in references, and present others at github [1].

1) How to integrate the ideology and politics education into specialities efficiently and effectively? To introduce the ideology and politics education into specialized or public courses, the ideology and politics element (IPE) must be extracted from these courses according to their teaching contents at first. Aided by information and communication technologies (ICT) in the era of "Internet+", education subjects (teachers, school superintendents, school logistics, enterprises, society, etc.) can deeply mine IPE in new teaching platforms, and organically combine IPE for various specialities, according to the speciality characteristics that can be profiled accurately by these technologies. The combination of IPE should be performed in the whole process of talent training, including the designs and practices of training program, teaching contents and methods as well as the evaluation of each courses, faculty training, and so on, for every speciality.
2) How to improve the CIP integration and the practice effect of CIP? The development of various ICT provides massive resources and new (online) ways for the implementation of CIP, complement to traditional (offline) education way. And these developed technologies can be applied in every stage of the talent training for the CIP education effect improvement, by sharing learning resources, providing multiple learning approaches, stimulating interests, and so on for students.
3) How to evaluate the CIP education effect accurately? The traditional method for evaluating the education effect is mainly exam and grading by teachers. This method has some issues. The evaluation contents hardly cover all education gaols for every student only by the exam and teachers' grading, especially when there are too many students. The evaluated results are mainly decided by teachers, which is highly subjective, making the traditional method not suitable for the CIP education effect that is related to students' behaviors at anytime and anywhere. These issues can be addressed by ICT very well. The online learning platform provides a way for evaluating the CIP education effect almost everywhere almost all the time, which can provide a comprehensive evaluation solution. The data mining technologies can provide a new strategy for learning behaviors of students without any manpower, by online learning and mobile computing.
4) How to evaluate the CIP ability of teachers? Teachers has the most influence on college and university students in CIP education, as they are the people who educate the students directly. Therefore, the CIP education ability of teachers has a big impact on the CIP education effect. Thus, the faculty training must involve cultivate the CIP education ability for colleges and universities, and this ability should be one criterion of the certification requirements for teachers.
5) How to design personalized CIP learning/education strategies according the students' features? Different students has varied learning abilities, various interests and hobbies, different ICT capabilities, different levels of professional skills and quality. Therefore, a personalized CIP education path should be designed for each student to achieve a good effect. This can be implemented by ICT, where the featured data and resources can be collected by network and communication technologies, and the personalized CIP education path can be generated by artificial intelligence algorithms.

IV. Challenges and directions

Based on the above literature review, we present several opportunities and challenges for providing research and practice directions on CIP exploiting ICT under the background of "Internet+", as followings.

- Improving the collaboration of multi-level managements for CIP. The collaboration degree of the multi-level managements, school-college-department-speciality, has great influence on the practice of CIP in a college or university, and thus, to a large extent, determines the progress and effect of CIP education. The network and communication technologies provide great feasibility for a deep collaboration among managements in different levels, where almost all instructions can be delivered at close to light speed. And by exploiting the blockchain

[1] https://github.com/wangXJTU/Education/

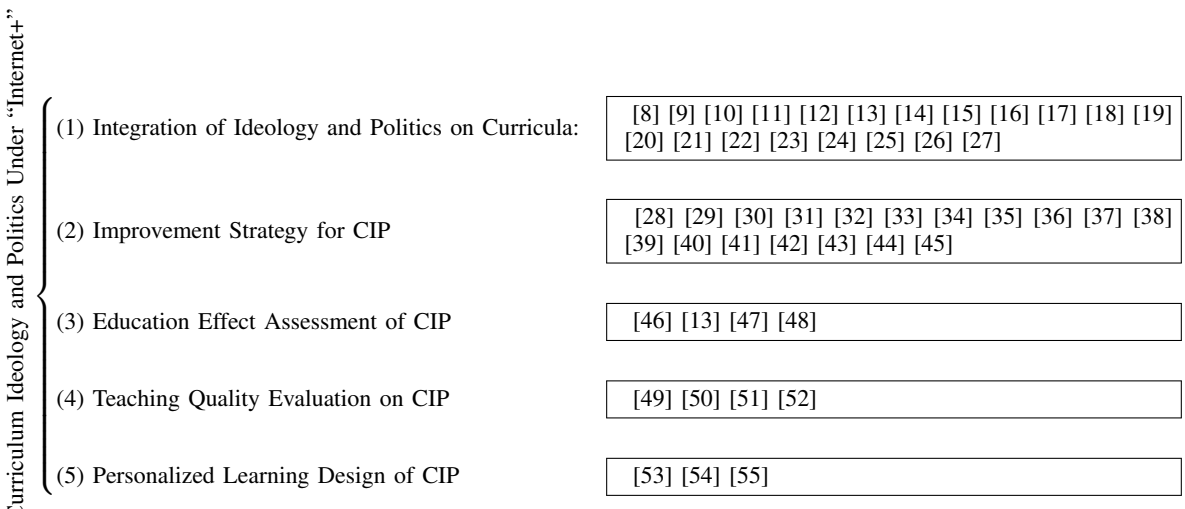

Fig. 1. The classification of studies on the application of information and communication technologies to Chinese curriculum ideology and politics.

security technology, the creditability of instructions can be ensured, and the execution procedure of instructions are recorded reliably and cannot be tampered. In addition, by Internet, the policy and its execution procedure can be exposed for students and their parents, teachers, enterprises, and the general public, to implement the supervisory and collect valuable advises.

- Comprehensively implementing collaborative education from all subjects. The CIP education of students (objects) never be the work of only teachers. It is the mission of all education subjects including objects themselves, faculty, enterprise, family, and society. To comprehensively improve the CIP education effect, these education subjects must collaborate with each other very well. Based on Internet and Web technologies, a collaborative education platform need to be developed to tightly coupled and share the responsibility among all of education subjects for the CIP education. The ideology and politics education ought not to be carried out only in curriculum teaching, and should infiltrated into every aspect of life, to subtly cultivate students' quality. This requirement is accordance with, and thus can be implemented by the ubiquitous network access.
- Characteristic-aware CIP construction for specialities. In Chinese higher education, 80% of the curriculum is specialist courses, and students spend 80% of their study time in developing specialist skills [56]. Therefore, CIP are mainly implemented by integrating ideology and politics into specialist courses. Different specialities have varied characteristics, and have various education effects when applying one integration strategy. Thus, the CIP integration strategy and its implementation must be customized for each speciality, which can get help from new ICT technologies. The Internet platform provides a huge amount of ideological and political resources, and new information technologies, e.g., big data and artificial intelligence, provide a support for the customization of specialist CIP education. Big data analysis and visualization tools can be used for establishing the logical relationship of CIP elements. Based on the CIP resources provided by Internet and the big data analysis, appropriate CIP integration strategy recommendation system can be designed for teacher teams of various specialized courses to construct the CIP. Similarity detection tools can be used to prevent the homogenization problem of different specialities.
- Personalized training of CIP abilities for teachers. In Chinese higher education, CIP has became an essential part of talent cultivation. Teachers are the guide to students in their growths, which are the direct implementer of CIP education. Thus, the CIP education ability should be an essential requirement for teachers. Due to the realization of CIP can hardly do without ICT, teachers need to have a certain ICT ability to provide an good effect. Internet technologies provide new ways to raise these abilities for teachers. Take advantage of the rapid and widespread dissemination of information in new media supported, the way to cognize CIP can be broadened, the cultural atmosphere of ideology and politics education in colleges and universities can be strengthened, and the mission identity can be enhanced. With rich cases of good CIP education effect on the Internet, the gratification of teachers can be enhanced by their implementation of the fundamental task of fostering virtue through education, and their emotional appeals on CIP can be increased. With big data and artificial intelligence, personalized training of improving CIP abilities can be designed for every teacher, based on the teacher's features of age, discipline, education background, work experience, etc. Meantime, incentives need to be tailored to combine guidance, rewards and punishment for advancing teachers' growths in CIP ability. This can prevent a decreased enthusiasm of teachers in CIP education, caused by the identical training strategy and standard requirement for all teachers. By big data technology, the demand and development tendency of state, society, and students can

be profiled, which can guide teachers for their self-developments.

- Targeted education for students. As digital natives, contemporary college and university students get information mainly from Internet, which provides new opportunities and challenges for targeted CIP education by Internet technologies. In the era of "Internet +", there are many new online learning platforms and ICT, e.g., MOOC, icourses, live interactive and short video platforms, communication software, virtual reality, and augmented reality, which can help for the deep integration of CIP, and improve the affinity and appeal of CIP. But the Internet is inundated with misinformation and fragmented knowledge that can result at negative effects. Therefore, education subjects need act as "gatekeeper", preventing students from wrong information. Collaborative filtering algorithms can be applied for finding and recommending high quality, positive, and personalized information for each student. By classification and clustering technologies, fragmented knowledge can be classified based on the CIP element, and organized by logical relationships of these knowledge and their CIP elements. And then, based on organized knowledge, personalised learning paths can be dynamically established for students according to their features and learning statuses. In addition, public opinion analysis and time series analysis technologies can be exploited to track the student statuses of CIP and emotion, and the personalised learning path can be tuning for each student, to prevent negative consequences timely.

V. Conclusion

In this paper, we focus on the curriculum ideology and politics in the era of "Internet+", to implement the fundamental task of foster character and civic virtue for Chinese higher education. We first retrieval related works based on Engineering Village Compendex database and the Web of Science Core Collection as well as Google scholar. Then, we review these related works in details, which can be classified into six categories. Based on reviewed results, we summarize several challenges and opportunities to provide promising research and practice directions. We hope that our work can promote progress of CIP in China, to cultivate more talents with high quality.

References

[1] Chinese Education Ministry, "*China Education Profile - National Education Development in 2020*," http://www.moe.gov.cn/jyb_sjzl/s5990/202111/t20211115_579974.html., November 2021.

[2] J. LI, Z. LI, S.-w. WANG, and X.-f. ZENG, "How new teachers adapt to the teaching of basic medicine in colleges and universities," *EDUCATION TEACHING FORUM*, vol. 2020, no. 8, pp. 29–30, 2020.

[3] Y. Wei, "Higher education - an important aspect of the country's technological innovation," *Qiu Shi*, vol. 2000, no. 10, pp. 27–30, 2000.

[4] C. Zeli, "Application analysis of influencing factors of online teaching platform under the internet background," in *2021 4th International Conference on E-Business, Information Management and Computer Science*, ser. EBIMCS 2021. New York, NY, USA: Association for Computing Machinery, 2021, p. 221–228.

[5] "Engineering village," https://www.engineeringvillage.com/, April 2023.

[6] "Web of science," http://apps.webofknowledge.com/, April 2023.

[7] "Google scholar," http://scholar.google.com/, April 2023.

[8] Y. Duan, "On the construction of course ideology and politics in online comprehensive english teaching based on cloud platform," in *The Sixth International Conference on Information Management and Technology*, ser. ICIMTECH 21. New York, NY, USA: Association for Computing Machinery, 2021.

[9] C. Zhu, "Reflections on the reform of curriculum ideological and political teaching mode in the era of artificial intelligence," in *International Symposium on Robotics, Artificial Intelligence, and Information Engineering (RAIIE 2022)*, Hohhot, China, 2022, p. 124542R.

[10] K. Li-Juan, X. Ji-Hui, and G. Jian-Guo, "Research and practice on the in-depth integration of curriculum politics and information technology in military academies," in *Proceedings - 2021 2nd International Conference on Education, Knowledge and Information Management, ICEKIM 2021*, Virtual, Xiamen, China, 2021, pp. 832 – 835.

[11] K. Zhang, "Research on online new media application in ideological and political construction of physical education curriculum," in *2022 7th International Conference on Multimedia and Image Processing*, ser. ICMIP 2022. New York, NY, USA: Association for Computing Machinery, 2022, p. 194–198. [Online]. Available: https://doi.org/10.1145/3517077.3517109

[12] J. Song, "Study on the methods of curriculum ideology and politics integration into the course of "basics of mechanical design" based on the data analysis by spss," in *2020 International Conference on Information Science and Education (ICISE-IE)*, 2020, pp. 691–695.

[13] X. Lin, Y. Wang, R. Zhang, T. Lin, J. Li, and X. Xue, "Ideological and political teaching reform: An introduction to artificial intelligence based on the obe concept," in *2022 11th International Conference on Educational and Information Technology (ICEIT)*, 2022, pp. 6–9.

[14] W. Sun, "Instructional design case study of curriculum ideological and political education in general chemistry based on online learning platform," in *2021 2nd International Conference on Artificial Intelligence and Education (ICAIE)*, 2021, pp. 502–505.

[15] J. Gao, X. Yang, Z. Gao, W. Jiang, C. Ren, and S. Zhang, "Research on the mixed teaching practice of curriculum ideological and political integration based on data analysis," in *2021 2nd International Conference on Information Science and Education (ICISE-IE)*, 2021, pp. 944–947.

[16] X. Gao, "Analysis on the construction path of "curriculum thought and politics" in higher vocational chinese teaching under the background of big data," in *2020 2nd International Conference on Applied Machine Learning (ICAML)*, 2020, pp. 208–211.

[17] Y. Han, "Research on the network platform construction of curriculum ideological and political education for college students," in *2020 13th International Conference on Intelligent Computation Technology and Automation (ICICTA)*, 2020, pp. 623–626.

[18] L. Qing and Y. Yan, "A preliminary study on integration of ideological, political courses into art curriculum of higher vocational colleges under 'intenet+'," in *2021 International Conference on Internet, Education and Information Technology (IEIT)*, 2021, pp. 445–448.

[19] H. Yuan, "Curriculum reform of integrating ideological and political education into advanced mathematics based on information-based teaching," in *International Conference on Artificial Intelligence and Information Technology in 2020 (ICAIIT 2020)*, Seoul, Korea, Republic of, 2020, p. 022091.

[20] X. Gao, S. Yang, and S. Li, "A practical exploration on ideological and political construction of curriculum in higher vocational colleges under the background of internet - - taking chinese tea culture as an example," in *3rd International Conference on Energy Resources and Sustainable Development (ICERSD 2020)*, Harbin, China, 2020, p. 05043.

[21] P. Li, Y. He, L. Meng, and Z. Liu, "Construction of "ideological and political course" in the undergraduate major of surgical nursing under the "internet +" teaching mode," in *2021 International Conference on Education, Information Management and Service Science (EIMSS)*, 2021, pp. 114–117.

[22] W. Ning and L. Huang, "Exploration of collaborative education mode of computer professional courses under the concept of curriculum ideological and political," in *Proceedings - 2020 2nd International Conference on Machine Learning, Big Data and Business Intelligence, MLBDBI 2020*, Chengdu, China, 2020, pp. 173 – 176.

[23] W. He and L. Yu, "Course on e-commerce in the context of internet strategies for ideological and political implementation and safeguard mechanism," in *2020 5th International Conference on Mechanical, Control and Computer Engineering (ICMCCE)*, 2020, pp. 1651–1654.

[24] X.-H. Yang, "The design of online cluster framework for infectious disease nursing courses in the era of big data," in *2022 3rd International Conference on Electronics and Sustainable Communication Systems (ICESC)*, 2022, pp. 1298–1301.

[25] B. Luo and Z.-s. Zhan, "Exploration on the application of circuit board design course combined with internet technology in vocational colleges," in *2021 2nd International Conference on Information Science and Education (ICISE-IE)*, 2021, pp. 193–196.

[26] J. Tan and J. Wan, "A study on the ideological and political teaching strategies of french professional english course from the perspective of new media," in *2021 7th Annual International Conference on Network and Information Systems for Computers (ICNISC)*, 2021, pp. 797–800.

[27] Z. W. He, "Research on the civic policy model and reform innovation of intelligent sensor technology course," *Journal of Sensors*, vol. 2022, p. 2499421, 2022.

[28] N. Wang, Q. Xu, X. Qi, C. Gao, and M. Li, "Statistical analysis based on spss and empirical research on curriculum ideology and politics implementation in professional basic courses: Digital communication course as an example," in *Proceedings - 2020 International Conference on Information Science and Education, ICISE-IE 2020*, Sanya, China, 2020, pp. 705 – 709.

[29] X. Huang, Y. Xie, and Y. Li, "Exploring online teaching design of curriculum politics by deep learning and visual sensing technology," *Computational Intelligence and Neuroscience*, vol. 2022, 2022.

[30] X. Wang, "The teaching reform exploration and practice of the curriculum ideological and political education in practical training course based on internet cloud platform," in *2021 International Conference on Education, Information Management and Service Science (EIMSS)*, 2021, pp. 305–308.

[31] X. Huang, J. Zhao, J. Fu, and X. Zhang, "Effectiveness of ideological and political education reform in universities based on data mining artificial intelligence technology," *Journal of Intelligent and Fuzzy Systems*, vol. 40, no. 2, pp. 3743 – 3754, 2021.

[32] S. Yang, X. Duan, and X. Gao, "A study on the path of ideological and political education in professional under the background of internet -- taking the applied economics and management specialty curriculum as an example," in *3rd International Conference on Energy Resources and Sustainable Development (ICERSD 2020)*, Harbin, China, 2020, p. 05042.

[33] F. Yang, Y. Rao, K. Wu, G. Wang, Y. Bao, and C. Liu, "Construction of curriculum ideological and political collaborative education mechanism based on edge computing and neural network algorithm," *Computational Intelligence and Neuroscience*, vol. 2022, p. 3596665, 2022.

[34] Y.-J. Huang, Y. Cheng, and Y.-Y. Hou, "Application study of the online and offline mixed teaching mode in ideological and political education mathematics course based on mooc: A case of mathematics course," in *2021 2nd International Conference on Artificial Intelligence and Education (ICAIE)*, 2021, pp. 353–356.

[35] C. Yang, H. Bao, W. Ma, and L. Wang, ""internet +" to promote the ideological and political construction of university courses," in *2020 4th Annual International Conference on Data Science and Business Analytics (ICDSBA)*, 2020, pp. 356–359.

[36] Z. Liu and Y. Mao, "Research on the teaching reform of ideological and political education in college mathematics based on information technology platform," in *2021 2nd International Conference on Information Science and Education (ICISE-IE)*, 2021, pp. 1394–1397.

[37] W. He, Y. He, H. Deng, and P. Li, "The exploration and practice of integrating ideological and political education into surgical nursing teaching on the basis of network," in *Proceedings - 2021 2nd International Conference on Artificial Intelligence and Education, ICAIE 2021*, Dali, China, 2021, pp. 738 – 742.

[38] H. Zheng, "Design and practice of ideological and political dynamic systematization of college english course based on web technology," in *Proceedings - 2022 3rd International Conference on Education, Knowledge and Information Management, ICEKIM 2022*, Virtual, Online, China, 2022, pp. 79 – 83.

[39] H. Hu and G. Liang, "Design of the ideological and political education platform for the teacher education public course in teachers colleges and universities based on the video on demand technology," *Advances in Intelligent Systems and Computing*, vol. 1117 AISC, pp. 1496 – 1502, 2020.

[40] N. Li, "An analysis on the teaching reform of human resource management major in colleges under the background of big data," *Advances in Intelligent Systems and Computing*, vol. 1343, pp. 866 – 870, 2021.

[41] S. Li and W. Han, "Design of distance education system for ideological and political courses of electronic engineering specialty based on big data," *Journal of Interconnection Networks*, vol. 22, p. 2147009, 2022.

[42] Y. Yang, D. Yu, and Y. Gao, "Research on the implementation path of ideological and political theory infiltrating the science and technology course teaching," in *Proceedings of the 5th International Conference on Distance Education and Learning*, ser. ICDEL 2020. New York, NY, USA: Association for Computing Machinery, 2020, p. 117–121.

[43] D. Kong, "Discussion on ideological and political education in the teaching reform of "refrigeration principles and equipment" based on new technologies," in *2021 2nd International Conference on Artificial Intelligence and Education (ICAIE)*, 2021, pp. 657–660.

[44] Z. M. Wen and R. D. Guo, "Exploration and practice of ideological and political content design of fluid mechanics based on multimedia technology," in *2021 2nd International Conference on Artificial Intelligence and Education (ICAIE)*, 2021, pp. 436–439.

[45] H. Zhang, "Design and implementation of english autonomous learning platform based on output oriented teaching mode," vol. 1343, Virtual, Online, 2021, pp. 921 – 924.

[46] Q. Mo, S. He, R. Tang, W. Liu, and W. Li, "Fuzzy comprehensive evaluation method of engineering curriculum ideology and politics based on extended triple helix model," in *MEMAT 2022 - 2nd International Conference on Mechanical Engineering, Intelligent Manufacturing and Automation Technology*, Guilin, Virtual, China, 2022, pp. 933 – 939.

[47] B. Wang, H. Yu, Y. Sun, Z. Zhang, and X. Qin, "An effect assessment system for curriculum ideology and politics based on students achievements in chinese engineering education," *International Journal of Advanced Computer Science and Applications*, vol. 14, no. 1, pp. 948 – 953, 2023.

[48] M. Li and C. Z. Luzi, "Influence of ideological and political integration of curriculum based on deep learning on the teaching design of sports aerobics," *Mathematical Problems in Engineering*, vol. 2022, p. 8018962, 2022.

[49] B. Liu and H. Cheng, "A stratified sampling method for teaching evaluation of curriculum ideological and political for higher education," in *Proceedings - 2022 3rd International Conference on Education, Knowledge and Information Management, ICEKIM 2022*, Virtual, Online, China, 2022, pp. 115 – 119.

[50] G. Li and Y. Qi, "Research on the competency model of university teachers under the background of curriculum ideological and political education," in *2021 3rd International Conference on Applied Machine Learning (ICAML)*, 2021, pp. 136–139.

[51] X. Lv, "A quality evaluation scheme for curriculum in ideological and political education based on data mining," in *2021 13th International Conference on Measuring Technology and Mechatronics Automation (ICMTMA)*, 2021, pp. 649–652.

[52] Q. Zhong, "Evaluation of traditional culture teaching efficiency by course ideological and political integration lightweight deep learning," *Computational Intelligence and Neuroscience*, vol. 2022, p. 3917618, 2022.

[53] J. Zhao, X. Yang, Q. Qiao, and L. Chen, "Personalized learning design of ideology and politics of distance education courses based on big data," in *Proceedings of 2020 IEEE International Conference on Progress in Informatics and Computing, PIC 2020*, Shanghai, China, 2020, pp. 135 – 139.

[54] G. Fan and F. Meng, "Personalized recommendation algorithm for curriculum- and politics-oriented hybrid teaching resources," in *2021 IEEE International Conference on Industrial Application of Artificial Intelligence (IAAI)*, 2021, pp. 361–366.

[55] Y. Zhao, "The practice of ideological and political construction of management communication course under the background of digital information teaching mode," in *2021 2nd International Conference on Information Science and Education (ICISE-IE)*, 2021, pp. 116–119.

[56] Party Review Article, "Striving to be a good "guide" for students," *The Party Building and Ideological Education in Schools*, vol. 539, no. 20, pp. 1–1, 2016.