Contemporary Education Frontiers, 2026, Volume 4, Issue 7
https://bbwpublisher.com/journal/CEF
Online ISSN: 3029-1860
Print ISSN: 3029-1879

Analysis of the Digital Transformation Path of Pedagogy Specialty in Colleges and Universities in the Era of Big Data

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Abstract: Big data promotes profound changes in basic education and also brings practical needs for the digital transformation of education majors in colleges and universities. Big data can help the transformation and development of pedagogy, but there are still some problems in the process of transformation, such as deviation in conceptual understanding, poor adaptability of curriculum resources, and insufficient ability to guarantee teachers' and students ' capabilities. In view of the above problems, we can create practical ways from three aspects: reconstructing curriculum supply, strengthening teacher training, and aggregating UGS collaborative resources, taking into account the effectiveness of data tools and the humanistic attributes of education, so as to provide a reference for the digital reform of pedagogy specialty in colleges and universities and the cultivation of big data teaching competence of normal students.

Keywords: Big data; Universities; Pedagogy; Digital transformation; Talent training; Professional construction

Online publication: July 26, 2026

1. Introduction

Based on the background of the digital development of basic education and the reshaping of classroom teaching forms by big data, this paper focuses on the cultivation of big data teaching competence of normal students, and discusses the internal logic of the digital transformation of pedagogy. The pedagogy major undertakes the mission of training normal students. Promoting digital transformation is not only an inevitable choice under the tide of basic education reform [1], but also an internal demand for realizing the goal of training normal talents. At present, there are still many practical obstacles in the digital transformation of education majors in some colleges and universities. Based on this, this paper analyzes the value and practical dilemma of transformation from the perspective of the cultivation of pedagogy professionals, and explores the implementation of digital transformation that can be implemented.

2. The era value of big data empowering the digital transformation of pedagogy major in colleges and universities

2.1. Empowering talent training and forging the big data teaching competence of normal university students

Under the background of the digital transformation of basic education, the intelligent classroom and online learning situation collection system have been popularized in most primary and secondary schools in China, which puts forward new ability requirements for normal students engaged in education in the future. The core of the cultivation of big data-enabled pedagogy professionals is not to train normal students to master all kinds of information-based teaching tools, but to shape the big data teaching competency of normal students. This ability covers the dimensions of recognition and interpretation of learning data, differentiated teaching design based on data, adjustment of teaching behavior based on data feedback, and adherence to educational data ethics [2].

The traditional pedagogy training system focuses on classical teaching skills such as teaching methods and classroom organization, and lacks the training of data-driven teaching-related abilities. The digital transformation of pedagogy specialty constructs the ability framework of normal students through data thinking, and completes the cultivation of talents in the digital classroom. Some normal universities introduce the simulation data set of learning situations in the trial training of normal students, guide students to study and judge the cognitive weaknesses of learners based on the data, and optimize the teaching design. This model can open up the school skill training and the real teaching scene in primary and secondary schools, and help normal students to establish a data-driven teaching mode of thinking in school.

2.2. Enabling professional construction and promoting the iterative upgrading of the connotation of pedagogy

The connotation construction of pedagogy specialty should not simply rely on experience judgment and subjective summary. Big data provides strong support for the transformation of pedagogy specialty from experience-driven to data-driven. In the process of professional education, microteaching records, course academic data, educational practice performance, graduates ' post-graduation feedback, and other information on normal students can be used as the basis for analysis after compliance processing. Colleges and universities can rely on the shortcomings of the above data mining talent training links to promote the dynamic optimization of talent training programs, curriculum modules and training systems. Through the statistical analysis of the internship data of many normal students, if it is identified that students cannot generally carry out stratified teaching based on the learning situation data, the major can add relevant thematic training content.

At the same time, big data can enrich the teaching and research paradigm of pedagogy. Teachers reflect on the teaching effect of the course with the help of teaching process data, promote the transformation of professional evaluation from the way of relying on written materials and qualitative summary to the comprehensive way of qualitative and quantitative data, and consolidate the connotative development data foundation of pedagogy.

2.3. Empowering the ecology of education and expanding the field boundary of education practice

Educational practice and teaching practice are important carriers of practical education in pedagogy. The

traditional model is affected by factors such as region, number of practice bases, and offline class hours. It has obvious limitations and is difficult to meet the needs of students ' practical development. Big data, cloud teaching and research platforms, and virtual simulation teaching systems can break through the limitations of time and space and broaden the field of practical education in pedagogy. Colleges and universities can establish a cloud practice channel with local primary and secondary schools. Normal students can observe the smart classroom of primary and secondary schools and participate in online joint teaching and research without leaving home. With the help of an AI simulation learning system, they can repeatedly polish the trial lecture and overcome the problem of insufficient supply of high-quality practice bases.

On the premise of protecting the privacy of teachers and students, colleges and universities can build a digital file of normal students ' practice, fully record the whole process of trial teaching, online observation, internship teaching and research, and realize the traceability of the practice process. The practice education ecology of online and offline integration can enrich the training forms and provide stratified practice training opportunities for normal students with different basic levels.

3. The realistic constraints faced by the digital transformation of pedagogy majors in colleges and universities from the perspective of big data

3.1. There is a deviation in cognition, and the practice of the big data education concept is insufficient

The effect of digital transformation depends on the cognitive level of university management and professional teachers. Some colleges and universities have a deviation in the understanding of the digital transformation of pedagogy. They simply equate digitization with hardware equipment iteration. The capital investment is concentrated on smart classrooms and platform procurement, but they ignore the deep reform of talent training models and curriculum systems.

Many pedagogy teachers recognize the instrumental value of big data, but fail to realize the deep-seated reform of education and teaching paradigm brought by it. They only regard big data as a tool for classroom demonstration, and fail to integrate data thinking and learning situation analysis logic into the teaching of the core curriculum of pedagogy. Although the talent training program is included in the relevant objectives of digital education, there is a lack of corresponding implementation measures in the aspects of curriculum setting and practical training arrangement, and big data education only stays at the conceptual level.

Some colleges and universities rely on scattered lectures to carry out the popularization of big data knowledge, and have not yet formed a chain of education throughout the whole process of training normal students, resulting in the disconnection between the construction of hardware resources and the pace of talent training reform, and it is difficult to transform digital construction into the effectiveness of talent training.

3.2. Insufficient curriculum adaptation and lagging construction of big data-oriented teaching resources

The curriculum system is an important carrier of digital transformation. In the pedagogy major of most colleges and universities, the relevant content of educational big data only exists in the course of " modern educational technology, " showing fragmented distribution characteristics. Core courses such as pedagogy principles, curriculum and teaching theory, and subject teaching methods rarely embed related topics such as educational data analysis and academic judgment. The content related to big data is separated from the main

courses of the major, and the problem of curriculum islands is more prominent.

There are also shortcomings in the construction of supporting teaching resources. Most of the existing public resources focus on big data technology commonly used in computers; they lack localized teaching cases and training projects suitable for the training of pedagogy normal students, lack analysis of learning situations in smart classrooms in primary and secondary schools, lack practical cases of educational data ethics, and lack teaching materials that teachers can directly use.

In addition to the insufficient supply of digital teaching materials, the traditional curriculum structure also has inherent shortcomings. The proportion of compulsory courses and elective courses in the curriculum structure can reflect the importance of college students ' subjectivity to a certain extent. Local normal universities do not pay enough attention to students ' subjectivity in the setting of professional curriculum structure. In the professional compulsory courses, the proportion of professional theory and skill courses is the highest, the proportion of comprehensive practice and case analysis courses is the second, and the proportion of research method courses is the lowest, and the difference between the three types of courses is large. Professional elective courses should fully consider the integration of profession, practice, and interest, and play the core role of comprehensive practical courses in promoting students ' development in the sequence of professional elective courses. However, most elective courses in colleges and universities still focus on theoretical courses, which is not conducive to the development of students ' subjectivity and the cultivation of practical innovation ability [3].

After students learn the operation of technology, it is difficult to establish the internal relationship between technology and education and teaching. There is a realistic dilemma that they understand technology but will not use it for teaching design. The curriculum supply is difficult to support the cultivation of big data teaching competence effectively.

3.3. The supply is weak, and there are shortcomings in the ability of teachers and students to apply big data

The promotion of digital transformation is inseparable from the comprehensive guarantee of manpower and systems. At present, many colleges and universities still have room for improvement in the supply of soft security.

From the perspective of teachers, most pedagogy teachers have a solid theoretical foundation in education, but lack systematic training related to educational big data and learning analysis, and lack the practical ability to carry out learning situation data analysis and data-based teaching design, so it is difficult to provide high-quality practical training guidance to students. The interdisciplinary teaching and research mechanism has not yet been popularized, and the teachers of pedagogy, educational technology, and computer science lack channels for normalized collaborative lesson preparation and joint course development.

From the perspective of students, although most students can skillfully operate basic information software, they still have shortcomings in high-level abilities such as the interpretation of academic reports, the identification of educational data risks, and the optimization of teaching design based on data. At the same time, the construction of a special training and teaching reform incentive system in many colleges and universities lags, and the results of teaching reform account for a low proportion in the teacher evaluation system, which makes it difficult to fully mobilize the subjective initiative of teachers to join the digital teaching reform.

4. The implementation path of big data-driven digital transformation of education majors in colleges and universities

4.1. Reconstruct the curriculum supply and build a big data-oriented teaching content matrix

In view of the reality of insufficient curriculum adaptation, the pedagogy major in colleges and universities should optimize the curriculum supply and build a big data-oriented teaching content matrix based on the training objectives of normal students. There is no need to add large-scale courses to increase students ' academic burden. The existing courses should be reformed, and the thematic content should be embedded, and the current situation in which the content of big data is only attached to the " Modern Educational Technology " course should be changed. In the revision of the talent training program, the training requirements for big data teaching competence are determined, and the content of big data application in education, learning situation data analysis, and education data ethics are spirally integrated into many main courses such as pedagogy principle, curriculum and teaching theory, and microteaching. The topic embedding needs to match the corresponding content of the teaching objectives of each course, avoid directly transplanting technical knowledge points, and avoid the problem of rigid splicing of big data content and course theme.

Combined with the real teaching scene of primary and secondary schools, the supporting training tasks are developed. Taking the learning situation of smart classrooms in primary and secondary schools as an example, the data-based training project of hierarchical teaching design is constructed. At the same time, we jointly create a teaching resource database with local primary and secondary school teachers, collect real and effective compliance teaching cases and training materials, form online curriculum resources, realize the seamless connection between theoretical teaching and practical training, eliminate the obstacles between technical learning and educational application, and promote students to transform data thinking into teaching practice ability.

4.2. Strengthen teacher training and improve the application level of teachers ' big data teaching and research

The teaching staff is a strong support for digital transformation. It is necessary to carry out training work in a hierarchical and classified way to improve the application level of big data teaching and research for teachers majoring in education [4]. Abandon the single lecture-based training model, and implement diversified training forms such as teaching and research workshops, case studies, and project-based training. The training covers two modules: concept updating and practical skills. It focuses on how to integrate big data thinking into pedagogy classrooms, rather than simply teaching computer technology operations. Build an interdisciplinary teaching and research community, promote the cooperation of pedagogy, educational technology, and computer science teachers in preparing lessons and jointly applying for teaching reform topics, and overcome the limitations of single-subject knowledge.

Improve the supporting incentive system, reasonably incorporate the results of digital curriculum construction and digital teaching reform into teachers' teaching and research assessment, and mobilize the enthusiasm of teachers to participate in the reform. The training should not only aim at completing the class hours, but also set up the task of teaching transformation. Teachers are required to develop the teaching design and training plan in combination with the teaching course, and transform the training acquisition content into classroom teaching results. Encourage teachers to carry out research and practice in the smart

classroom of primary and secondary schools, accurately grasp the actual needs of the digitization of basic education, and feed back into classroom teaching, so that teachers have the comprehensive ability to guide students to carry out big data teaching and training.

4.3. Aggregate UGS collaborative resources and improve the evaluation system of big data empowerment practice

Give full play to the advantages of the UGS (universities, governments, primary and secondary schools) collaborative education mechanism, integrate all resources, and build a practical evaluation system empowered by big data. Clarify the division of responsibilities of the three parties: colleges and universities provide the theoretical framework of pedagogy and the implementation plan for practical training; the local education administrative department coordinates the intelligent teaching resources of regional primary and secondary schools and does a good job in policy guidance and coordination guarantee; cooperative primary and secondary schools open smart classroom practice scenarios and assign front-line teachers to carry out practical guidance. The coordination mechanism should establish a normalized management system to avoid the problem of cooperation becoming a mere formality. On the premise of ensuring the privacy protection system of educational data, it provides normal students with practical opportunities to contact the data of compliance chemistry, and relies on the cloud virtual teaching and research section to realize the joint guidance of college teachers and primary and secondary school tutors.

Based on the School of Wisdom Education of Jiangsu Normal University, it cooperates with local education administrative departments and many primary and secondary schools in the region, strictly abides by the student information privacy protection system, and builds a case library of educational big data training on the basis of meeting the requirements. The data source is desensitized and input into the system for the use of undergraduates majoring in education, so as to obtain teaching design and practical cases closer to the real situation.

Optimize the practice evaluation method, abandon the evaluation mode of educational practice that relies too much on lectures and subjective comments, and incorporate digital teaching design, data analysis and application, and data ethics practice into the digital practice process archives of normal students. It is necessary to rationally view the evaluation role of data, adhere to the humanistic attributes of education evaluation, and not use quantitative data to completely replace teachers' qualitative observation and comprehensive judgment, so as to avoid the drawbacks caused by data-only evaluation [5]. The practical problems exposed by the practice of normal students are transmitted to colleges and universities in reverse, which provides a realistic basis for curriculum iteration and revision of talent training programs, and constructs a closed-loop collaborative education chain.

5. Conclusion

Big data brings new opportunities for the reform and development of education majors in colleges and universities. Digital transformation is not a simple upgrading of technical equipment, but a systematic reform of talent training, curriculum construction, and practical education. Colleges and universities should face up to the realistic constraints in the process of transformation, rely on curriculum reconstruction, teacher team construction, UGS coordination mechanism, take into account the application value of data tools and the background of educational humanities, continuously cultivate the big data teaching competency of

normal students, and promote the high-quality development of pedagogy specialty. Digital transformation is not a one-time construction task, but a professional construction project that requires continuous iterative optimization.

Disclosure statement

The author declares no conflict of interest.

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