

The Social Role of Elementary School Teachers in the Era of Artificial Intelligence: Challenges and Responses

Yajing Xue*, Jiayu Zhou

School of Education Science, Nanjing Normal University, Nanjing 210024, China
1158705895@qq.com

* Corresponding author

Abstract: The fast-developing artificial intelligence technology penetrates and blends with all walks of life, and the education field is no exception. Elementary education presents new characteristics in the era of artificial intelligence. Regarding teaching goals, it pays more attention to cultivating students' thinking quality and moves toward diversified knowledge in teaching content, being more flexible and rich in teaching methods, etc. Under the social background of the rapid development of artificial intelligence technology, elementary school teachers face a series of challenges in role development. Society has higher expectations for the role of elementary school teachers, requiring them to have more professional role literacy. At the same time, the role practice of elementary school teachers is more complicated. In this context, elementary school teachers should adhere to the true nature of education, adjust their roles in time, be leaders of student growth, professional educators, and model lifelong learners, shoulder the responsibilities of the times, and continue to realize the teachers' value of nurturing people.

Keywords: artificial intelligence, elementary education, teacher role

1. Introduction

With the rapid development of science and technology, the era of artificial intelligence (A.I.) is coming. Artificial intelligence is increasingly closely related to all walks of life, and the field of education is no exception. In such an era, elementary education presents new characteristics. Correspondingly, the social role of teachers in elementary school is also facing new pressures and new challenges. The Opinions of the Central Committee of the Communist Party of China and the State Council on Comprehensively Deepening the Reform of Teachers in the New Era (2018) requires teachers to take the initiative to adapt to new technological changes such as informatization and artificial intelligence. This adaptation is not accomplished overnight, but is constantly adjusted and changed with technological progress. If teachers cannot recognize their situation in the background of artificial intelligence era in time, they will easily fall into the predicament of role development. Therefore, how to adjust the role of elementary school teachers to meet the challenges of the era of artificial intelligence has become a topic of our concern.

2. New Characteristics of Elementary Education in the Era of A.I.

The impact of artificial intelligence technology on elementary education includes, but is not limited to, educational objectives, educational content, and educational methods. Educational objectives are related to what kind of social roles students should be trained into and what qualities students should have, which is the fundamental issue of education. Under this background, what are the changes and the focus in elementary school's teaching content? What qualities should we focus on in elementary school students? Technological progress has changed the traditional way of knowledge dissemination. Under this background, what are the changes and what is the focus in the teaching content of elementary school? Artificial intelligence provides a wider variety of options for teaching methods in elementary education. How should teachers grasp the use of intelligent tools? Does classroom teaching still have an unshakable position? The development of artificial intelligence technology has brought some new characteristics to elementary education.

2.1 Weakening Disciplinary Barriers and Focusing on Thinking Training

Education is a future-oriented career, and the people we train should adapt to and create the future. Artificial intelligence is a comprehensive discipline that includes psychology, philosophy, neurophysiology, computer technology, etc. In the era of artificial intelligence, people to train not only people who can adapt to technological development but also people who can develop the technology. Based on adhering to the original educational objectives, instructors must pay more attention to cultivating the quality of thinking. The elementary education has implemented subject-based teaching for a long time, and the boundary of curriculum implementation is apparent. With the penetration of artificial intelligence in all aspects of life, the requirements for comprehensive literacy of students have become more and more important. The importance of cultivating the quality of thinking is highlighted at this time. Elementary education itself has the characteristics of introduction and foundation. It is not advocate to emphasize the professional characteristics of various subjects at the elementary level. Instead, the emphasis is on cultivating students' overall thinking. In addition, artificial intelligence technology is integrated among disciplines, which requires elementary education to lay a good thinking quality foundation for students. Professor Gu (2016) once pointed out that people observe things comprehensively, and new scientific discoveries and technological inventions often occur in interdisciplinary fields. The popular "STEAM" course in recent years is the integration of multiple disciplines to cultivate students' comprehensive creative thinking. Artificial intelligence requires elementary education to cultivate people with the quality of integration, logical thinking, systemic thinking and divergent thinking. Education at the elementary level determines to a large extent a person's lifelong thinking mode. Enlightenment education on these thinking qualities is becoming more and more vital in the era of artificial intelligence.

2.2 Breaking through the Restrictions of Textbooks and Moving Towards Knowledge Diversity

The advancement of artificial intelligence technology has changed how knowledge is created, acquired, controlled and used, and has given knowledge a diversified form of expression. In traditional elementary education, books are the primary carrier of knowledge, and the knowledge learning of elementary school students at school is mainly based on textbooks of various subjects. Artificial intelligence technology has realized the integration of resources. The changes brought about are the presentation of knowledge and a sharp increase in the amount of information. Traditional teaching content cannot better meet the needs of students and the requirements of social development. The demand for intellectualized knowledge has become stronger and stronger, and many emerging courses including computer programming have begun to appear in people's vision and enter elementary education. The learning content of elementary school students is continuously expanding from basic knowledge to diversified knowledge. Schools are also actively exploring the development of diversified courses, trying to offer a variety of personalized elective courses to meet the diverse learning needs of students and adapt to the diversified knowledge needs of the era of artificial intelligence. In addition, schools in various places have invested much money in infrastructure to prepare the hardware for the practical application of artificial intelligence technology to education and teaching and provide a path for realizing diversified knowledge teaching. The introduction of artificial intelligence technology has allowed school education to break through the limitations of books, and have more diversified development space in basic courses, providing students with more diversified choices.

2.3 Stepping out of the Classroom Boundary and Changing Methods of Teaching

Advanced technology has changed the way of teaching and learning. In the past, the central place for students to study was the school. In the school, the primary place for students to study was the classroom. In the classroom, the principal learning scene was the class under the guidance of the teacher. The changes that artificial intelligence technology brings to education are reflected in and outside the classroom. From the perspective of the class, compared with traditional class, today's class is called "smart class". The so-called "smart" is mainly aimed at the intelligence of class teaching. At present, it has begun to promote the use of "smart class" in elementary schools. Take the *Changyan Smart Class* developed by Iflytek Co., Ltd as an example, the whole system hardware and software combine to create an intelligent classroom environment, which can realize three-dimensional communication and interaction, generate full scene teaching records, conduct intelligent voice evaluation, and be equipped with diversified learning terminals. This makes the traditional books are gradually being replaced, and the traditional teaching modes are being changed. The upper grades of

elementary school students are equipped with tablet computers, interconnected with the classroom through App in the networked state. Teachers can directly control the software to complete teaching task, including random questioning, homework assignment and correction, which can be completed online. From the perspective of outside the classroom, the development of artificial intelligence provides students with a variety of learning channels. Out of the classroom, students can rely on abundant resources to achieve autonomous learning, which also means higher requirements for students' autonomous learning ability.

3. The Role Challenges Faced by Elementary School Teachers in the Era of A.I.

Some scholars pointed out, "In the era of rapid development of intelligent technology, many occupations in modern society are facing the challenge of artificial intelligence, and even many occupations may be replaced by artificial intelligence." As artificial intelligence technology makes virtual teachers a reality, intelligent robots can replace teachers in reading texts, correcting homework, answering questions, etc. The discussion about the role of teacher is popular in the public. Although most scholars firmly believe that machines cannot completely replace teachers, we have to recognize the challenges brought to teachers in the era of artificial intelligence. The role of teachers is facing a certain development dilemma under the impact of technology. A correct understanding of the new requirements for primary school teachers in the era of artificial intelligence can help teachers better position their self role in the era of artificial intelligence.

3.1 The Society Has Higher Expectations for the Role of Teachers in Elementary Schools

Yu HAN, a Chinese philosopher in the Tang Dynasty, wrote in *On Teachers* that "teachers pass on the truth impart knowledge and solve puzzles". For a long time, teachers have been given the role image of preacher, educator and solver. "Preaching", "teaching" and "solving puzzles" are considered to be the main responsibilities of teachers. In addition, there are various metaphors for the role of teachers, such as candles, gardeners, engineers of human soul and so on, which all place people's reasonable expectations for teachers. Besides, with the progress and development of society, the era of artificial intelligence puts forward more and higher requirements for teachers. In the United States of America, International Society for Technology in Education (ISTE) has formulated *The ISTE Standards*, which provide the competencies for learning, teaching and leading in the digital age, providing a comprehensive road-map for the effective use of technology in schools worldwide. Aiming at the use of technology in the field of education, the educator section of ISTE standards specifies seven main roles of teacher: learner, leader, citizen, collaborator, designer, facilitator and analyst, and details a total of 24 specific standards. It can be seen that the traditional role of teachers is difficult to satisfy people's expectations of teachers, and society has a more contemporary role expectation for teachers. With the universal application and penetration of artificial intelligence technology, parents have become increasingly aware of the importance of foundation-laying education in elementary schools, and more aware that the significance of cultivating children's thinking quality is far greater than the accumulation of basic knowledge. From the current reality of China's elementary education, the main focus of most elementary school teachers is still on the daily management of students and classroom teaching. However, parents' expectations of elementary school teachers are no longer satisfied with simple teaching and learning, and also include all aspects required by the development of the times. It can be seen that there is an imbalance between the current situation of elementary school teachers' role and the social expectation of teachers' role.

3.2 The Role Literacy Requirements of Teachers in Elementary Schools Are More Professional

Studying in elementary school is the first step and the essential part of compulsory education in China. The work of primary school teachers is often considered to have little technical content because of the young age of teaching objects and the foundation of teaching content. The application of artificial intelligence technology in the field of education can directly replace teachers to deal with some simple repetitive work, which makes education and teaching work have intelligent assistants. In the process of education and teaching, primary school teachers form the cognition of their own role and feel the challenge to their professional quality brought by artificial intelligence technology. First, about knowledge literacy. Artificial intelligence technology's powerful knowledge integration ability impacts elementary school teachers' initially fragile knowledge possession and puts forward higher requirements for teachers' knowledge-trace ability, philosophical reflection, and self-renewal. Second,

about ability literacy. Artificial intelligence technology's real-time and diversified presentation of knowledge has a significant impact on elementary school teachers' traditional "blackboard + chalk" teaching method. Elementary school teachers need to cultivate technical application ability in education and teaching. Elementary school teachers need to cultivate the technical application ability in education and teaching. This application ability is neither excessive worship and dependence on technology, nor excessive exclusion of technology, but focuses on what form and degree of application can make technology tools play the most reasonable value. Third, about moral quality. In the era of artificial intelligence, primary school teachers' moral quality requirements have risen to a new height. Jaspers said, "Education is about the soul, not the accumulation of rational knowledge and understanding." The rapid development of science and technology challenges the spiritual world of human, and the significance of elementary school teachers in shaping students' personalities and leading moral quality has become more and more prominent.

3.3 The Role of Teachers in Elementary Schools is More Complicated in Practice

Current students learned in elementary school suffer from the enormous revolution through the digital science and technology. Their vision of the world and the perspective of dealing with problems are different from those of the past generation. Elementary education for the "digital native" is also more complex and more uncertain than traditional elementary education. The complexity is expressed in many aspects including regular school management, student education and teaching, and home-school communication and cooperation. Firstly, in terms of regular school management, intelligent campus management based on artificial intelligence technology has brought great convenience to the school, but it has also added many digital tasks to teachers. Especially in the transition period of technology applications, it is necessary to carry out systematic training for teachers. Secondly, in terms of student education and teaching, today's elementary school students are nurtured and grown in a digital technology environment, they feel common rather than novel about the application of artificial intelligence technology everywhere in their lives. What is worthy of primary school teachers' attention is not only the application of technology in classroom teaching, but also how to guide students to form their own thinking and judgment abilities in an environment of information expansion. Thirdly, in terms of home-school communication and cooperation, the development of Internet information technology has broken the time and space constraints of home-school communication, which means that technological progress has invisibly increased the work pressure of elementary school teachers. In some elementary schools with well-established smart campuses, parents of students can directly see the real-time situation of their children in the school through the APP on mobile phone, the communication between teachers and parents becomes more convenient, and it also increases the work pressure of teachers. Various changes such as these have made the situation of teachers in elementary schools more complicated.

4. Responses to the Role of Elementary School Teachers in the Era of A.I.

Rethinking Education: Toward a Global Common Good?(2015) was published by UNESCO in November 2015, which pointed out that "The missions and careers of teachers must constantly be recast and reconsidered in the light of new requirements and new challenges to education in a constantly changing globalized world." Artificial intelligence technology has changed the education environment. The traditional role of teachers cannot meet the requirements of the times. Facing the challenge of the role development of elementary school teachers in the new environment, we cannot blindly seek to adapt and make changes to achieve role breakthroughs, what we should do more is to adhere to the true nature of education. In order to make a breakthrough in the role of elementary school teachers, the key is to think about how to take on the educational responsibilities of the times. They must have the courage to innovate, and at the same time they need to stick to some things. Their educational ideas and methods need to be changed, but the teachers' responsibility for educating people has not changed fundamentally.

4.1 Return to the True Nature of Education and Be a Growth Facilitator of Students

The rapid development of artificial intelligence technology has stimulated people's discussion about whether machines can replace teachers. Under the background of intelligent technology, the role of teachers as knowledge transmitters has been greatly impacted. So what are the qualities of teachers that artificial intelligence cannot replace? Many scholars have already given the answer that what makes

teachers irreplaceable is the essence and connotation of education. Elementary school teachers should return to and focus on the true nature of education, step out of the traditional role of "knowledge transmitter" and be a facilitator of children's growth. The role responsibility of elementary school teachers as "growth facilitators" covers all aspects of children's growth:

1) Elementary school teachers are the guides of children's emotions and values. Elementary school stage is the basic period of children's physical and mental growth. Teachers should enable students to receive timely emotional care in the artificial intelligence environment, care for children's young hearts, guide students to establish correct values, and lay the foundation for students' lifelong personality development.

2) Elementary school teachers are facilitators of students' learning. In the face of elementary school students, teaching in elementary schools is not only to popularize basic knowledge and teach basic skills, but also to stimulate children's curiosity, protect children's curiosity, and cultivate children's ability to actively explore and learn independently by using artificial intelligent technology.

3) Elementary school teachers are the companions of children's socialization. Artificial intelligence cannot replace the situational experience of face-to-face communication between people. Elementary school is an important place for communication between teachers and children, children and children. Children complete the first step of socialization here, and elementary school teachers must take responsibility for the socialization of children, play the role of companions of children's socialization and guide children to pay attention to the humanistic spirit in era of high-technology.

4.2 Strengthen the Improvement of Literacy and Be a Professional Educator

Elementary education is a science. "As a specialized type and field of education, it is a science formed by combining various related knowledge, theories and technologies with the physical and mental development and healthy growth of primary school students as specific conditions." Elementary school teachers should grow into professional educators who master the scientific laws of elementary education. Compared with the traditional single and closed education environment, huge database resources and human-machine collaboration are unique advantages in the era of artificial intelligence. Modern elementary school teachers should make full use of the rich resources and convenient conditions provided by artificial intelligence technology to lay a solid literacy foundation for growing into "professional educators". The literacy requirements of professional educators are as follows: Firstly, they should have comprehensive professional knowledge literacy. With technical support in the era of artificial intelligence, teachers in elementary school should have a comprehensive grasp of subject knowledge, pedagogical knowledge, teaching method knowledge, the knowledge of children's physical and mental development, and other related knowledge. Secondly, they should have solid professional ability and quality. Elementary school teachers in the era of artificial intelligence should have the ability to screen and integrate huge amounts of knowledge, the ability to apply intelligent technology rationally, and the ability to provide personalized guidance and analysis to students. Thirdly, they should have specific scientific research ability. Elementary school teachers are faced with developing children, which requires teachers to have certain scientific research literacy. In this way, they can continue to explore the scientific laws in the increasingly complex elementary education and teaching situation in the era of artificial intelligence, showing the literacy and ability of professional educators.

4.3 Pay Attention to Self-Renewal and Be a Lifelong Learner

"There has never been an era like the era of artificial intelligence, which has such high requirements and expectations for the learning ability of teachers: if you don't learn, you will be eliminated, if you don't continue learning, you will fall behind, and you will be lost in all beings." Although "teacher consciously is a learner" is the inherent requirement of the teaching profession itself, it must be admitting that the era of artificial intelligence has put forward higher standards and higher requirements for teachers in elementary schools. The rapid update and iteration of technology makes teachers have to rethink: what can we do to avoid being eliminated by the times? The answer is continuous learning, continuous reflection, self-renewal and lifelong learning. "Teachers as lifelong learners" is not only a professional requirement, but also a model of continuous learning for the society. Lifelong learners must have good learning ability, establish their knowledge system, and continuously improve and update through learning. Students in elementary schools have strong imitation ability, so the learning of elementary school teachers is not only the enrichment of self-knowledge, but also an example of continuous learning for students. In self-learning, teachers guide students to constantly enrich and

improve their existing knowledge, and guide students to master scientific learning methods. In addition, elementary school teachers be life-long learners can better adapt to the era of artificial intelligence with rapid technological changes, better deal with open and constantly changing and complex primary education situations, use continuously updated knowledge to find problems and solve problems through continuous learning, so as to realize the continuous progress and achieve continuous self-improvement, and then drive the progress and improvement of students.

5. Conclusion

Elementary education presents new characteristics in the era of artificial intelligence, pays more attention to cultivating students' thinking quality in teaching objectives, becomes more diversified in teaching content, and becomes more flexible and rich in teaching methods. Under the social background of the rapid development of artificial intelligence technology, elementary school teachers face a series of challenges in role development. Society has higher expectations for the role of primary school teachers, and more professional requirements for the role literacy of primary school teachers. Meanwhile, the situation of role practice of elementary school teachers is more complicated. In this social context, we believe that elementary school teachers should not blindly seek to adapt and make changes, but to adhere something and have the courage to bring forth new ideas. Artificial intelligence is a new technology surrounding education, teachers as the most essential character in education should adhere to the true nature of education, be the facilitator of students' growth, strive to improve professional quality to be a technical educator, maintain the habit of self-renewal to be a model lifelong learner, shoulder the responsibility of the times and continue to realize the teachers' value of nurturing people.

References

- [1] Central Committee of the CPC and the State Council (2018). *The Opinions of the Central Committee of the Communist Party of China and the State Council on Comprehensively Deepening the Reform of Teachers in the New Era*. http://www.moe.gov.cn/jyb_xwfb/moe_1946/fj_2018/201801/t20180131_326148.html.
- [2] Wansen Wang (2018). *Principles and Functions of Artificial Intelligence*(4th ed.). Beijing: Publishing House of Electronics Industry, p.1-20.
- [3] Mingyuan Gu (2016). *The Variance and In-variance of Future Education*. China Education Daily, 2016-08-11, p.003.
- [4] Chifei Zhang (2021). *Transformation of teachers' role connotation in the era of artificial intelligence*. Teacher Education Forum, vol.34, no.04, p.23-26.
- [5] Min ZHAO (2021). *An dynamic Analysis of Teachers' Role Playing in the Information Age*. Journal of Taiyuan Normal University (Social Science Edition), vol.22, no.02, p.99-105.
- [6] ISTE (2017). *The ISTE Standards*. <https://www.iste.org/iste-standards>.
- [7] ISTE (2017). *ISTE Standards: Educators*. <https://www.iste.org/standards/iste-standards-for-teachers>.
- [8] Karl T. Jaspers (1977). *Was ist Erziehung?* (Translated by Jin ZOU in Chinese). Beijing: SDX Joint Publishing Company, 1991, p.4.
- [9] UNESCO (2015). *Rethinking Education: Toward a Global Common Good?*. Paris: UNESCO, p.55. <https://unesdoc.unesco.org/ark:/48223/pf0000232555>.
- [10] Weihe Xie & Min LI (2021). *Principles of Elementary Education*. Beijing: Higher Education Press, p.4.
- [11] Yonggang Feng & Ying CHEN (2021). *"Transformation" and "Persistence" of Teachers' Role in the Era of Wisdom Education*. China Educational Technology, vol.2021(04), p.8-15.
- [12] Zhengtao Li (2017). *When a teacher meets artificial intelligence....People's Education*, vol. 2017(Z3), p.20-23.
- [13] Weidong Zhang (2003). *An Essay on the Pluralism of Modern Teachers' Role*. Journal of Linyi Teachers' University, vol.2003(04), p.116-118.