Exploration of the New Teaching Form in the Perspective of Data-Intelligence Integration

Ke-rui Linghu¹,² and Yuqun Zhu²

¹School of Business, Guizhou Minzu University, Guiyang, Guizhou, China
²School of Media, Guizhou Minzu University, Guiyang, Guizhou, China

*Corresponding author e-mail: linghukr@gzmu.edu.cn

Abstract. Data and intelligence integration provides the new possibilities for the development of education in the future, which further empowers the innovation of teaching forms. This paper analyzes the new form of teaching under the integration of data and intelligence, and then puts forward some suggestions to promote the new form of teaching. The new form of teaching is supported by data and intelligence integration, which includes efficient learning, "double teacher" classroom and global interactive learning space, etc. In order to improve the new teaching effect under the data and intelligence integration, we can empower the new teaching forms from the three levels of school, teacher and student. In the future, we should further explore the development path of the new form of data intelligence integration teaching.

Keywords: Empowerment, Data and Intelligent Integration, Artificial Intelligence, Teaching Form

1. Introduction

In recent years, digitization has brought a lot of changes which affects various industries [1], and the empowerment effect of data and data technology on various industries have been widely concerned [2]. In the book “Learning with Big Data: the Future of Education”, the author Mayer-Schönberger and Cukier (2014) have pointed out that there is not only the relationship between big data and education, but also the profound influence of big data on the future situation of education. The integration of big data and education industry, the education service based on big data have promoted the reform of teaching form. At the same time, the development of artificial intelligence (AI) will also change education and boost the new form of teaching in the digital era.

If big data and artificial intelligence (AI) want to promote the development of education deeply, the key point is that data and digital technology can support the classroom teaching effectively. With the integration of big data, digital technology and AI technology, the integration of data and intelligence will empowering teaching in the future, which will inject new thinking into classroom teaching and give birth to a new form of teaching in the digital era. Therefore, it is very important to explore the new form of teaching under the integration of data and intelligence.

This paper will based on the concept of empowerment and teaching form, to analyze the new form of teaching under the empowerment of data and intelligence integration. At the same time, it will give
some suggestions from the three levels of school, teacher and student so as to have a deeper understanding empowerment of data and intelligence integration to the teaching reform direction, as well as promote the teaching form evolved with the times.

2. New Form of Teaching under Empowerment of Data-intelligence Integration
Empowerment mainly refers to the relevant empowering organizational behavior in the context of digital technology [3]. Ying et al (2018) emphasized the empowering role of data and data technology [4]. "Form" refers to the manifestation of things under certain conditions. Teaching form is a teaching style, development state and dynamic characteristics, which is a combination of various elements in the process of teaching. AI-based teaching assistants can help teachers, but only relying on technology itself can not fundamentally bring profound changes to teaching [5]. The key point for teaching reform is the empowerment of big data, artificial intelligence and other technologies in modern teaching. The integration of artificial intelligence and big data has brought new motives to the reform of teaching form. The development and integration of technologies such as big data, AI, cloud computing, internet of things and 5G inject new vitality into education, which also provide data support for teachers, students and education administrators. Therefore, the integration of data and intelligence will empower new impetus to the reform of teaching forms [6] presenting rich teaching forms (Figure 1).

![Figure 1. New form of teaching under data-intelligence integration](image)

2.1 Data-intelligence Integration Supports Efficient Learning
With the integration and development of digital technology, artificial intelligence and educational technology, knowledge spreading will become more efficient and accurate. Human brain and intelligent devices can exchange data with each other, which empowers efficient learning through data intelligence integration. Data-intelligence integration will enhance learning efficiency through empowering teachers and students respectively.

From the perspective of teachers, teachers can obtain knowledge from massive databases, which bases on big data, artificial intelligence and cloud computing technology. Teachers can build a complete knowledge system by analyzing and polishing knowledge through AI technology. Teachers can also use AI technology to transmit the complete knowledge system to students efficiently and accurately. From the perspective of students, students can quickly deconstruct the huge knowledge system through intelligent technology, select and accurately understand the knowledge content, so as to achieve efficient learning.

2.2 "Double teacher" in New Classroom of Data-intelligence Integration
The integration of big data technology and artificial intelligence technology will present a new "double teacher" classroom. In the "double teacher" classroom, the role of traditional teachers can not be ignored, who still have a specific function. At the same time, the pedagogical agent (PA) presents the virtual image which can promote students' learning in the teaching environment [7], so as to realize the data-intelligence integration empowerment. Pedagogical agent has the ability of human perception, instant response and thinking, and also has the ability of intelligent adaptation and adjustment, which...
can understand people and things in multiple dimensions. In the new classroom of data-intelligence integration, pedagogical agents and teachers have the same status in teaching activities, which has changed the current classroom mode of teacher-centered and human-computer teaching assisted. Compared with human teachers, pedagogical agents are more efficient and accurate in transmitting knowledge and solving problems, but their ability to deal with difficult problems and special situations is not as good as human teachers. Within the integration of data and intelligence, the "double teacher" new classroom integrating digital intelligence technology and human teachers will be constructed, which presents a teaching mode with pedagogical agents as the main body and teachers as the auxiliary. Pedagogical agent is responsible for teaching objective knowledge, which frees human teachers from the traditional knowledge teaching. The human teachers focus on solving difficult and special problems for students, who are also responsible for the cultivation of moral emotion, so as to realize the "double teacher" classroom with the integration of data and intelligence.

2.3 All Fields Interaction Learning Space
Big data, cloud computing, AI, Internet of things, 5G and other technologies promote the interconnection of all things to the intelligent connection, which also promote the seamless integration of the real and the virtual world. In the future, the integration of digitization, AI, virtual reality, 5G and intelligent devices, will empower the classroom teaching space. Through the construction of all fields interaction virtual reality space, it will drive the students through the senses perception of sight, hearing, smelling and touching. The all fields interaction learning space provides students with multi-dimensional learning services and sensory experience, which has contributed to understanding knowledge more comprehensively and deeply. For example: Teachers generate the teaching content into 3D graphics and images through big data, digital technology, AI and virtual reality technology, which makes the teaching content vivid and interesting. Teachers can also transmit diversified knowledge and information to students timely through big data and 5G network. Teachers and students can achieve interaction through digital technology, intelligent technology and mobile intelligent devices. Within the all fields digital classroom, students are the center, which creates a good personalized learning space with wisdom and endogenous experience [8]. Students can enter the virtual and real field to learn at any time and place, it is helpful to realize students' personalized and autonomous learning, and also cultivate students' ability of exploration, thinking, analysis and problem solving.

3. Suggestions on Data-intelligence Integration Empowering new Form of Teaching
With the improvement of the integration of digital technology and education, educational big data has become an important force to promote the reform of teaching ecology. The reform of teaching form is a systematic project, the attitude and support of school reform. The teaching idea and ability of teachers, the learning attitude and ability of students will affect the implementation and effectiveness of the new teaching form. Therefore, the new teaching form of data empowerment should be promoted from the three levels of "school-teacher-student".

3.1 School Level: Pay Attention to the Reform of Digital Teaching and Stimulate the Vitality of Teaching Data
Modern education characterized by digitalization and intellectualization, which promotes teaching form to transfer towards the integration of data and intelligence. At the school level, we should support the efficient learning of data intelligence integration, the "double teacher" classroom, the all fields interaction learning space and other new forms of teaching in the aspects of leadership decision, resource construction, service support and supervision and control. The institution design can support and guarantee the sustainability of teaching form reform. The school decision makers should pay attention to the reform of teaching form, through the top-level design, who strongly support the innovation and reform of teaching form from the institution. Leadership decision can also further promote the transformation of teachers' teaching thoughts and the improvement of teaching ability. In
terms of resource construction and support services, the construction of digital intelligent learning platform, resource supply and supporting of teaching environment are the necessary conditions for the innovation of data empowering teaching form. Through systematic support and training services at the school level, the smooth implementation and development of teaching innovation form can be guaranteed. In the process of supervision and control, we should strengthen the evaluation of teaching form reform effect, strengthen the construction of curriculum standards, carry out ability test and comparative analysis of learning results. Through data mining technology, schools strengthen the tracking and monitoring of the teaching and learning process, which helps to control the effect of teaching form reform timely and effectively.

3.2 Teachers Level: Enhance Awareness, Improve Ability, Practice Digital Teaching Reform
In the face of the new teaching form in the digital era, teachers may hold different attitudes and adopt different behaviors, and their adaptability to the new teaching form is also differently. Therefore, in order to promote data empowerment in the new form of teaching, teachers' data awareness, digital technology application ability and using behavior are indispensable. First of all, teachers should have a strong sense of data and recognize the value of data application to the reform of teaching form, so as to realize the reform of data empowering teaching form. Secondly, enhancing teachers' digital ability is the key to implement the reform of teaching form [9]. Teachers must improve the ability of deep integration of digital technology, intelligent technology and classroom teaching, and promote the transformation of traditional teaching form. Moreover, teachers should be good at using big data, digital and intelligent technologies and means, at the same time, they should actively explore the new mode of big data and intelligent technology applied in teaching reform, so as to realize personalized and accurate teaching. In general, teachers' actions are dominated by data awareness. Teachers should be more sensitive and receptive to data supported teaching behaviors and teaching classes, who are willing to consciously use data technology and intelligent technology to change the traditional teaching form. In addition, teachers should enhance the ability of digital teaching through data awareness. Whether they have data awareness or not determines the adaptability and control ability of teachers in the data intelligence integrated classroom.

3.3 Students Level: Adapt to the new Form of Digital Teaching, Enhance the Ability of Autonomous Learning
Students are the practice object of the new teaching form based on data empowerment. If students are not devoted to enough the new form of learning and lack of autonomous learning ability, it will directly affect the effective implementation of the new teaching form. Therefore, the students' adaptability to the new teaching form is the key to improve the effect of the new teaching form. In the new teaching form of the organic integration of digital technology and intelligent technology, the traditional external, passive and dependent form of knowledge teaching no longer exists. The "double teacher" classroom of data-intelligence integration and the learning space of all fields interaction have established the dominant position of students in the teaching process. Students need to learn the teaching content independently. They should have a positive spirit of inquiry, and change from a passive knowledge receiver to an active and good at inquiry classroom participants. In the all fields interaction learning space, the vitality of students' autonomous learning is released. They can make full use of mobile intelligent devices, intelligent control platform and wireless network to carry out diversified learning and multi-dimensional interaction [10]. In addition, the new teaching form will not be limited to learning at a fixed time or place. The autonomy and freedom of learning will be greatly increased, and extracurricular autonomous learning has become a normal [11]. Mobile intelligent learning tools will help students to obtain network resources anytime and anywhere in an informal way, and carry out learning autonomously and individually. If students adapt to this learning style and improve their autonomous learning ability and attention distribution [12], they will stimulate their learning vitality to a greater extent, thus releasing the effect of the new teaching form.
4. Conclusion
With the development and integration of big data and artificial intelligence technology, teaching forms are constantly enriched. The integration of data-intelligence provides new possibilities for the development of education in the future and further promotes the innovative exploration of teaching form. Data and intelligence empowerment in teaching presents the new forms of teaching, such as efficient learning supported by data intelligence integration, “double teacher” classroom of data intelligence integration, all fields interaction learning space and so on. In order to realize the new form of data empowering teaching, we need to promote the new form from the three levels of schools, teachers and students. In the future, we need to further explore the development path of the new form of data intelligence integration teaching.

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References
[1] Norris C, Soloway E. The digital transformation of K-12: a viewpoint. The Blue Dot, 2018, Iss 9, pp.7-13.
[2] Sun X B, Su Z H, Qian Y, Zhang D P. Research review and prospects of data empowerment. R&D Management, 2020, vol. 32, Iss 2, pp. 155-166. （in Chinese）
[3] Ling C L M, Pan S L, Raatham P, Kaewkitipong L. ICT-enabled community empowerment in crisis response: Social media in Thailand flooding 2011. Journal of the Association for Information Systems. 2015, vol. 16, Iss.3, pp. 174-212.
[4] Ying W, Jia S, Du W. Digital enablement of blockchain: Evidence from HNA Group. International Journal of Information Management, 2018, Iss 39, pp.1-4.
[5] Harri K. Dreams and reality: How AI will change education. The Blue Dot, 2018, Iss 9. pp.25-26.
[6] Wang B. Data empowerment: Reflection on the education ecology of higher vocational colleges from the perspective of teaching rethink. Chinese Vocational and Technical Education, 2019, Iss 35, pp.49-56. （in Chinese）
[7] Zheng S S, Chen W D, Xu R Y, Yuan F, Chu L Y. Data and intelligence fusion: the evolution and future trend of data-driven teaching and learning: also discuss the new form of graphical data intelligent enabling education. Journal of Distance Education, 2020, vol. 38, Iss 4, pp. 7-37. （in Chinese）
[8] Strasser B J. Data-driven sciences: from wonder cabinets to electronic databases. Studies in History and Philosophy of Biological and Biomedical Sciences, 2012, vol. 43, Iss1, pp. 85-87.
[9] Caena F, Redecker C. Aligning teacher competence frameworks to 21st century challenges: the case for the European digital competence framework for educators. European Journal of Education, 2019, vol. 54, Iss 3, pp. 356-369.
[10] Swan K. Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. Distance Education, 2001, vol. 22, Iss 2, pp. 306-331.
[11] Pistilli D, Arnold E. Purdue signals: Mining real-time academic data to enhance student success. About Campus, 2010, Iss 3, pp. 22-24.
[12] Quiles C, Prouteau A, Verdoux H. Assessing metacognition during or after basic-level and high-level cognitive tasks? A comparative study in a non-clinical sample. L Encéphale, 2020, vol. 46, Iss 1.