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Digital technologies for education in China: National ambitions meet local realities

Barbara Schulte

The first part of the paper discusses the importance of the research and the objectives of the study. It then moves on to a literature review, which provides a background on the topic and identifies the gaps in the existing research. The methodology section describes the research design, data collection, and analysis. The results section presents the findings of the study, and the conclusion summarizes the main points and offers suggestions for future research.

The research was conducted in a systematic and rigorous manner, following the principles of good research practice. The data was collected from a representative sample of the population, and the analysis was carried out using appropriate statistical methods. The results of the study are presented in a clear and concise manner, and the conclusions are based on the evidence gathered.

The study has several strengths, including a large sample size, a well-defined research design, and the use of appropriate statistical methods. However, there are also some limitations, such as the potential for bias in the sample and the fact that the study is a cross-sectional design, which means that it cannot establish causality.

Overall, the study provides valuable insights into the topic and contributes to the existing knowledge in the field. The findings have important implications for practice and policy, and the study has the potential to inform future research in this area.

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KEY FINDINGS

- The use of digital technologies for learning plays a central role in China's education reform. China has emerged as global leader in promoting ICT4E.
- ICT4E infrastructure has been implemented in Chinese schools at remarkable speed. Yet, the digital education technologies are still rarely used in class.
- The slow local acceptance can be attributed to two factors: University entrance exams still emphasize rote learning. Many parents and teachers consider ICT4E a distraction from learning.
- To take advantage of ICT4E's innovative potential, China's educational staff needs additional training to learn more about how to integrate digital technologies into teaching. China might even have to consider reforming the university examination system.

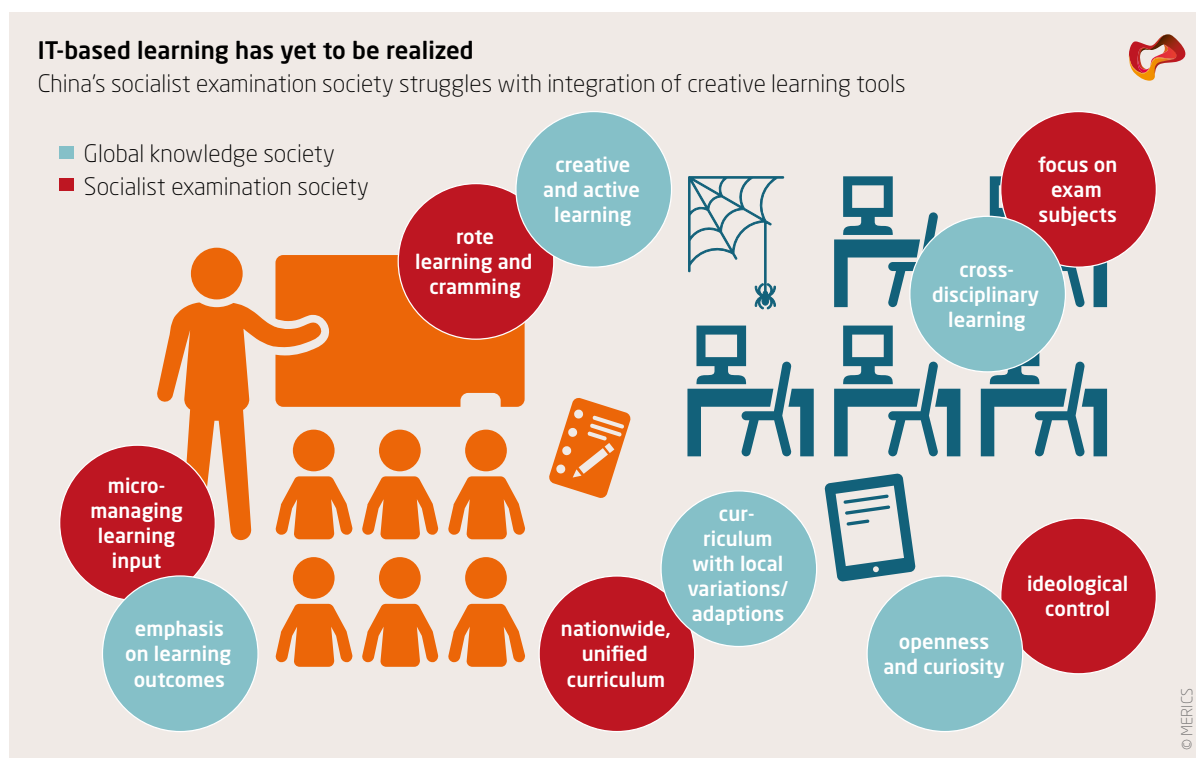
China has been a pioneer in including information and communication technologies for educational purposes (ICT4E) in national educational policies. Having recognized the role technology can play in education in the late 1990s, the country has by now emerged as an international leader in propagating the benefits of ICT4E. At the levels of the school and individual learner, however, ICT4E still play a subordinated role. This mismatch between political ambitions and educational realities can largely be attributed to contradictions within the Chinese education system, which attempts to reconcile diverging political, social, and pedagogical objectives.

The following section will introduce the reader to these contradictions, to then briefly outline what ICT4E entail in general, and how they are relevant in China. The subsequent sections will describe the goals, initiatives, and policies related to ICT4E in China particularly since 2012/2013 – the time when Xi Jinping took over as head of party and state; identify actors and their interests; shed light on implementation, experiments, and outcomes; and conclude by discussing the global implications of Chinese ICT4E initiatives.

China's education system is characterized by two basic tensions. Firstly, while the system has expanded at all levels, enabling 40 percent of an age cohort to attend a university in 2017 (compared to 17 percent in 2003), schools and universities have increasingly diversified in quality and prestige. Various social and geographical divides impact the educational quality that students have access to, such as lower vs. middle class background or rural vs. urban residency. Secondly, while the curriculum reform since the late 1990s intends to turn Chinese students into creative, innovative, active, and responsible members of the knowledge society, persisting forms of examination that stress rote learning and cramming, such as the university entrance examination (*gaokao* 高考), run counter to these goals – as does continued political-ideological control.

Social and geographical divides impact the educational quality that Chinese students have access to

Figure 1



WHY AND HOW DIGITAL LEARNING TECHNOLOGIES ARE RELEVANT FOR CHINA

Both in China and internationally, ICT4E have been associated with potential improvements in teaching, learning, and educational administration, based on the following assumptions:¹

- **ICT4E enable tailor-made, differentiated learning.** Learners can progress according to their respective skill levels and preferences. This is in line with China's curriculum reform, which seeks to move beyond traditional, teacher-centered instruction.
- **ICT4E allow for interactive learning.** Digital applications facilitate communication among students and shared learning. The Chinese curriculum reform aims to move from exam-oriented rote learning to more student interactivity.
- **ICT4E bridge divides and improve equity.** ICT4E can provide universal access to digital knowledge resources and instruction units. In China, this is considered a cost-efficient way to reduce educational inequalities.
- **ICT4E support the professional development of teachers.** The provision of knowledge resources, online teacher training, and platforms for communication and exchange among teachers can advance on-the-job teacher training. In China, this has been integrated with existing teacher networks for learning.
- **ICT4E facilitate educational administration, school inspection, and assessment.** Shared digital software can align administrative work, leading to more efficiency and transparency. In China, this can be considered a part of the more general digitization of administrative services (e-governance).
- **ICT should be a part of the school curriculum.** This stresses the importance for students to acquire ICT skills and digital literacy. In Chinese documents and guidelines, the two purposes – teaching of and by ICT – are often blurred. ICT are not an exam topic in the university entrance examination.
- **ICT4E can educate the public.** New technologies have the capability to educate the wider society outside the school. With regard to China, this role of ICT has occasionally been framed as “propaganda 2.0.”²

CONFLICTING POLICY OBJECTIVES: SPREADING AND CONTROLLING INFORMATION

Policies and initiatives related to ICT4E gained momentum in China in the early 2000s and became increasingly specified and substantiated during the present administration under Xi Jinping. The most important policy document to date is the “Ten Year Development Plan for the Informatization of Education between 2011 and 2020” (《教育信息化十年发展规划2011-2020年》).³ The plan defines an ICT strategy for education in the digital age and largely revisits educational issues that had been on the agenda for almost two decades, such as: using ICT to support mass education, high-quality education, individualized learning, and lifelong learning; nurturing an innovative and strong nation; improving equality and shared access to educational resources; and involving diverse actors under the guidance of the government. The plan is also the first key strategy document by the Ministry of Education to target the problem of digital divides (besides the already existing offline divides), particularly between urban and rural areas. These more recent ICT4E objectives as outlined in the plan are linked to the older idea of distance education, which took its beginnings in the 1930s. It played an important role after the Communist take-over in 1949, and was made a priority under the Hu Jintao/Wen Jiabao administration, in the form of large-scale rural distance education projects (2003-2007). The focus has been particularly on the less populated Western regions, with the Normal Universities (in charge of teacher education) as driving forces.⁴

From 2012 onwards, the Chinese government’s ICT4E strategies began to be specified through the so-called “three implementations” – schools going online, classes using online resources, and virtual learning spaces reaching everyone (even beyond school education). These implementations were to be supported by “two platforms:” platforms providing educational resources; and platforms for educational administration.⁵

Throughout policy design and discussion, two questions have kept re-surfacing over the past 15 years. First, how to keep control of the content while making information and knowledge accessible for all; and second, how to strike a balance between involving private and commercial actors while keeping the state in the driver’s seat. Already in 2002, the Ministry of Education (MOE) made it clear that online content should be “healthy, reliable and secure;” it also cautioned against an over-emphasis on commercial interests.⁶ However, there is little detail on the regulation and standardization of online content in education, and the issue has largely been left to the general censorship and control mechanisms (such as the Great Firewall). More recently, plans have emerged to combine ICT4E with moral education and the cultivation of “good netizens;” besides, “security” (of technology and content) has lately been added as a focus of attention.⁷ Regarding commercial actors, the Chinese government stresses that unlike “Western countries” it does not rely primarily on the market but follows the principle of “government policies controlling, companies participating in the construction, and schools using sustainably” ICT4E.⁸ Again, lack of regulatory clarity leaves a grey zone in which commercial actors can operate.

There is little detail on the regulation and standardization of online content in education

ICT4E policies in the Xi Jinping era are marked by the following four characteristics:

- **Education as a shared resource.** “Enjoying together” is a key term in education (and beyond) in the 13th Five-Year-Plan (2016-2020).⁹ Tackling the problem of both quality and equality in education, Xi Jinping intends to “let millions of children enjoy high-quality education;” through ICT4E, “all people can learn, people can learn everywhere, and people can learn at any time,” enabling everyone to “change one’s destiny through knowledge.”¹⁰
- **Re-centralization of ideology through education.** The Xi Jinping administration also places increased emphasis on moral education as a root to national wellbeing. This marks a shift from the previous emphasis on learner autonomy and creativity towards more ideological control of the curriculum. Offline, these efforts have included the recentralized production of textbooks and strengthened ideology education; online, security concerns begin to be addressed more systematically in ICT4E strategies.
- **Investment in mass innovation.** While ICT4E have long been associated with innovation and creativity, the Xi Jinping administration has reinforced the mission of nurturing and spreading “innovation” in various announcements and guidelines. The administration’s focus is on expanding innovation from the elites to the masses, by facilitating grassroots innovation. ICT, both in education and beyond, are considered to play an important role in this mission. Policy

papers do not address the potential contradiction between calls for innovation and creativity on the one hand and increasing ideological control on the other.

- **Push for global impact through education.** China's ICT4E strategy also has a global dimension that has been substantially expanded under Xi Jinping. As has been noted by UNESCO,¹¹ China has been able to distinguish itself as an important global actor in ICT4E particularly in Africa. Also, the UNESCO International Research and Training Centre for Rural Education, which has a strong focus on ICT4E, is based in Beijing. Underlining his personal investment in the issue, Xi delivered the welcome address at the International Conference on ICT and Post-2015 Education, jointly organized with UNESCO, in May 2015 in Qingdao. This conference resulted in the so-called Qingdao Declaration of "Leveraging ICTs for Achieving Education 2030" as well as in a series of follow-up conferences in Qingdao and internationally.

UNIVERSAL EDUCATION BECOMES CORE STATE RESPONSIBILITY

Most initiatives, programs, and projects in ICT4E are state-run, though often in cooperation with commercial partners. While there are educational grassroots initiatives in the charity sector, they are highly unstable and increasingly under political pressure. Even more than its predecessors, the Xi Jinping administration postulates that it is the core responsibility of the state to deliver education for all.¹²

The Xi administration considers education for all a core responsibility of the state

There are actors at the national, provincial, municipal/school district, and school level. At the highest level, the guidelines, legal frameworks, regulations, announcements, and opinions issued by the Chinese government, including the Ministry of Education (MOE), provide the general direction for the discussion and possible implementation of ICT4E. Until October 2016, two important institutions were consulted: the National Center for Educational Technology (NCET), which is in charge of designing and overseeing the implementation of ICT4E throughout the country; and the Office for the Promotion of Informatization in Education (OPIE), which was established in 2011 to guide the planning and implementation of ICT4E and comprised mainly actors from the MOE's Science and Technology Department plus the head of the NCET.

In October 2016, the OPIE was dissolved; instead, the MOE established a Leading Small Group for Internet Security and Informatization (LSGISI). Headed by the Minister and the Vice Minister of Education, it serves as a cross-departmental coordination platform within the ministry. It is hence constructed analogously to the central leading small group for internet security under Xi Jinping, with the explicit mandate to implement the central group's goals and guidelines.¹³ The group led by Xi oversees the Cyberspace Administration of China, which is the central agency for internet censorship. This signifies an important change of mandate under Xi Jinping: instead of treating ICT4E as a mainly technical challenge, the state organs dealing with the matter have been integrated in the national internet security structure. Thus, while the former OPIE mainly executed the guidelines as developed within the MOE's Science and Technology Department, the LSGISI constitutes a direct link between China's central political leaders and the design and implementation of ICT4E. It remains to be seen to what extent the change from OPIE to LSGISI constitutes a true organizational change, or merely symbolizes the central leadership's claim to control.

As is often the case with Chinese policy design and implementation, the policy formulations at the highest level leave much room for interpretation; there is also a lack of clear goals or clearly defined milestones, so that success or failure are difficult to assess objectively. Provinces and municipalities do not start implementation simultaneously. Some regions have served as early adopters or even pilot areas, whose "best practices" are then selected and adapted by other regions.¹⁴ This trial-and-error approach, combined with the rules of the Chinese nomenklatura, tends to favor ambitious regional leaders who may be able to boost their careers by assuming the role of (successful) pioneers.

Generally, public or private ownership of schools does not make any difference with regard to ICT4E. Private actors benefit more from providing ICT equipment and solutions to schools than from owning or operating schools. ICT4E generate lucrative business opportunities for producers of hardware and software as well as for providers of ICT infrastructure and services. The MOE has signed large contracts with companies like China Telecom, China Mobile, and China Unicom. Other

large companies like Lenovo, Huawei, Tencent, Alibaba, Inspur, and iFlytek have secured contracts at the provincial level, amounting to an estimated volume of 156 billion CNY (22 billion EUR) in 2016 and showing a growth rate of almost 30 percent compared to the preceding year.¹⁵

EDUCATION AGENDA FACES STRUCTURAL AND CULTURAL OBSTACLES

In terms of numbers, the speed of ICT4E implementation in China has been remarkable: by 2016, 87 percent of primary and middle schools had access to the internet (compared to 25 percent in 2011); 80 percent of classrooms were equipped with multimedia facilities (40 percent in 2011); 8 students shared one computer (compared to 12.5 students in 2011); millions of online instruction units had been created, and millions of teachers and students had undergone ICT training.¹⁶ In international comparison, however, China's ICT4E implementation is still below OECD average: in OECD countries, 1.3 students share a school computer, and 96.4 percent of these computers are connected to the internet.¹⁷ Differences at pupil's home are even starker: while in OECD countries, an average of 91.2 percent of students can use a computer at home for doing homework, only 59.8 percent of Chinese students have this possibility; besides, only 64.6 percent have an internet connection at home, compared to an OECD average of 94.3 percent.¹⁸ In terms of finances, the MOE reports that in 2016, 4 billion CNY (540 million EUR) were invested in ICT4E at the provincial level.¹⁹

By 2016, 87 percent of primary and middle schools had access to the internet

WHAT DOES A LOCAL ICT4E INITIATIVE LOOK LIKE? THE EXAMPLE OF XINGYE COUNTY IN GUANGXI PROVINCE

Population: ca. 763,500 inhabitants, mainly rural areas, home to twelve different ethnic groups

GDP in 2016: 15 billion CNY (2 billion EUR); **public expenditures on education:** 4.6 percent of GDP

In March 2017, the county launched an ICT4E project with a volume of 20 million CNY (2 million EUR) (ca. 3 percent of the country's annual public expenditure on education). This covered hardware for 293 schools, the establishment of a data center, a platform providing educational resources, an administrative platform, a platform for communication, resources for mobile learning, resources for applying technology in teaching, and a platform for knowledge about digitization. Content includes 4 million documents for learning, 25,000 teaching units, 270,000 e-books, and 1.6 million exam topics.²⁰

The Chinese central government's enthusiastic embrace of ICT4E has led to a myriad of initiatives and platforms, operated by both state and commercial actors. In areas where political leaders encourage ICT4E initiatives, this has led to an uneconomical competition of various projects, at times producing wasteful duplicates; while in less focused regions, there can be a lack of commitment to ICT4E altogether. Another side effect of the massive investment in ICT4E is the urgency to spend the allocated resources. Often, this leads to an unequal distribution of resources, due to political prioritization or as a result of too superficial research into local demands and very limited involvement of local stakeholders. Hasty investment often turns out to be not sustainable; while hasty spending can lead to (often unintended) misuse of funds, such as constructing luxury administrative buildings.²¹ Generally, there has been little alignment with local needs and grassroots initiatives: public and grassroots initiatives related to ICT exist alongside each other, with grassroots actors facing increasing political difficulties over recent years.

ICT4E = BETTER LEARNING OUTCOMES AND LESS INEQUITY?

As outlined at the beginning, ICT4E are expected to improve learning outcomes and reduce inequity in education. A study of an ICT4E trial project in Chengdu reveals that rather than upgrading low-quality schools and improving the learning results of disadvantaged students, “the main benefactors of the project intending to help weak schools are, perverse as it seems, the elite schools in the respective districts.”²² With the help of additional resources and student participation, elite schools profit from producing videos that are then widely distributed to the poorer regions. In contrast, students in the poorer regions only passively consume these videos, and the schools do not receive additional benefits. The study could find no peer learning or community empowerment; neither was there evidence for more interactive and differentiated learning. Finally, the study notes a benefit for commercial providers who sell their online material to the poorer regions while profiting from government subsidies.

Most teachers and parents regard ICT as inadequate for learning

Even more problematic is the social acceptance of ICT4E among teachers and families. Fieldwork conducted by the author in the years 2014 to 2017 showed that most teachers and parents regard ICT as inadequate for learning. They consider ICT as distracting and potentially counter-productive for children, and at the school as well as in family homes, ICT are at best offered for entertainment and relaxation, often as reward after long periods of cramming and rote learning. These latter, conventional modes of learning are considered most efficient for attaining good exam results. In fact, schools’ higher performance often corresponds to a less frequent use of ICT, while less prestigious schools allow for a certain amount of leeway, or lenience, towards ICT use.

Even though the MOE emphasizes the “three uses” of ICT4E – “use in the class room, frequent use, and widespread use”²³ – what has been most conspicuous when visiting Chinese schools is the non-use of ICT4E, particularly among students. If at all, ICT4E are used for presentation purposes by teachers, e.g. in the form of PowerPoint presentations or downloaded micro-lectures. Rarely do ICT4E change the approach towards learning, or generate changes in how information and knowledge are being sought and processed. International surveys confirm this non-use among Chinese students: according to the OECD-conducted Programme for International Student Assessment (PISA), Chinese students use the internet least of all students internationally;²⁴ they were also found to have difficulty with effectively navigating information on the internet (task-oriented browsing).²⁵

CHINA IS A LEARNER AND A LEADER IN GLOBAL EDUCATION

China’s heavy investment in ICT4E does not only have domestic implications but is also of global relevance.

Many observers regard China primarily as a learner – as an emerging nation that, in the field of education, needs to solve above all two issues: equal access to high-quality education across regions and schools; and upgrading the country to an innovative knowledge society, in order to be a creator, and not just a maker, of globally competitive products.²⁶ ICT4E are seen to help in this quest.

However, China has also emerged as a global actor in (offline) education, and the government’s ambitions have moved beyond learning from other countries and reforming its own system. International large-scale assessments of educational performance such as PISA have shown the competitiveness of (some parts of) the Chinese school system. This has not only resulted in educational publications to market the Chinese solution to the rest of the world, but also to the actual export of teaching experiences and models to developed countries like the United Kingdom – an achievement that the Chinese MOE has been particularly proud of.²⁷

For the most part, these exports have focused on conventional methods of teaching and learning with the aim to achieve excellence. The export of ICT4E is mostly seen from a develop-

mental perspective, as a tool for bridging social and regional divides. The Vice Minister of Education, Du Zhanyuan, sees the potential “international impact” of Chinese ICT4E and possibilities of export as one of the most important strategies for increasing China’s soft power.²⁸ Over recent years, China has been increasingly engaged in the strategy of “opening the new era’s education to the outside.”²⁹

This involves educational aid to, and engagement in, developing countries, particularly in Africa.³⁰ China increases its export of ICT technologies and know-how to Africa,³¹ and it has intensified its ICT4E engagement on the African continent. For the first time in history, China signed a Fund-in-Trust with UNESCO in 2012, to advance ICT for teacher education in ten African countries.³² In the subsequent years, the Xi Jinping administration has invested massively in education initiatives in Africa,³³ particularly in those involving ICT. In light of the recent, systematically designed programs for establishing soft power – among other things, through founding the National Cultural Soft Power Research Center at Peking University³⁴ – these global activities suggest that China is ready to assume global leadership in education.³⁵

China has invested massively in education initiatives in Africa

Endnotes:

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