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The Analysis on the Influence of ICT on Early Childhood Education in China

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Abstract: *This study examines the impact of ICT on early childhood education in China in terms of young children, teachers and kindergartens; the emergence of ICT was found to have impacted on the traditional educational model of early childhood education in China. Not only does it provide young children with more access to knowledge, but it also helps teachers to enrich classroom content and increase opportunities to communicate with parents. More importantly, it has effectively improved the efficiency of kindergarten and education administration management and has alleviated the lack of educational resources in many areas. However, the use of ICT still needs to be regulated to avoid negative effects on children's health and daily school life. The government can increase its policy and financial support for the promotion and implementation of ICT in early childhood education settings.*

Keywords: *The Influence of ICT, Early Childhood Education, China*

1. Introduction

Information and Communication Technology (ICT) includes any electronic or digital devices that enables users to obtain information, communicate with one another or influence their environment. Commonly encountered forms of ICT include computer hardware and software, digital cameras, the Internet, telecommunication tools, programmable toys and many other devices [1].

In the past five years, much scholarly attention has been devoted to the introduction of ICT into Chinese education and teaching. The influence of the Internet is changing Chinese traditional education mode and having revolutionary impacts on students' learning life [2,3]. However, compared with the elementary, secondary education and university levels, Chinese early childhood education (ECE) has not yet made extensive use of ICT [3,4]. Early childhood education plays a vital role in any educational system. The Chinese government has gradually come to recognise the importance of early childhood education, and has issued many policies to improve the status of preschool education in China [5,6]. This has made parents and educators focus more on in-school education, and to pay more attention to the content and methods of children's learning, particularly in early childhood (Wang and Chang, 2018). Therefore, as ICT is an important source of knowledge for children during their preschool education, China should consider incorporating the use of ICT into its early childhood programmes, in order to keep pace with the rest of the world [4,7].

Chinese Kindergartens use ICT to develop and manage educational resources. While this has benefited kindergartens, teachers, parents and children, there remains a lack of kindergarten ICT resources, and deficiencies in the use of existing resources [2,7]. Therefore, a study of the potential impact of the ICT on early childhood education in China may be conducive to furthering and promoting use of ICT in this setting [4].

This essay studies the influence of ICT on early childhood education in China. The importance of ICT for kindergartens, teachers, parents and children is first addressed. Then, the essay explores the problems regarding the development and utilization of the ICT in early childhood education programmes. Finally, some suggestions are offered as to how ICT can be more effectively utilized to improve early childhood education in China.

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2. The Importance of ICT for Early Childhood Education in China

2.1. Kindergarten

ICT has profoundly influenced the educational resources available to, and the management of, kindergartens in many countries, including China[1,8,9]. ICT has bolstered kindergartens' educational resources by making them more connected [7,9]. It has created shared channels where kindergarten educators and administrators can learn from one another's experiences [2,3]. For example, many kindergartens in China have recently developed their own web pages [4]. This creates a platform for them to share textual and visual content related to their activities. This not only promotes the kindergarten, but also provides a means of communication between the kindergarten and parents as well as other kindergartens.

In general, the development of early childhood education in China has been uneven. There is a serious imbalance between urban and rural early childhood education programmes in terms of their access to resources [1,9]. Compared with urban areas, kindergartens in rural areas suffer more shortages of basic educational resources, such as textbooks [9,10]. This creates a lack of equity in education that remains to be overcome. The emergence of ICT and its incorporation into ECE programmes has somewhat mitigated the problem. Some rural governments have distributed funds for kindergartens to buy computers and establish distance education services for kindergartens, which may help to close the educational gap between urban and rural areas [3,10].

ICT has also increased the efficiency of kindergarten management (Liu et al., 2014; Rachel, 2020). Firstly, ICT has enhanced kindergartens' safety management [9,11]. Kindergartens use ICT to implement automatic positioning systems for students on campus [7]. Kindergarten security personnel can automatically locate each student from the monitoring room to ensure their safety [3,6]. Some kindergartens also set up campus monitoring systems, which can observe students' actions and learning in real time to deter abuse by teachers and other staff to ensure children's healthy development [2,7]. Moreover, parents can monitor their children by connecting to these campus monitoring systems through the relevant applications, which increases the parents' confidence in their kindergartens [6].

Secondly, ICT facilitates more effective management of educational administration [6,7,11]. Student records which were formerly kept in paper form are now stored on computer software, which makes it easier for kindergarten to query and store students' information long term [9,11]. Moreover, when students graduate from kindergarten, the kindergarten can directly transmit this information to the primary school where the students will be attending, making it more convenient for primary school teachers to obtain the information and understand students' situations, so as to provide personalized teaching [4,6]. Kindergartens also use the internet to provide each teacher with more reasonable working arrangements and timetables, and even quickly re-arrange class times when teachers change classes [7] (Wang and Chang, 2018).

2.2. Kindergarten Teachers

ICT has also greatly influenced the working life of kindergarten teachers [1,8]. The Internet has given teachers access to online resources and multimedia courseware, such as Power Point, to assist in teaching. These multimedia approaches enrich classroom content, holds children's attention and creates a more engaging classroom atmosphere [4]. For instance, when reading the picture book Hungry Caterpillars, which tells the story of caterpillars turning into butterflies, a teacher can play a video to help students understand caterpillars' growth process. Additionally, ICT has changed the way teachers create their lesson plans [3,6]. Kindergarten teachers can search for relevant background information through the Internet, collect pictures, animations and other media resources related to their activities, improving the quality and efficiency of lesson planning [1,11].

ICT allows access to diverse communication and interaction platforms for teachers and parents, such as WeChat and QQ, which may ease any friction between teachers and parents enhance their relationship and mutual understanding [3,12]. Furthermore, kindergarten teachers can update their knowledge and continue their professional development through online resources [5,9]. More importantly, teachers in the areas lacking in educational resources can use the Internet to overcome geographical restrictions, listening to expert lectures, participating in teaching forums, and accessing relevant literature (Wang and Chang, 2018).

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2.3. Children

ICT has also changed children's learning styles [3,4](Li, 2018; Ren, 2015). In the past, kindergarten teachers introduced children to different settings to facilitate their independent learning and exploration [12,13]. For example, a teacher might take their class to visit aquariums, zoos and museum to gain first-hand experience of their study subjects [4]. In such a learning mode, the approach for students to acquire knowledge is single, which means that students acquire knowledge mainly from teachers [5](Wang and Chang, 2018).

However, the increasing prevalence of ICT has increased the number of approaches through which students can acquire knowledge [2,4]. Children are now able to obtain information through the internet and its rich multimedia functions, which has immense educational potential [1,6]. This learning style has untethered learning from the classroom, and instruction is no longer limited to a relationship between teachers and students, helping children to find their own learning strategies and pursue knowledge autonomously [7,11].

3. The Negative Effects of ICT on Young Children

ICT may have some negative impacts on children's health and lives [4,8,13]. First of all, a variety of information is freely available on the internet; some of this content may not be appropriate for children to watch, such as violent videos, which may damage their mental health [4,14]. In addition to the potential impact on mental health, ICT may also damage children's physical health [2,13]. This is because there is a lot of content on the Internet that is aimed at attracting children's attention, such as online games and cartoons. Enjoying this content may lead to excessive use of ICT, which in turn may lead to problems with vision, or diseases such as cervical spondylosis [4,13]. Thirdly, in their daily learning, children are used to using ICT devices to learn through pictures, sounds, animations, and 3D scenes [3]. This may cause children's sensitivity and understanding of text-based learning to decline, and make it difficult for them to develop an analytical, logical, and abstract way of thinking through text-based learning [3,14].

4. The Problems of ICT Development in Chinese ECE

The popularization and implementation of ICT in education mainly involves hardware resources, software resources and theoretical resources [10,12]. Teachers are the key to connecting these three kinds of resources and optimize their educational value [14]. However, some problems in these aspects that hinder the utilization of ICT in Chinese early childhood education [6,15].

4.1. Insufficient Hardware Resource and Obvious Regional Differences

Hardware required for ICT, such as computers and cameras, are costly, and thus require a substantial investment for their use in preschool education [1,14]. However, ECE is not in the scope of compulsory education in China, and government investment in preschool education accounts for only 1.3% of total education expenditure [13]. Not only is this far less than the proportion of Chinese investment in compulsory education, it is also significantly lower than the international average level (3.8%) [15].

In addition, most of these limited funds are invested in public kindergartens, and thus these schools are sufficiently equipped with the necessary ICT hardware [2,12]. However, according to the data of the National Bureau of statistics in 2012, private kindergartens accounted for 68.7% of all kindergartens in China. In rural areas, they account for more than 90% (Wang and Chang, 2018). Therefore, in the absence of state funding, private kindergartens with limited economic resources can hardly bear the cost of ICT hardware. This significantly widens the educational gap between public and private kindergartens as private kindergartens are unable to keep up with ICT developments [3,7].

Furthermore, differences in regional economic development overall exacerbates the imbalance in the development of ICT in early childhood education between rural and urban areas [12,13]. In eastern China, kindergartens in major centers such as Shanghai and Hong Kong are equipped with multimedia activity rooms, electronic whiteboards, projectors and other hardware [14](Wang and Chang, 2018). These kindergartens are equipped with sufficient ICT equipment, and provide far-reaching WiFi in their buildings, so that teachers can use ICT in any corner of the campus [13]. In contrast, the development of ICT in early educational settings in central and western China remains at a low level (Wang and Chang, 201). For example, in Lanzhou, more than half of kindergartens lack ICT equipment such as computers

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and projectors (Ren, 2015; Wu and Zhao, 2014). Their teaching is still supplemented only by older generation technologies such as tape recorders and televisions [15]. Furthermore, approximately 30% of kindergartens do not have any ICT equipment (Ren, 2015). These inequities serve to perpetuate both regional educational gaps and those between urban and rural areas [9].

4.2. Backward Software Design and Poor-Quality Educational Resources

The role of early childhood education software in promoting early childhood development is growing [11,12]. However, the development and quality of ECE software in China has advanced relatively little since the 1990s [10]. Thus, even though the volume of available software has been increasing in recent years, China remains far behind western countries in research and development (R & D) for preschool education software [12,15]. Existing educational software resources in China include mainly children's learning websites, educational game software, resource bases and so on. These are generally of low quality, lacking in innovation, etc [15]. (Wang and Chang, 2018).

In addition, few digital resources are dedicated enhancing the learning experience for early childhood education in China, especially in central and western China [9,15]. For example, in Lanzhou, 36% of kindergartens have their own web pages, which are used mainly for the kindergartens' publicity, exchanges of information between teacher, interactions between teachers and parents, and so on [3,10]. These web pages do little to provide independent learning resources for children [14]. Thus, much of the educational potential of ICT is lost in early childhood education settings due to the inadequate quantity and quality of educational software resources [1,6].

4.3. A lack of Theoretical Research

The theoretical research for ICT for use in early childhood education has lagged behind ICT development for primary and secondary schools. This is another weak link in the field of education in China [2,7]. Focused research on ICT in Chinese early childhood education began a 2006 master's thesis entitled the impact of ICT on preschool education [15].

Furthermore, few researchers have studied the development of ICT in the specific context of early childhood education [9,12]. Due to this lack of systematic theoretical support, ICT development of in the ECE field must take its lessons from the experience of ICT development in primary and secondary education [7,15]. However, if kindergartens blindly follow the examples of primary and secondary schools in their ICT development, as some have, this may negatively affect children's learning and development as it ignores the particularity of education objects [10,14].

4.4. Kindergarten Teachers

Kindergarten teachers' emphasis and knowledge of ICT differ along the lines of teachers' region, educational level, and especially age [7,15]. For example, some rural teachers and older teachers do not know how to utilize ICT, making it difficult for them to integrate ICT in their early childhood curricula and teaching methods [14]. Even if a kindergarten is fully- equipped with ICT facilities, some teachers do not have the knowledge or the inclination to use them to their full potential in their teaching activities, wasting their value [7].

5. Suggestions

5.1. Government

Financial support and policy support from the government are prerequisites for the promotion and implementation of ICT in early childhood educational settings [6,12,15].

5.1.1. Increasing Financial Support

Although the Chinese government's investment in early childhood education has increased over the past five years, there remains a huge gap between Chinese investment in preschool education and that in developed countries [2,3]. China is also at a disadvantage compared with other countries in the Asia Pacific region [6]. The government must therefore make it a priority to increase its investment in preschool education [7,12].

Aside from increasing funds for ECE, the government must also be mindful about the distribution of

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funds [3,14,15]. Given that more than 60% of kindergartens in China are private kindergartens in underserved areas with few or no placements for public kindergartens [12,14], the government should consider devoting a portion of these funds to supporting the purchase of ICT equipment for private kindergartens to help close the educational gap. Moreover, the Chinese government should make an effort to direct funds to kindergartens in remote and poverty-stricken areas to help them invest in hardware and network devices, such as computers and monitoring devices [4,9]. Finally, local governments could set up special funds to encourage development of preschool education software products by kindergartens and other educational institutions (Wu and Zhao, 2014). For example, in Shenzhen, when a kindergarten develops an application for uploading and sharing outstanding teachers' videos, lesson plans and other teaching resources, the government awards them a sum of money [13].

5.1.2. Education Policy

Appropriate Government policy is necessary to ensure the smooth development of a given field [10,14]. To encourage development of innovative preschool education software, the government should strengthen its intellectual property rights protections. This not only provides legal protection for preschool education software and online education resources such as teaching videos, but also ensures that teams of developers will be able to reap sufficient financial returns for their investment of money and time for R&D [3,7]. In addition, the government must more closely manage the development of ICT in education [6,13]. For example, the government should set specific requirements regarding educational content and strengthen the audit and supervision process to avoid disordered or false information in online preschool education resources [13].

The development of ICT in preschool education cannot rely solely on financial support from the government, but also requires engagement from other sectors, such as private enterprises and the research and development facilities of colleges and universities [4,12]. Some policies, such as 'Some opinions of the State Council on the current development of preschool education,' emphasise the need to encourage the participation of different sectors [10].

5.2. Kindergarten

Kindergartens need to enhance teachers' familiarity with ICT and encourage them to incorporate ICT in their teaching through some countermeasures [14](Wang and Chang, 2018). Many kindergartens consider teachers' utilization of ICT in their employee assessments [3,14]. Through regular performance assessments, kindergarten administrators can detect the extent and effectiveness of teachers' ICT use and monitor their progress [5,7]. Many kindergartens incentivize teachers' use of ICT by offering rewards based on these assessment results, such as salary increases [10,15]. Some kindergartens also offer lectures and training courses on ICT use to help teachers, especially older teachers, improve their ICT competency [5].

Additionally, kindergartens should guide parents to supervise children's use of ICT, so as to control children's use time and the content of ICT, avoiding the negative impact of ICT on children [16].

6. Conclusion

There is no doubt that ICT has brought about long-term positive impacts on Chinese kindergartens, having had a profound influence on both teaching and learning methods. ICT is therefore likely to gradually become an indispensable component of early childhood education. However, the state of ICT utilization in Chinese early childhood education programmes remains underdeveloped. The cost of hardware, outmoded software, a gap in scholarly support and a lack of kindergarten teachers' ability or inclination to use ICT in teaching are all limiting factors. To address these problems, the Chinese government has increased financial support and enacted relevant policies to promote the development and use of ICT in early childhood education. Kindergartens have also implemented assessment and reward systems to encourage teachers to familiarize themselves with ICT and use it in teaching.

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