

# Research on Improvement of College Teachers' Teaching Abilities in the Artificial Intelligence Era

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## ABSTRACT

Artificial intelligence is deeply contributing to the reforms and innovations in teaching and learning, bringing opportunities as well as challenges to the teachers in colleges and universities. This paper highlights the important impact of AI technologies on the field of higher education and discusses the potential challenges faced by college teachers in the era of AI in terms of the teaching methods, knowledge delivery, changes in the roles and functions of the teachers, and attempts to elaborate three capacities that college teachers should possess to deal with these challenges, namely, the personalized professional teaching capacity, modern technology application capacity, and scholarship of teaching capacity. These three capacities serve as the core factors that constitute the college teachers' teaching abilities as well. Finally, this paper suggests feasible paths for the future improvement of college teachers' teaching abilities and the effective integration of AI into teaching from the university and college level and the individual teacher level, respectively.

**Keywords:** artificial intelligence; teaching abilities; talent cultivation

## INTRODUCTION

With the continuous advancement of emerging theories and technologies such as mobile internet, big data, cloud computing, and brain science, artificial intelligence (AI) has been developing rapidly and is deeply affecting the field of education. The intelligent environment not only changes the way of teaching and learning but also exerts a great impact on the philosophy, culture, and ecology of education [1]. In 2019, The Central Committee of the Communist Party of China and the State Council issued China Education Modernization 2035 [2], emphasizing "Building the intelligent campuses, coordinating the construction of integrated intelligent teaching, management, and service platforms, applying modern technologies to accelerate the reform of talent training mode, and realizing the effective combination of large-scale education and personalized training." Artificial intelligence appears to be a critical topic in various fields, and the cross-border integration of artificial intelligence and education has become an unstoppable trend of the times. Seizing the opportunities and stimulating the inherent vitality of education in the national artificial intelligence development strategy, cultivating qualified teachers with multi-intelligence, and creating innovative talents are the major issues for all higher education institutions to promote the development of education.

## CHALLENGES of COLLEGE TEACHERS' TEACHING IN THE AI ERA

While AI applications can bring profound impact and convenience to colleges and universities, they also bring great challenges to college teachers' teaching. However, many college teachers today do not effectively integrate AI technologies with classroom teaching, and therefore fail to cultivate students who are expected to meet the development requirements in society. Here, three main challenges are listed as follows:

### • AI Changes the Way of Teaching

AI directly or indirectly affects future education and triggers profound changes in the way of teaching, teaching methods, and teaching ecology. A certain number of college teachers consistently adopt the traditional lecture-based approach, which is not aimed at cultivating independent and innovative talents. Their teaching methods mainly follow the one-way knowledge delivery pattern that is not beneficial for the improvement of students' critical thinking and independent learning [3]. During the epidemic period, most classroom teaching activities moved to online lectures. In the process of the transformation, WeChat, DingTalk, and other online educational applications were integrated into teaching with intelligent and diversified functions. However, the complexity of the applications causes problems and troubles for the college teachers who have to spend time figuring out the functions that are suitable for teaching and plan to take full advantage of the applications to help students achieve better learning. This poses challenges to their regular teaching and learning. In addition, the rapid development of artificial intelligence technologies contrasts greatly with the learning environment that is in the shell and lacks the concept and culture of intelligent education. College teachers who plan to implement AI-based instruction may be anxious about the increasing workload of lesson preparation, and some teachers may be prone to resistance and dissatisfaction. Therefore, it is still a difficult task for the popularization of intelligent teaching modes and methods in colleges and universities.

### • AI Dissolves the Privilege of Knowledge Monopolists

Previously, universities and research institutes hold a large number of high-quality teaching resources, and college teachers are the main owners and suppliers of subject knowledge [4]. The authority of traditional teachers is based on the monopoly of knowledge.

However, in modern society, with the accelerated spread of updated knowledge, the situation that only college teachers possess specialized knowledge no longer exists. Besides, the development of AI technologies can accelerate the interplay and interaction of different educational resources. Students can break the boundaries of time and space to obtain the learning content and materials they desire for. However, the massive growth of information and knowledge also brings challenges for students to acquire since the knowledge scatters in a disordered manner. The more amount of knowledge in the learning environment, the harder to obtain effective information. As students have limited time and access to knowledge and resources, they have to adapt to the environment with the assistance of AI tools. As intelligent technologies begin to play an equally important role in education, how to help students extract effective and useful knowledge from the huge knowledge information base in a short time has become one of the central tasks of contemporary college teachers in the future.

#### • AI Replaces the Functions of College Teachers

With the emergence of AI, on the one hand, college teachers can use AI and network information technology to enrich instructional content and improve teaching quality. On the other hand, while AI brings great convenience to teachers' teaching and learning, it can indeed replace part of teachers' functions. AI is progressively being applied in the management of higher education and instruction as intelligent robots arise. Teachers can be replaced by intelligent robots who can engage with students, lead and answer questions on their own, read papers, grade assignments, evaluate knowledge, and so on. [5]. For blended delivery courses or wholly online courses, Personalized learning with an intelligent robot or 'cloud-lecturer' can be employed. Moreover, in the assessment process, AI can serve as a personalized tutor able to diagnose students' mastery of knowledge and provide targeted tests based on the learning status and performance of each individual. Additionally, it is already possible to provide affordable solutions for using brain computer interface (BCI) devices that can detect when a student is fully focused on the content and learning tasks, and super-computers, such as IBM's Watson, can provide an automated teacher presence for the duration of a course [6]. While AI offers convenience to teachers' teaching and assessment, it also replaces some of their work to a certain extent. College teachers who do not recognize the profound changes that AI has brought to teaching and learning, and who fail to keep up with the times and make timely adjustments, are at risk of being eliminated.

#### DEVELOPMENT OF CORE TEACHING ABILITIES

Teachers' teaching abilities are generally considered the subjective conditions that teachers possess to implement the whole teaching process, including knowledge reserve, teaching standard, and teaching skills. However, in this AI era, college teachers' philosophy of teaching, teaching methods, and professional development directions can change to a certain extent. Therefore, the system of teaching abilities of college teachers should keep up with contemporary requirements and provide timely feedback to them to improve their teaching abilities while better cultivating well-rounded talents for society.

#### • Personalized Professional Teaching Capacity

Professional teaching ability requires college teachers to be able to integrate subject knowledge and teaching knowledge and select appropriate teaching strategies and methods in accord with specific subjects, contexts, and conditions [7]. Basic knowledge is dynamic and ever-changing, and subject and pedagogical knowledge are not immutable as well.

For the effective integration of subject knowledge and pedagogical knowledge, college teachers need to actively explore and summarize their personal experience in the teaching process and carry out the teaching profession in line with the development direction of modern instruction. However, teaching is a highly-personalized activity. Although the human-computer synergy is beneficial to the teaching of college teachers, their teaching methods and contents can be adjustable in line with different teaching contexts, contents, and groups. Under the circumstances, college teachers not only need to improve the teaching capacity of knowledge integration but to improve the capacity to deal with differentiated and personalized teaching. Therefore, in the AI era, college teachers should put more focus on the combination of the personal capacity and the intelligent system, and take full advantage of the learning diagnosis and concomitant evaluation to timely adjust their lesson arrangements. They are also encouraged to establish an interactive, heuristic, and inquiry learning ambient in which students can not only obtain a deeper understanding of knowledge and better master professional skills but also can increase their intellectual curiosity and improve their capacity for innovation and independent learning.

#### • Modern Technology Application Capacity

Technology application capacity refers to the capacity of college teachers to effectively combine and coordinate teaching experience, educational theories, and instructional technologies to improve the teaching and learning effects. One of the key issues of whether the AI technologies can lead to a new round of higher education teaching and learning reform is the extent to which it can enable college teachers to refocus on the reinvention and innovation of learning theory and pedagogy. In the context of the AI era, the capacity to apply technology can reflect the modern teaching skills of a college teacher. Although intelligent technology can help free college teachers from mechanized work, they still need to reckon with the orientation of educating with AI technologies. If they consider that the utilization of multimedia and other intelligent teaching equipment is merely to improve the capacity of technology application rather than designing how to appropriately and effectively integrate AI technologies into the teaching and learning activities, they will be gradually replaced by the machines and lose the necessity of existence. The core of the modernization of education is not the modernization of intelligent technology, but the modernization of talents [8]. Therefore, the cultivation of modern technology application capacity is not simply to master the operation of AI technologies, but to make full use of AI technologies to better understand students' learning preferences, thinking styles, and personal characteristics in order to provide students with more personalized, differentiated, and customized learning content and materials. Furthermore, college teachers need to reflect on how to connect the idea that using AI in teaching activities with the idea that using AI to help facilitate teaching. They should also be able to reflect innovative educational theories on AI to facilitate the comprehensive development of teachers and students.

#### • Scientific Scholarship of Teaching Capacity

With The scholarship of teaching refers to the ability of teachers to inquire and reflect on the elements of teaching activities, such as teaching philosophy, teaching methods, and teaching tools, and to transmit and recreate knowledge through an understanding of the nature of teaching and learning. In 1990, Ernest Boyer (1990) first proposed the concept of "scholarship of teaching" and elaborated that teaching should not only transmit knowledge but transform and extend knowledge so that students can be critical, creative thinkers with the capacity

to go on learning [9]. The scholarship of teaching capacity includes both teaching and academic aspects that represents the key idea of integration of education and science. It suggests that teachers are creators, directors, and transmitters of knowledge. It advocates the dissemination of cutting-edge scientific findings and subject knowledge to students through scientific curriculum development and instructional design as well. For the group of college teachers, they should learn to make use of pedagogical and technological resources to expand research horizons, actively explore the uncharted fields of teaching and learning, and reconstruct the relationship between teachers and students.

#### WAYS FOR IMPROVING TEACHING ABILITIES

In the context of the AI era, intelligent technologies bring both challenges and conveniences to college teachers' teaching. Attempting to effectively take advantage of the intelligent technologies and grasping the opportunities brought by the AI era will be of great help for the improvement of college teachers' teaching abilities.

##### • From University and College Level

Universities and colleges need to establish a new education system and a learner-centered educational setting at the macro level. Thus, universities should be responsible for the development of high-quality teaching platforms to offer teachers the latest technical guidance, and for the establishment of effective training and assessment systems to help college teachers improve their knowledge and teaching abilities. Colleges at a university can even develop specified AI-based teaching platforms that include materials from the national high-quality courses and the online teaching resources library. At the same time, colleges and universities can also design personalized teaching platforms and provide related resources and tools according to the demands of individual teachers. Like the student learning platforms, the college teacher education platforms can capture the status and data of a teacher in the teaching process and timely adjust personalized recommendation strategies so that each teacher can receive the appropriate learning resources and training courses to enhance their learning experience. In addition, universities and colleges should expedite the construction of high-level intelligence campuses that include a variety of factors, such as the intelligent monitoring system, intelligent classrooms, intelligent teaching management, big data platform, intelligent decision-making system, and the like. College teachers can make good use of the hardware and software equipment within the intelligence campus to create an AI-based teaching ambient and explore new teaching methods and patterns.

##### • From Individual Teacher Level

For college teachers, the ability of learning is one of the core abilities in the teaching process. An important reason why teachers cannot be replaced by machines is that teachers can involve in continuous learning, especially when learning with AI technologies. They can choose to apply various types of intelligent devices, such as tablets, mobile phones, and robot assistants in the classroom teaching activities to achieve a smooth transition between the physical classroom and the virtual space. Besides, it is necessary to pay attention to the collaborative relationship between human and machine, teachers can take advantage of the cloud-based classroom to help develop a tacit understanding of human and machine and to build up a human-machine community. Teachers in higher education cannot give up their central position in teaching and turn into the "puppet" of intelligent technologies due to an excessive trust in AI.

For another aspect, in this AI era, college teachers must learn to accept the changes in the roles in teaching and gradually transform themselves from the authorities of teaching to the supporters and facilitators, from the developers and providers of the learning resources to the organizers and designers to the learners. They are required to constantly improve their intelligent teaching capabilities, master big data processing and analysis technology as much as possible, and adjust individual teaching modes and methods in a timely manner to fit with specific learning groups and contexts. Additionally, college teachers should not only be aware of the fast-changing environment, but also update their teaching philosophy and principles, and make full use of the available AI resources and teacher education platform to continuously improve their professional teaching capacity, technology application capacity, and scholarship of teaching capacity.

#### REFERENCES

- [1] Xu, J. & Li, T. (2021). The application of artificial intelligence and virtual reality in the auxiliary teaching of American science fiction literature. *Journal of Intelligent and Fuzzy Systems*, 6, 1-10.
- [2] The Central Committee of the CPC and the State Council: China Education Modernization 2035, [http://www.gov.cn/xinwen/2019-02/23/content\\_5367987.htm](http://www.gov.cn/xinwen/2019-02/23/content_5367987.htm),
- [3] Wang, C., Wang, S., & Xing, R. (2020). Research on the new model of empowering education for the computer science majors in universities during the AI era. *Contemporary Education Research and Teaching Practice* 13, 89-90.
- [4] Zou, T., Kang, R., & Tan, P. (2021). Teacher's role crisis and role remodeling in the AI era. *Contemporary Education Sciences*, 6, 88-95.
- [5] Botrel, L., Holz, E. M., & Kübler, A. (2015). Brain painting v2: Evaluation of P300-based brain-computer interface for creative expression by an end-user following the user-centered design. *Brain-Computer Interfaces* 2(2-3), 135-149.
- [6] González, V. M., Robbes, R., Góngora, G., & Medina, S. (2015). Measuring concentration while programming with low-cost BCI devices: Differences between debugging and creativity tasks. In *Foundations of Augmented Cognition*. Pp. 605-615. Los Angeles, USA: Springer.
- [7] Tian, H. & Gong, A. (2020). Research on the teaching ability system of college teachers in the era of intelligent education, *Journal of Suzhou University: Education Sciences Edition* 8(4), 73-82.
- [8] Li, Z. (2007). Serving for the modernization of talents—the core of modernization of education. *Education Review*, 5, 4-6.
- [9] Starr-Glass, D. (2016). Reconsidering Boyer's reconsideration: Paradigms, sharing, and engagement. *International Journal for the Scholarship of Teaching and Learning*, 5(2), 1-9.