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Reconstructing the Practical Path of Teacher-Student Interaction in Colleges and Universities in the Age of Digital Intelligence

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Abstract: *The risks that come with digital-intelligent technologies bring multiple realities to the stable college teaching ecosystem in the form of hidden realities. In this paper, the path of teacher-student interaction is reconstructed from the three levels of maintaining the teacher's ontological value, centering on "learning", and constructing a community of teacher-student interaction. It aims to respond to the development trend of the digital and intellectual era, and to promote innovation and change in education in order to achieve higher-quality educational outcomes and maintain the stability and sustainability of the teaching and learning ecosystem in higher education.*

Keywords: *Digital Intelligence Technology; Teacher-Student Interaction; Path Reconstruction*

1. Introduction

This paper takes teacher-student interaction practice as the entry point to examine practical challenges and potential concerns across the entire educational chain—ranging from top-level design and educational supply to educational processes and learner demand. Based on the evolutionary logic of "highlighting the essence of interaction and nurturing – reshaping new interaction patterns – constructing an interactive teacher-student community," it proposes a new path to promote the sound development of the teaching ecosystem in the digital intelligence era.

2. Realities and Potential Pitfalls in the Age of Digital Intelligence

2.1 The pace of iteration is accelerating and the changing role of teachers needs to be adapted urgently

(1) Time dimension: invisible prolongation of teachers' workloads and the pressure for "immediate feedback"

With the widespread use of digital tools and online learning platforms, teachers have greatly expanded their working hours through the extension of technology, making their workload invisibly magnified [1]. The popularity of real-time communication tools and online course management platforms (e.g., LMS systems) has forced college teachers to deal with students' queries, homework corrections, and instant feedback even after class, which inadvertently exacerbates teachers' stress and makes it difficult for them to get out of the work environment after work, which in turn creates both mental and physical fatigue. On top of that, teachers are under greater time pressure to prepare lessons. The diversification of digital resources requires teachers to put more effort into screening, integrating and updating teaching materials when preparing lessons, and this increased workload has a direct impact on their rest and personal life, causing many teachers to fall into the cycle of "endless work" and even leading to burnout. Over time, this state of overwork may further affect teachers' professional satisfaction and their teaching effectiveness.

(2) The spatial dimension: fragmentation of teacher-student interaction and weakening of the emotional connection

The teaching environment in the digital intelligence era breaks through the traditional classroom space [2], and the interaction between teachers and students relies more on the virtual platform, thus realizing "decentralization" in space, which brings flexibility in teaching, but also leads to the weakening of the emotional connection between teachers and students [3]. In online education or blended learning

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models, it is often difficult for teachers to access these nonverbal signals, leading to a lag in instructional feedback and fragmentation of interactions. Virtualization in the spatial dimension also affects the trust and understanding between teachers and students. Due to the lack of face-to-face interaction, the relationship between teachers and students tends to be more superficial, and it is difficult for teachers to gain an in-depth understanding of students' real learning needs and psychological state. This change in the space of interaction has led teachers to rely more on technological tools for feedback and interaction in the educational process, rather than understanding the needs of their students through direct communication with them. Teachers' roles in the virtual space are also gradually changing into "technology administrators", who not only have to manage course content, but also have to deal with technical issues, which makes teachers face more distractions during the teaching process and find it difficult to focus on the teaching itself, thus further weakening the depth and quality of the teacher-student interactions.

2.2 Inequality in physical space, the status quo of the divide is highlighted

(1) The time dimension: "delayed" access to education and uneven learning progression

One of the notable issues of the digital divide in the time dimension is the asynchronicity and imbalance in the teaching and learning time of teachers and students in higher education. In many developed regions, students and teachers have ready access to high-quality digital resources and online course platforms, and flexible learning and teaching arrangements through digital tools. However, in more underdeveloped regions or economically disadvantaged groups, teachers and students have limited access to digital resources and often have to rely on limited hardware equipment for learning and teaching during fixed periods of time. This temporal imbalance leads to large differences in learning outcomes between groups. For example, economically disadvantaged students may not be able to access learning materials or interact with instructors online anytime after class as well as students with good access to technology, resulting in a more constrained allocation of study time than other students [4]. Teachers may also find it difficult to follow up on students' learning progress in a timely manner due to technological constraints, especially in courses that require frequent interactions and immediate feedback, and the gap in the quality of education is exacerbated by the lack of synchronicity in time [5].

(2) Spatial dimension: uneven regional distribution of educational resources and heterogeneity of learning environments

First, uneven physical facilities exacerbate the difficulties that students and teachers have in using digital tools. For example, in colleges and universities with relatively well-developed equipment and network facilities, teachers and students are able to use high-speed Internet, participate in online discussions, and access digital resources such as digital libraries from any corner of the campus. And in less well-equipped districts, students and teachers may not be able to secure even the most basic computing equipment, making it difficult for them to engage in high-quality online teaching and learning activities. Especially in colleges and universities in remote areas, students even have to run around to find stable network signals, and this inequality in the physical environment leads to great limitations in learning space.

Second, differences in the popularity of digital learning platforms also exacerbate spatial inequalities. For example, some colleges and universities have adopted advanced AI-assisted teaching systems that can provide customized teaching support based on students' learning progress and individual needs. In areas where the digital divide is evident, teachers and students still rely on the traditional physics classroom teaching model and are unable to enjoy the flexibility and convenience of advanced educational technology. In the long run, this spatial disparity can lead to serious polarization in the learning experience and learning outcomes of students from different regions and groups.

2.3 A paradigm shift in student learning that requires adapting to new types of interactions

(1) Time Dimension: Fragmentation of Learning Pace and Compression of Deep Learning Time

With the use of technology, the pace of student learning has been greatly fragmented. As a result of the popularization of information technology and the diversification of digital resources, students' learning time has been gradually broken up into "micro-learning" time segments. Many learning activities take place through online platforms and mobile devices that allow students to access knowledge anytime, anywhere, and while this flexibility in learning increases convenience, it also leads to a superficialization of the learning process for students. This shift diminishes the ability of students to

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engage in deep thinking and systematic learning in the time dimension. And technology-assisted learning, especially through videos, quick searches, and knowledge sharing on social media, often prompts students to become accustomed to quick access to information but lacks in-depth processing and reflection on knowledge. In the long run, it is difficult for students to build up a deep understanding and a firm memory of their knowledge, and there may even be a shortening of the memorization cycle of the content they are learning. Likewise, its makes it harder for students to control the pace of learning. It is difficult for students to develop a complete learning framework while being exposed to different learning tasks at different times. This fragmented approach to learning not only increases students' cognitive load, but may also affect their time management ability, leading to lower learning efficiency, which in turn brings about academic pressure and psychological burden.

(2) The spatial dimension: the generalization of virtual learning spaces and the lack of social interaction

First, the generalization of virtual learning spaces weakens students' social interactions. In virtual spaces, teacher-student interactions rely more on text, voice, or video tools, which diminishes opportunities for natural communication and collaborative learning among students. In particular, the lack of face-to-face emotional interactions and non-verbal communication leads to students' vulnerability to feelings of loneliness and alienation in the virtual space. Second, students may lack effective learning supervision in virtual learning spaces. In virtual learning, it is difficult for teachers to grasp the learning status of each student in real time, and students procrastinate or slack off due to the lack of external pressure, leading to poor learning results. The generalization of virtual space also brings with it the casualness of the place of learning, which makes it possible for students to be more disturbed in the learning process. Informal learning spaces do not provide the same focused environment as a school classroom, resulting in students being distracted from the learning process or unable to manage their time effectively. While the freedom of space increases the flexibility of learning, it also reduces the focus and depth of learning.

2.4 Instructional capstone design, need to ensure standardization of technology use

(1) The time dimension: the loss of control over the pace of teaching and learning and the impact of the speed of technological development

Generative AI breaks the explicitly time-based rhythm of traditional teaching by providing highly personalized, immediate feedback and content generation. While this change provides a high degree of flexibility for learners, it also creates a great deal of uncertainty for teachers in terms of instructional design. It is difficult for teachers to control the pace at which lessons progress as they did in the past, as students have instant access to a wealth of information through generative tools, and even generate academic content that may be outside of the teacher's pre-determined pace of instruction. At the same time, AI technologies and tools are updated so frequently that teachers must continually adapt and optimize their instructional designs to keep up with the rapid changes in technology. This change has resulted in shorter design cycles for teachers, who need to keep up with the latest technical specifications when planning their content, even if they have to make significant revisions every semester or year. This change in technological norms increases the workload of teachers and may also lead to incoherent content and a lack of systematic instructional design. In responding to technological developments, teachers must not only deal with the learning and application of new technologies, but also ensure that these technologies comply with ethical and legal requirements in education.

(2) The spatial dimension: the blurring of virtual and real teaching spaces and the difficulty of implementing technical specifications

In the spatial dimension, the main problem facing digital-intelligent instructional design is the blurring of virtual and real instructional spaces. GenAI allows students to learn anytime, anywhere through technology tools, and this spatial flexibility goes a long way to impacting the clear definition of learning places in traditional teaching. In this new learning paradigm, it is difficult for teachers to effectively monitor and manage the learning environment for their students, which leads to the enforcement of technical specifications becoming more difficult. For example, GenAI in virtual learning spaces can help students generate assignments, essays, etc., however, it is difficult for teachers to monitor students' adherence to academic norms in real time in a virtual environment. Students may use these tools to circumvent academic integrity requirements by submitting work that they did not do independently. This phenomenon makes it imperative for instructors to design and monitor the technical specifications more closely to ensure that students adhere to academic ethics when using GenAI.

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3. Reconstructing the Three-Level Practice Path of Teacher-Student Interaction in the Age of Digital Intelligence

3.1 Highlighting the most essential aspects of teacher-student interaction with the value of teacher ontology

On the one hand, with the deepening of the application of Digital Intelligence in education, the roles, responsibilities and functions of teachers will undergo profound changes. Although some roles have been replaced or decomposed by AI, the ontological value of the teacher's role has not only not been weakened, but its irreplaceable importance has been emphasized in the context of digital intelligence [6-7]. Each teacher, with his or her unique knowledge base and life experiences, subtly influences the trajectory of students. This impact involves a number of dimensions such as emotions, attitudes, and values. This is the art of education that cannot be replicated by machines, which lack human emotion, intuition and creativity. On the other hand, teachers need to actively embrace technology and view it as a right-hand man. Teachers also need to improve their skills in technology operation, data analysis, and curriculum design to ensure that they can effectively use digital intelligence tools to optimize the teaching process, enrich learning resources, and achieve accurate teaching. At the same time, teachers need to safeguard the privacy and security of students and avoid the misuse of technology. In addition, teachers need to continuously incorporate innovative ideas and technological literacy so that they can become a bridge between the past and the future, between tradition and modernity, and lead education to a new stage of greater intelligence, inclusiveness and efficiency.

3.2 Learning as the center, reshaping the new pattern of teacher-student interaction

In the age of digital intelligence, self-driven and self-led learning behaviors have become an indispensable way of life for realizing personal values. Responsibility for learning is gradually returning to the individual with changes in the way education is delivered, a shift aimed at encouraging learners to acquire knowledge through self-learning, self-awareness, self-acquisition and self-discovery. In this context, a “learning”-centered teacher-student interaction will become the need of the hour, and a “learning”-centered teacher-student interaction is sprouting and growing. The fundamental purpose of education is to liberate and stimulate the individual's self-learning ability and growth momentum. A machine- or teaching-centered teaching model actually deviates from the essence of learning, and not only fails to trigger real learning behaviors, but may also inhibit individual learning and development, and even lead to the nihilization of education. Therefore, in the process of reshaping teacher-student interactions in the digital age, we must re-examine and re-emphasize the fundamental and critical status of “learning”. This means that we need to return to the essence of education, redefine the meaning of “learning”, and build a new pattern of teacher-student interaction centered on “learning”. Such a new paradigm not only helps students lay a solid foundation for life, but also promotes the development of education in a more open, interactive and personalized direction, so that every student can realize his or her self-worth in self-exploration and growth.

3.3 Building a community of teacher-student interaction with each other

In the age of digital intelligence, communication and exchange between teachers and students is not only the transmission of knowledge, but also a bridge for learning and growth. The learning process of students is still deeply rooted in the communication and exchange between teachers and students. Student learning is essentially a self-driven growth and development process centered on teacher-student interaction, which is by no means unidirectional knowledge instillation, but a dynamic process based on two-way interaction and mutual influence. Based on a shared vision and common goals, teachers and students form a close relationship of mutual dependence and achievement together constituting a learning community.

4. Conclusion

Higher education is evolving at an unprecedented pace, and teacher-student interaction—at the heart of the educational processes undergoing significant changes in both form and meaning. To address these challenges, this study proposes a practical framework for reconstructing teacher-student interaction across three dimensions: preserving the ontological value of teachers, centering on learning, and building a teacher-student interaction community. First, the ontological value of teachers must be upheld by

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leveraging their educational expertise, enhancing their digital literacy, and ensuring that technology serves the fundamental goals of education. Second, the focus should shift to "learning" by reshaping teacher-student interaction patterns, returning to the essence of education, redefining the meaning of "learning," and promoting more open, interactive, and personalized educational experiences. Finally, constructing a teacher-student interaction community fosters deep dialogue and communication, enabling teachers and students to grow together within a nourishing learning environment. This study highlights that while digital intelligence technologies have transformed teaching methods, the core essence and purpose of education remain unchanged.

In the digital intelligence era, it is essential to uphold the original mission of education, reinforce the leading role of teachers, and foster educational innovation and reform. At the same time, greater attention and support must be directed toward students' learning processes to cultivate self-directed learning behaviors and help them realize their full potential. It is hoped that the findings of this study will offer valuable insights for teaching reform and innovation in higher education and contribute to the cultivation of talents with innovative thinking and practical capabilities.

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