

The Dilemma and Improvement of College Students' Deep Learning under the Background of Smart Education

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Abstract: College students face a variety of deep learning dilemmas in the context of smart education, including the lack of learning motivation and self-efficacy, insufficient or excessive application of information technology, limitations of learning resources and environment, and the inconsistency between the education evaluation system and deep learning goals. Accordingly, this paper puts forward some targeted improvement countermeasures, including optimizing teaching design to promote students' participation and interaction, strengthening teacher training to enhance teachers' teaching ability, perfecting technology applications to make reasonable use of smart education tools, and establishing an effective evaluation system to reflect and promote deep learning and other targeted improvement countermeasures.

Keywords: College students; Deep learning; Smart education

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1. Introduction

As a modern education model that integrates information technology (such as artificial intelligence, big data, cloud computing, etc.), smart education focuses on providing personalized learning programs, intelligent teaching resources, and data-driven decision-making, aiming to optimize the teaching process and provide interactive and participatory learning experiences. Deep learning, as an advanced learning mode in the field of education, goes beyond simple memorization and repetition and focuses more on understanding, critical thinking, creative thinking, and knowledge application. This type of learning encourages students to dig deep into knowledge, understand the principles behind it, and flexibly apply what they have learned in different contexts. The relationship between wisdom education and deep learning is complementary, and deep learning is the core goal and ultimate direction of the smart classroom^[1]. By simulating the real environment and providing interdisciplinary resources, smart education provides personalized and challenging resources to support personalized and adaptive learning paths, promotes students' ability to develop independent learning, and effectively promotes the development of deep learning. Deep learning enables students not only to memorize

knowledge, but to focus on the deep integration and application of knowledge, and to deeply understand and apply knowledge to practical situations, which lays a solid foundation for adapting to the changing environment. The flexible and interactive learning environment created by smart education as well as the interactivity and technical support help to improve the efficiency and quality of learning, enabling students to conduct deep learning more effectively. However, college students also face many difficulties in deep learning under the background of smart education. This paper aims to reveal the main challenges and dilemmas faced by college students in deep learning under the background of smart education and put forward practical strategies and suggestions to improve the deep learning experience and effect of college students.

2. Realistic dilemmas of deep learning for college students in the context of smart education

The concept of smart education originates from the application of information technology in the field of education. In the early stage, it mainly focuses on the digitalization and networking of educational resources. With the development and introduction of artificial intelligence, big data, cloud computing, and other technologies, smart education has begun to develop in a more personalized and intelligent direction. Modern smart education is no longer limited to the provision of digital content but pays more attention to the optimization of the learning process, the design of personalized learning paths, and data-driven teaching decisions. Many universities have begun to apply smart education platforms, such as online learning systems and intelligent teaching software, to improve teaching quality and learning efficiency. Smart education can promote students' deep understanding by providing diversified teaching resources and methods to help students understand knowledge from different perspectives and promote deep understanding rather than superficial memorization. Interactive discussion and problem-solving activities in a smart education environment encourage students to develop critical thinking, a key part of deep learning. Through data analysis, smart education platforms can provide a customized learning path for each student, making learning more in line with individual needs and interests, which contributes to deep and continuous learning. However, in the face of many advantages brought by smart education that are conducive to learning, college students still have some dilemmas in deep learning, which hinder their deep learning.

2.1. Lack of learning motivation and self-efficacy

In the context of smart education, the dilemma of college students in deep learning is highlighted by the lack of learning motivation and self-efficacy. The first is the lack of learning motivation. On the one hand, college students' internal motivation for deep learning is insufficient, and many students may lack internal learning motivation, such as interest in learning content and internal satisfaction with learning results. This may stem from the dryness of the course content, the lack of practical application connections, or the excessively simple and boring learning tasks. On the other hand, the lack of external incentives for college students in deep learning, such as the encouragement of teachers and parents, and the school's reward system, is also very important for stimulating students' learning motivation. When these external incentives are insufficient or inappropriate, students' learning enthusiasm may be affected. The second is the lack of self-efficacy. This manifests itself in things like low confidence and fear of failure. Self-efficacy refers to the individual's confidence in his or her ability to accomplish a particular task. Research shows that there is a significant positive correlation between college students' deep learning ability and their self-efficacy in an e-learning environment ^[2]. In an intelligent learning environment, students may not feel confident due to past failures, lack of necessary skills or knowledge, or unfamiliarity with new technologies. While fear of failure may also

undermine students' sense of self-efficacy, when students fear that their efforts may not lead to success, they may shy away from challenging tasks, which can limit their ability to learn deeply and explore new knowledge.

2.2. Insufficient or excessive application of information technology

In the context of smart education, the underapplication or overuse of information technology by college students is a problem worthy of attention. Both of these extremes may have an impact on students' deep learning effectiveness and overall development. On the one hand, there is insufficient application of information technology, and there are objective restrictions on college students' access to learning resources. Some students may not be able to make full use of the advantages of information technology in learning due to insufficient equipment, unstable network connection, or lack of access to high-quality digital learning resources. The effective use of information technology requires certain technical skills, and if students lack these skills, they may not be able to make full use of the available technical resources, thus affecting their learning process and learning outcomes. At the same time, teachers play a key role in guiding students to use information technology effectively. If teachers themselves are unfamiliar with these technologies or lack relevant training, they may not be able to provide the necessary support and guidance. On the other hand, the overuse of information technology can also affect college students' deep learning. Some students may rely too much on online resources and information technology, such as the overuse of search engines and online answer libraries, which may lead them to neglect the importance of deep thinking and independent learning. The overuse of technology may also lead to students' distraction, such as frequent checking of social media or emails while studying, which weakens the efficiency and depth of their studies. The sheer volume of information on the Internet can lead to information overload, and students may have difficulty sifting through valuable content or feel they don't know where to start. Therefore, when the application of information technology is insufficient, students may miss out on personalized learning and resource-rich opportunities made possible by technology, which limits the depth and breadth of their learning, while the excessive application of technology may lead students to rely on superficial learning methods and lack the habit of deep thinking and active exploration.

2.3. The limitations of learning resources and environment

In the context of smart education, college students may face several limitations on their learning resources and environment, which may affect their learning effectiveness and overall educational experience. On the one hand, there is an unequal distribution of resources. While smart education offers a large number of online resources, access to and utilization of these resources often depends on students' economic conditions and geographical location. Access to quality educational resources may be more difficult in areas with fewer resources or for students with poorer economic conditions, which may result in some students not having access to quality textbooks, online courses, or other learning tools. In particular, in some regions, technical infrastructure limitations such as unstable or slow Internet connections can seriously affect the accessibility and experience of online learning resources, especially for students who require online learning platforms and software. On the other hand, there is a limitation of the learning environment. Not all students have access to a quiet, distract-free learning environment at home, where family responsibilities, space constraints, or noise disturbances can affect learning. In a more autonomous learning environment, students need strong self-management and self-discipline, and for some students, the lack of a structured learning environment can lead to procrastination and inefficiency. There may also be limitations in the school's learning environment, such as insufficient seating in the library, crowding of study spaces, etc. In a smart education environment, teachers may not be able to provide enough individual instruction and support for each student, especially if there is low engagement or a

large number of students.

2.4. The educational evaluation system is inconsistent with deep learning goals

Traditional teacher evaluation methods are too limited in the intelligent era ^[3]. In the context of smart education, there is some inconsistency between college students' educational evaluation system and deep learning goals, which is mainly reflected in the following aspects: On the one hand, the traditional evaluation system has certain limitations, focusing on the examination of students' memorization and repetition of knowledge, rather than understanding, analyzing, applying and creating these deeper cognitive abilities. Many evaluation systems are still test-oriented, lack evaluation of the learning process, usually focus on the outcomes rather than the learning process, neglect the process of evaluating how students acquire, process, and apply knowledge, tend to use standardized tests to evaluate students' learning outcomes, and rarely target students' deep learning abilities such as critical thinking, problem-solving, and creative thinking. This can lead to students learning rote to cope with the test, rather than deep learning. On the other hand, in the context of wisdom education, learning evaluation is out of sync with learning goals, and there is a conflict between formal evaluation and personalized learning. Smart education promotes the personalization of learning styles, but the traditional evaluation system is usually unable to provide personalized feedback and accurately reflect the progress and needs of each student in deep learning. If the evaluation system remains standardized and formalized, this may limit the motivation of students to explore individualized learning paths. When the evaluation system is closely linked to test-oriented education, students may focus more on test scores than on true understanding and application of knowledge, which reduces their motivation for deep learning. If the evaluation system does not encourage or reward deep thinking and innovation, students may lack the incentive to explore unknown areas and learn in depth.

3. Countermeasures to improve college students' deep learning in the context of smart education

3.1. Optimize teaching design: promote students' participation and interaction

In the context of smart education, in-depth teaching reform is the key to improving the quality of education. It is necessary to rebuild teachers' views on teaching and students' outlook on development and knowledge, thereby promoting students' in-depth learning ^[4]. Instructional design is a crucial part of educational activities. To optimize instructional design and promote students' deep learning in the environment of smart education, a series of strategies need to be adopted. First, add interactive curriculum elements. It is found that peer dialogue feedback can significantly reduce students' tendency to superficial learning methods, but has limited effect on deepening deep learning methods ^[5], while peer dialogue feedback strategy can significantly improve college students' tendency to deep learning methods and promote the improvement of cognitive level ^[6]. Therefore, curriculum design should include rich opportunities for students to interact with teachers, such as Q&A, discussion, or feedback sessions, to help teachers better understand students' needs and challenges. Secondly, a variety of teaching methods should be used, combined with a variety of teaching methods such as lectures, discussions, demonstrations, and case studies, and problem-based learning (PBL) should be implemented to introduce real-world problems and challenges into the curriculum design, stimulate students' curiosity and desire to explore, and guide them to actively learn and think deeply. Finally, curriculum design should take into account students' backgrounds, interests, and needs, making the content relevant and engaging. Flexibility to adjust lesson plans and pacing based on student progress and feedback to ensure that all students can keep up and participate in the lesson.

3.2. Improve the application of technology: make proper use of smart education tools to promote deep learning

Deep learning is an inevitable choice for college students in the complex Internet+ era ^[7]. To rationally use technology tools to promote deep learning in the smart education environment, multi-faceted strategies need to be adopted. First of all, the choice of appropriate technical tools is the foundation. Tools should be selected precisely according to the teaching content and students' needs. For example, courses requiring high visual elements can use AR or VR technology. At the same time, emphasis should be placed on the ease of use and accessibility of the tools to ensure that all students, including those with special needs, can easily use them. Secondly, technology tools should be closely integrated with course design to ensure that their application is in line with teaching objectives and content. Technology tools such as online forums and interactive voting systems can be used to enhance classroom interaction and encourage students to participate in discussion and feedback, thereby enhancing student engagement and interactivity in learning. In addition, regular technical training is provided to students to teach them how to use learning tools and resources effectively. At the same time, students are encouraged to use technology critically and develop their information literacy so that they can effectively evaluate and utilize online information. Teachers and students are encouraged to use technology innovatively and explore new ways to apply technology to innovate and improve the teaching process, ensuring that technology application promotes deep learning such as critical thinking and independent research. Finally, regularly evaluate the effectiveness of technology tools in teaching and learning, and collect feedback from teachers and students for continuous adjustment and improvement. The integrated application of these strategies will provide strong support for deep learning in smart education.

3.3. Strengthen teacher training: enhance teachers' teaching ability in the environment of smart education

To improve teachers' teaching ability in the smart education environment, strengthening teacher training is the key. First, technical skills training should not only equip teachers with the latest educational technologies such as learning management systems, online collaboration tools, interactive software, etc. but also teach them how to effectively apply these technologies in teaching to enhance the learning experience and promote deep learning. In terms of teaching methods and strategies, innovations should be made in the training of teaching methods such as problem-based learning, flipped classrooms, case studies, etc., to promote students' active learning and participation. Secondly, in terms of assessment and feedback skills, teachers should be trained to use diversified assessment methods such as peer assessment and project-based assessment, which are more conducive to evaluating students' deep learning and integrated skills. At the same time, teachers are trained to provide effective and constructive feedback to help students recognize their progress and areas for improvement. Finally, emotional and psychological support is equally important for teacher health and effectiveness. Emotional factors such as emotional analysis, emotional engagement, emotional interaction, and emotional design in online education play a key role in improving online learning experience and effectiveness ^[8]. Schools should provide training and resources to help teachers manage work stress and maintain a positive and healthy attitude. Teaching teachers how to understand and respond to students' emotional needs is very important for building a positive learning environment and student relationships. Through these comprehensive training measures, teachers will be more effective in adapting to the smart education environment, improving the quality of teaching and the effectiveness of student learning.

3.4. Establish an effective evaluation system: an evaluation mechanism that is compatible with the deep learning goals

Evaluation of deep learning is an important link in deep learning research, and it is a yardstick to judge the achievement of deep learning, which can locate the degree of deep learning ^[9]. To establish an effective evaluation system that adapts to the goals of deep learning, multiple evaluation methods need to be comprehensively applied first. In addition to traditional exams and written assignments, diversified evaluation forms such as project evaluation, oral report, peer evaluation, and self-evaluation should also be included. Procedural assessments, such as learning logs and progress reports, emphasize the assessment of the learning process and reflect the student's learning progress and deep understanding. In the evaluation system, emphasis should be placed on the assessment of skills and abilities, including the evaluation of students' critical thinking, problem-solving, and creativity. At the same time, students' ability to apply what they have learned to practical situations should be examined ^[10]. Secondly, provide timely and specific continuous feedback mechanisms to help students understand their strengths and areas for improvement, while encouraging students to conduct self-assessment and reflection through feedback, facilitating the process of deep learning. The evaluation system needs to be closely linked to the teaching objectives and ensure that the evaluation content reflects the core elements of deep learning. Evaluation criteria should be clear, transparent, and fair to ensure that all students can understand the criteria and process of evaluation. Finally, schools should provide teachers with training on designing and implementing diverse evaluations, support teacher innovation and improvement in evaluation practice, and encourage teachers to try new evaluation methods. In this way, teachers will be able to use diverse assessment tools more effectively and better support students' deep learning.

4. Conclusion and outlook

In the context of smart education, there are many factors affecting college students' deep learning, and the solution needs to consider all aspects comprehensively. Smart education offers the potential to promote deep learning, but it also brings challenges, especially in ensuring the effectiveness of technology application and equity in education. In the long run, smart education will continue to incorporate more advanced technologies such as artificial intelligence, big data analytics, and augmented/virtual reality. The development of these technologies is expected to further enrich the learning experience, provide students with more effective learning paths and resources, better adapt to the learning needs of different students, and promote their deep learning. Future education needs to focus more on cultivating students' critical thinking, innovation, and lifelong learning abilities, future teachers need to be equipped with stronger technological capabilities and more flexible teaching methods, and colleges and universities need to enhance the training and professional development of teachers to ensure they can effectively use new technologies and adapt to new educational models. With the emphasis on deep learning, more forms and various evaluation methods will emerge, such as results-based evaluation, continuous process evaluation, etc., and the student evaluation system in colleges and universities will undergo major changes, placing more emphasis on evaluating students' comprehensive ability, critical thinking and innovative ability, rather than just memorization and repetition.

Disclosure statement

The authors declare no conflict of interest.

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