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Characteristics of Educational Informatization in Graduate Geography Courses and Pathways for Model Transformation

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Abstract: Traditional graduate classroom teaching models have faced significant challenges in the wave of educational informatization. The development of modern information technology has profoundly impacted the teaching of graduate geography courses, driving the reorganization of teaching resources and innovation in teaching models. Under the influence of informatization, graduate geography courses exhibit three main characteristics: integration, personalization, and sharing. In the process of transforming traditional geography classroom teaching into an informatized teaching model, it is essential to improve teachers' information technology skills, expand the content and functionality of online teaching platforms, foster a multidirectional interactive classroom communication model, and increase the emphasis on process evaluation to enhance the effectiveness of classroom teaching.

Keywords: Geography; Graduate Programs; Characteristics of Teaching Informatization; Educational Model; Conversion Pathways

1. Introduction

In the context of the new era, graduate education in China is facing new demands, including talent cultivation and scientific innovation. With the establishment of a service-oriented view of quality, the quality of talent cultivation has increasingly become the fundamental standard for measuring the quality of graduate education. Course learning plays a foundational role in the development of graduate students. At the same time, the continuous advancement of educational informatization, driven primarily by the "Internet + Education" model, is profoundly transforming educational philosophies and teaching concepts. It is reshaping school governance structures and operational models, reforming classroom teaching structures and methods, altering the presentation of teaching content, and changing the ways students learn and perceive knowledge, while also shaping the governance and teaching cultures within schools[1-3].

In short, modern information technology has brought both tremendous opportunities and challenges to graduate classroom teaching[4]. The continuous integration of information technology into the graduate teaching process is set to fundamentally transform current teaching practices, enriching and evolving new educational concepts, teaching theories and methods, instructional models, and evaluation systems. This paper focuses on the geography master's program at North China University of Water Resources and Electric Power, where research reveals a growing trend of deep integration between information technology and geography education. Information technology has significantly enhanced the flexibility, diversity, and richness of geography teaching at the graduate level, while also innovating teaching methods and evaluation systems.

2. Definition of Informatization

In 1963, Japanese scholar Tadao Umesao proposed that "informatization refers to the modernization of communications, computerization, and the rationalization of behavior." Lin Yifu and others pointed out that "informatization refers to the process of using IT to transform traditional economic and social structures, based on the development of the IT industry and the diffusion of IT across various sectors of the economy." The "National Informatization Development Strategy 2006–

2020" states that informatization is the historical process of fully utilizing information technology, developing and utilizing information resources, promoting information exchange and knowledge sharing, improving the quality of economic growth, and driving the transformation of economic and social development. Overall, information possesses characteristics such as objectivity, dependency, timeliness, identifiability, transmissibility, value-addability, storability, transferability, shareability, and developability, with the subjectivity of information also being a key trait. Informatization can be summarized as the process of collecting, processing, and handling information based on network information technology, embedding this process and its outcomes into the optimization of social structures, and reflecting the ongoing interaction between information technology and the human socio-economic framework.

3. The Meaning of Informatization in Geography Graduate Classroom Teaching

The informatization of education refers not only to the informatization of educational methods and tools but also to the use of informatization to promote the advancement of educational undertakings, resources, and services throughout society. While the informatization of education and the informatization of graduate-level geography classroom teaching share common roots and principles, they also differ. The academic community has conducted extensive research on "educational informatization." One definition states that "educational informatization refers to the comprehensive and in-depth application of modern information technology in the field of education to promote educational reform and development, ultimately forming a completely new educational model—informatized education[5]." Another defines it as "the widespread use of modern information technology in education to develop educational resources, optimize the educational process, cultivate and improve students' information literacy, and promote the modernization of education[6]."While there are many definitions of educational informatization, research specifically focused on the informatization of geography graduate classroom teaching is nearly nonexistent. Therefore, based on the

definition of educational informatization, we propose an exploratory definition of "the informatization of graduate geography classroom teaching": the deep integration of graduate-level geography classroom teaching with modern network information technology, aimed at optimizing the geography education system, enriching the practical material for foundational theory courses and specialized electives, and enhancing the convenience, efficiency, shareability, and value-add potential of teaching and learning in geography classrooms. This defines a dynamic process of comprehensive development for geography-related courses.

The informatization of geography graduate classroom teaching is based on the new characteristics and trends of moral education in the "Internet+" era, such as the enhanced subjectivity of graduate students, diversification of information channels, multi-channel construction of social value systems, and the informatization of social learning. It promotes the deep integration of geography courses with 24/7 information and emotional two-way interactive technologies like WeChat, Weibo, and other new media platforms. This approach explores the informatized and integrated innovation of classroom teaching models, structures, and systems, aiming to achieve seamless integration of online and offline teaching. Additionally, it facilitates the effective transformation of the textbook system into the cognitive and belief systems of students. By leveraging the convenience and characteristics of information technology, geography courses can fully mobilize, explore, and enrich educational materials. Through the multi-subject interaction feature of the internet, the latest and most creative real-time materials can be collected, processed, organized, refined, stored, and quickly transmitted to graduate students. In specialized geography courses, the interactive, timely, and hypertextual nature of online media, along with the wireless, diversified, mobile terminals, service-oriented resources, personalized push notifications, and the humanized, intelligent, and pervasive nature of technology, can be fully utilized. This ensures continuity, multidimensionality, precision, and effectiveness in cultivating foundational geography concepts and practical skills among graduate students.

4. Characteristics of Informatization in Geography Graduate Classroom Teaching

The informatization of geography graduate classroom teaching, through the advancement of the "Internet + Education" model, aligns with the learning needs of graduate students, enhancing their interest and initiative. It creates learning scenarios where students can learn anytime, anywhere, with rich content, further stimulating their enthusiasm[7][8]. The informatization of geography graduate classroom teaching significantly differs from traditional geography teaching methods in terms of classroom facilities, teaching approaches, content, and models. Throughout its implementation, it has gradually developed characteristics of integration, sharing, and personalization.

4.1 Integration

The integration of information technology with geography course teaching essentially merges the teaching structure, methods, content, and resources into a cohesive whole. Information technology permeates the entire teaching process, including students' language learning, enhancing their initiative and efficiency in learning, and helping them better achieve the course's instructional goals[9]. As geography courses shift from large-scale open course resources to an "artificial intelligence + geography education" model, this integration becomes even more robust. On another level, this integration is reflected in the deep merging of information technology with the teaching of geography as a discipline. This includes restructuring the learning environment in areas such as information technology, teacher-student interaction, and educational practice activities. It also encompasses the integration of technology with academic disciplines, the fusion of technology with student development, the blending of teaching with academic research, the linking of academia with societal service, and the merging of technology with campus life. The deep integration of information technology and geography education is the primary expression of the value of informatized teaching. By empowering education with technology, the process fosters students' growth, thereby facilitating the advanced and efficient transmission of disciplinary knowledge and the development of specialized academic skills.

4.2 Shareability

The development of information technology breaks the constraints of geography and time on teaching, allowing abundant educational resources to be shared among diverse learners[10]. By establishing subject-specific educational platforms that aggregate high-quality global educational resources, learning materials can be integrated and circulated, enabling students to easily access resources that suit their needs. Additionally, information technology allows for the continuous acquisition of high-quality and up-to-date learning resources, further stimulating student interest and enhancing teaching quality and effectiveness. Through the sharing of information, knowledge, teaching, and resources, a cross-regional, cross-institutional, and even global digital education consortium for geography courses can be established, enabling more learners to access quality educational resources. Currently, geography students at our university can share online courses from top universities both domestically and internationally. As former Peking University president Zhou Qifeng stated, while it may not be possible to fulfill the aspirations of all young students to attend Peking University, modern educational technologies, including information technology, can help those who wish to become Peking University students realize their dreams.

4.3 Shareability

Modern information education methods and vast teaching resources enable the true realization of personalized learning for students. They also allow teachers to quickly and accurately track individual students' learning progress and challenges using information technology. This enables timely, tailored instruction, providing comprehensive personalized guidance for students to access customized learning resources and engage in personalized learning approaches and pathways, thus aligning teaching with student needs in a "student-centered" manner[11]. On the other hand, timely summaries of teaching situations can be conducted, with information technology used to analyze and predict learning conditions, better facilitating adaptive and self-directed learning among students. This allows students to "set their own pace" in personalized learning, fully reflecting their

central role in the learning process and promoting a shift from teacher-centered to student-centered models. Currently, advancements in technologies such as cloud computing, big data, the Internet of Things, mobile communication, machine learning, and virtual simulation provide strong technical support for personalized learning, continuously innovating methods and models in the informatization of geography course teaching.

5. Specific Measures to Promote the Transformation of Traditional Geography Classroom Teaching Models to Informatized Teaching Models

5.1 Enhancing Teachers' Information Technology Skills

Teachers are the main agents in implementing teaching activities. To reform teaching content, methods, and techniques, it is essential to enhance student initiative by adopting heuristic, inquiry-based, discussion-oriented, and participatory teaching strategies that foster students' ability for self-directed learning. To effectively advance undergraduate teaching reforms in an information-rich environment, teachers must shift their teaching perspectives and grasp the fundamental principles of modern education. Currently, the informatization level of geography graduate courses is relatively low, primarily due to insufficient emphasis by teachers on informatized teaching methods and inadequate guidance for students in utilizing online teaching platforms. Many teachers continue to rely on traditional methods—using a single pen, a blackboard, and a PowerPoint presentation—leading to low student enthusiasm for online platforms. To address this, it is crucial to strengthen teacher training in online teaching and actively expand the availability of high-quality course resources for open sharing. Teachers should instruct students on how to efficiently use various online teaching platforms, enhancing their abilities to identify, retrieve, and utilize diverse forms of information, as well as communicate effectively through these platforms. Improving the efficiency of online teaching platform usage necessitates a change in teaching methods, integrating modern online resources and technologies. Additionally, the school should innovate in teacher development through aspects such as qualification requirements, hiring mechanisms, and evaluation systems, fostering a supportive and interactive environment. This will facilitate the transition from traditional teaching methods to informatized approaches in geography education.

5.2 Expanding the Content and Functionality of Online Teaching Platforms

Currently, the construction of online teaching platforms primarily focuses on course development, which often leads to a static presentation of materials. The integration of existing online teaching platforms with curated online resource libraries and their management systems can create a comprehensive support environment for online teaching. Teachers can use these platforms to collect and filter teaching materials, obtain and share educational resources, and communicate with students asynchronously. Students can independently arrange their learning schedules and locations, and they can access background materials needed for classroom discussions. After collaborating with their peers, they can submit their discussion contributions online. This shift moves away from the traditional model of unilateral instruction by teachers, making learning more personalized and autonomous. Using online teaching platforms, teachers can create various resources tailored to the characteristics of their courses and integrate these resources into a cohesive system. Under the guidance of teachers, students can engage in self-directed learning through these platforms. Teachers can then adjust their in-person class sessions based on students' online learning progress, focusing on key concepts and challenging topics for discussion. As a result, students not only grasp fundamental knowledge but also significantly enhance their abilities to analyze and solve real-world problems, as well as their capacities for self-directed and creative learning. Their information literacy is also greatly improved.

5.3 Establishing a Multi-directional Interactive Classroom Communication Model

Traditional geography graduate courses primarily rely on teacher-led instruction, resulting in a one-way communication flow from teacher to student. However, the online

classroom environment, along with a rich repository of legal resources and multimedia materials such as videos and audio textbooks, creates a dynamic teaching context. Online teaching platforms facilitate communication, while tools like QQ, WeChat, forums, and blogs provide interactive platforms for engaging with educational content. In this setup, traditional resources like blackboards and printed materials serve as essential foundations and necessary supplements to classroom teaching. Under teacher guidance, students assume a more prominent role as active participants in networked learning. Activities such as posting hot topics, group discussions, resource collection, seeking help from teachers and peers, conducting periodic assessments, and showcasing results can all take place on the online teaching platform. Background knowledge and supplementary materials that are difficult to cover within a 45-minute class can be disseminated through the platform, allowing students to engage in self-directed learning before and after class. This multi-directional interactive platform extends the temporal and spatial boundaries of traditional classrooms, providing students with greater freedom to learn at their own pace and time. This innovation in teaching methods and approaches enriches educational content, enhances student interest and initiative, and ultimately improves teaching quality.

5.4 Increasing the Emphasis on Process Evaluation to Enhance the Effectiveness of Classroom Teaching

Traditional teaching primarily focuses on outcome evaluation, with students often concerned about whether they will fail at the end of the semester. The phenomenon of "cramming" before exams—where students do not put in consistent effort but study intensively right before tests — is quite common. However, with advancements in online technology, process evaluation has become both possible and easier. Traditional, passive, exam-oriented teaching methods are being replaced by modern, active, interest-driven approaches. On online teaching platforms, each student becomes "transparent." Their level of preparation, the number of discussion topics they engage in, and the independent opinions they express are all clearly visible. In this online environment, students' learning behaviors can serve as indicators of their attitudes and effectiveness, with feedback on this information provided through visual means. Teachers can assess student performance not only through final assignments or exams but also based on regular participation levels and quality. Additionally, peer evaluations can be implemented, allowing students to assess each other. This approach emphasizes the importance of process evaluation, significantly enhancing the effectiveness of classroom teaching.

6. Conclusions

Teaching informatization is an inevitable requirement and development trend of educational modernization reform, as well as a necessary choice for educational transformation in the information age. The advancement of modern information technology has profoundly impacted geography graduate course teaching, significantly promoting the reorganization of teaching resources and innovation of teaching models. Under the influence of informatization, geography graduate courses have gradually developed characteristics of integration, shareability, and personalization. Based on these characteristics, in the process of transforming traditional geography classroom teaching models to informatized ones, it is crucial to focus on enhancing teachers' information technology skills, expanding the content and functionality of online teaching platforms, constructing a multi-directional interactive classroom communication model, and increasing the emphasis on process evaluation. These efforts will improve the teaching quality of geography graduate courses and help cultivate high-level innovative talent in geography for the nation.

References

[1] Wang F, Zhou Q. Countermeasures for the Development of Education Management in Higher Vocational Colleges under the Background of "Internet Plus". Journal of Higher Vocational Education, 2024, 1(3): 60-64.

[2] Shi J, Wang F. On the English Classroom Teaching Mode of Primary School under the Background of Distance Education. Journal of Contemporary Educational Research, 2021, 5(2): 81-84.

[3] Dong T. Design of informatization classroom teaching based on "internet plus education". BASIC & CLINICAL PHARMACOLOGY & TOXICOLOGY, 2020, 127235-235.

[4] Ling Z. The Application of Information Instructional Design in Graduate Courses Teaching. Applied Mechanics and Materials, 2014, 707(707-707): 445-449.

[5] Xuejiao B. The Role and Challenges of Artificial Intelligence in Information Technology Education. Pacific International Journal, 2024, 7(1): 86-92.

[6] Lin L, Yuqi D, Xingye C, et al. Exploring the impact of design thinking in information technology education: An empirical investigation. Thinking Skills and Creativity, 2024, 51101450.

[7] Xiang M. How to Stimulate Students' Interest in Learning in College Mathematics Teaching. International Journal of Mathematics and Systems Science, 2023, 6(5): 113-115.

[8] Saiying Q. By Means of Positive Psychology IN English Teaching to Stimulate Students' Interest. Psychiatria Danubina, 2022, 34(S5): 396-396.

[9] Li X, He H. Research on Effective Integration Strategies of Information Technology and College English Teaching. Canadian Social Science, 2023, 19(6): 34-37.

[10] Pop M M, Giurgiulescu M. Educational Sciences between Information Technology and Communications and Quality Assurance Techniques. Procedia - Social and Behavioral Sciences, 2015, 209383-388.

[11] Abdillah W. The situational cognitive mediation effects on dispositional personality influence on the intention to use the internet: an empirical study of information technology acceptance within higher education institution. Int. J. of Management in Education, 2009, 3(3/4): 359-374.