Vesselina Kachakova

The Potential of ICTs in Education Worldwide: A Review of Several International Studies

Abstract

The potential of ICTs in education is often seen as a panacea for almost all educational problems: ICTs would narrow the inequalities, give access to open resources and make the system fair for all who want to benefit from it, ICTs would make the education more attractive and effective for the students, ICTs would have the power to reform the way of teaching and the way of learning, and to bring for a huge social change. Different international organizations (OECD, IEA, World Bank, etc.) study the impact of ICTs on education worldwide and their conclusions do not confirm the high expectations. The politicians should not hyperbolize the positive effects that ICTs could have for improvement of quality or reducing the inequality in education, and to rely on ICTs to do their work as policymakers, responsible for the implementation of educational reforms and changes in the ways of learning and teaching through ICTs.

Keywords: information and communication technologies (ICTs), education, policy, quality, access, inequality

Introduction

Since the late 1970s in many developed countries, there have been increasing efforts to introduce ICTs at schools through the provision of personal computers. In the early 1980s when relatively cheap microcomputers became available and distributed to schools the issue of 'computers in education' became more popular in educational policymaking. Later the term 'computers' was replaced by 'IT' (information technology) and around 1992 when e-mail started to become available to the general public the term 'ICTs' (information and communication technologies) was introduced (Pelgrum & Law, 2003, p. 19), and it has been used until now.

Reports from the World Bank (2000) and the Organisation for Economic Co-operation and Development (OECD, 2000) share the concerns that ICTs deepen the existing inequalities: "the gap between the rich OECD countries and the poor developing countries is growing, both in terms of ICT products as well as in terms of incomes" (World Bank, 2000, p. 3) and "the divide between the information rich and information poor exists between individuals in the same neighbourhood, as well as between nations and continents" (OECD, 2000, p. 17).

In 2012 the European Commission states in its Communication *Rethinking Education* that: "Technology offers unprecedented opportunities to improve quality, access and equity in education and training. It is a key lever for more effective learning and to reducing barriers to education, in particular social barriers." (European Commission, 2012, p. 9).

Research framework

The EU statement provoked the aim of this paper to search for evidence in the recent international studies on the potential of ICTs to improve: quality, access and equity in the education worldwide, as well as to find if it is a key lever for changes in the way of learning and reforms in the educational systems.

One of the studies was undertaken by OECD's Centre for Educational Research and Innovation (CERI) and it presents and discusses the findings from 93 case studies of 22 participating countries in the fieldwork of ICTs and organizational change, completed by 2001 (OECD, 2008). The paper systematizes also the results from the international studies of the International Association for the Evaluation of Educational Achievement (IEA) – *Results of the International Computer and Information Literacy Study (ICILS) for 2018*, OECD – *Students, Computers and Learning: Making the Connection*, and the European Commission's *2nd Survey of Schools: ICT in Education*, as well as some conclusions from particular studies on the effects of ICTs in education and on the way of learning.

Potential of ICTs to improve quality, access, and equity in education

The use of laptops in classrooms seems to be a controversial topic. Many teachers believe that computers (and the Internet) serve as distractions, detracting from class discussion and student learning. Conversely, students often self-report a belief that laptops in class are beneficial. Empirical research tends to support the teachers' view, finding that students using laptops are not on task during lectures, show decreased academic performance, and are less satisfied with their education than their peers who do not use laptops in class (Mueller & Oppenhaimer, 2014, p. 1).

Examples from the case studies, largely based on teacher opinion, express uncertainty about the potential of ICTs to enhance educational quality: some see it as a valued resource for student research, others concern it as wasting student time, encouraging a 'cut and paste' culture and superficial work. This range of opinion reinforces that the educational impact of ICTs depends largely on the use to which it is put (OECD, 2008, p. 31).

The *2nd Survey of Schools: ICT in Education* presents controversial data about the opinion of students regarding the positive impact of ICT use during lessons: about 35% of them define the positive impact as 'A lot', about 38% think the impact is 'Somewhat', and the rest about 27% think it is 'A little' or even 'Not at all' (European Commission, 2019, p. 113).

The data from the report of OECD *Students, Computers and Learning: Making the Connection* (2015) conclude: "Resources invested in ICT for education are not linked to improved student achievement in reading, mathematics or science" (2015, p. 146). According to their findings: "countries where it is less common for students to use the Internet at school for schoolwork, students' performance in reading improved more rapidly than in countries where such use is more common, on average" (OECD, 2015, p.146); and "even such specific online reading skills do not appear to benefit from more intensive use of computers at school" (OECD, 2015, p. 154). Some of the reasons are associated with a greater frequency of certain

activities, such as chatting online at school and practicing and drilling, which may replace other more effective learning activities (OECD, 2015, p. 154).

Concerning the connection between ICTs use and the quality of education, the results from the studies are still skeptical and controversial for the potential of ICTs to improve the quality of education. According to the conclusions, the role of the teacher as a predictor for the better quality of education is more significant than the use of ICTs.

Despite these conclusions, during the past 25 years schools and families around the world have spent a substantial amount of money on computers, Internet connections, and software for educational use. By 2012, in most OECD countries less than 2% of 15-year-old students lived in households without computers (OECD, 2015, p. 188). Differences in access to digital resources across students of different socio-economic status have narrowed considerably over recent years, to the point where, in all but five OECD countries with available data, disadvantaged students spend at least as much time on line as advantaged students do (OECD, 2015, p. 147). The tendency, however, is that students use information and communication technologies more for leisure than for learning activities (Fraillon et al., 2019, p. 132).

Results from the case studies give examples of schools, which had schemes to facilitate access – some provided laptop computers on loan or even desktop computers on long-term loan; in others, the issue was addressed by extending access to the computers after normal school hours. Such measures help address the 'digital divide' but they are not in place for all students and all schools (OECD, 2008, p. 30).

Particular benefits from the access to ICTs were reported for students with special needs. The case studies' results show good examples of how ICTs can help students with writing difficulties, may enhance the opportunities for those with communication difficulties and those with autism to relate to others and to participate more actively in the education process (OECD, 2008, p. 24, p. 31).

But, even with equal access, not all students have the knowledge and skills to benefit from the resources that are available to them. To reduce inequalities in the ability to benefit from digital tools, countries need to improve equity in education first and to ensure that every child attains a baseline level of proficiency in reading and mathematics (OECD, 2015, p. 16).

The results of the *International Computer and Information Literacy Study* (ICILS) for 2018 confirm that the access to the technical devices, the Internet and the open resources does not mean that the young people have the knowledge, the skills, and the attitudes to use them: "Digital natives are not digital experts: Young people do not develop sophisticated digital skills just by growing up using digital devices" (IEA, 2019, slide 10); "There is a digital divide relating to the socioeconomic status, home access to devices and years of experience of using devices" (IEA, 2019, slide 26); "Differences in students' Computer and Information Literacy (CIL) scores within countries are larger than the differences between countries" (IEA, 2019, slide 32).

Although in many classrooms around the world, technology is used to support quality teaching and student engagement, through collaborative workspaces, remote and virtual labs, or through the many ICT tools that help connect learning to authentic, real-life challenge, still, countries and education systems can do more to improve the effectiveness of their investments in ICTs, so that to maximize the use of the potential of ICTs. To conclude, the expanded access to technologies

worldwide is not directly linked to improvement in quality or reducing the inequalities in education. Introducing ICTs in education is not a panacea and the policymakers need to identify the goals they want to achieve by ICTs in education and to measure progress towards these goals.

Potential of ICTs to be a key lever for changes and reforms in educational systems

The Report of the International Association for the Evaluation of Educational Achievement (IEA) of 2013 concludes: "computers were most commonly being used to access digital textbooks and workbooks rather than to provide dynamic, interactive pedagogical tools" (Fraillon et al., 2019, p. 245). It is similar to the high expectations in the early 1990s that the introduction of microcomputers in education would make it more effective and motivating. Many surveys had shown that computers were used mainly as a supplement to the existing curriculum and much less as tools that were fully integrated into the learning of traditional subject matter, the general feeling among many policymakers was one of great disappointment (Pelgrum & Law, 2003, p. 19). According to Pelgrum and Law, there are three distinct roles of ICTs in the curriculum: "'Learning about ICT', which refers to ICT as a subject of learning in the school curriculum, such as computer (or ICT) literacy, computer science and information literacy; 'Learning with ICT', which refers to use of ICT, including multimedia, the Internet or the Web, as a medium to enhance instruction or as a replacement for other media without changing the beliefs about the approaches to, and the methods of, teaching and learning; and 'Learning through ICT', which refers to the integration of ICT as an essential tool into a course/ curriculum, such that the teaching and learning of that course/curriculum is no longer possible without it" (Pelgrum & Law, 2003, p. 23).

Only the third role of ICTs has the potential for significant changes in the ways of teaching and learning as well as for reforms at school or system level. The OECD case studies research on the impact of ICTs raise the question "To what extent ICT acts as the change agent?" and their findings conclude: "Several of the schools reported that ICT had led to changes in pedagogy within the school"; In many schools, ICT was used as a lever by a higher administrative body, such as ministry, university, etc.; ICT can support a traditional didactic model of teaching as well as a project-based model. There is nothing inherent in the technology which orients it towards one particular methodology; If ICT is a neutral lever, then the crucial factor in determining the direction of change will be the thinking of the teachers who use it (OECD, 2008, pp. 7-11). The Concluding Summary of the research states that: 1) the impact of ICT on educational quality flows from the way the technology is used, and the same technology, in the hands of different teachers, produces different outcomes; 2) the adoption of ICTs is not a technical implementation but an ongoing process of educational change and as such, it may be a slow, often unpredictable process (OECD, 2008, p. 28).

The World Bank report of 2000 concludes that civil liberties go hand in hand with the conditions to innovate and generate technological progress and the ICTs diffusion rates may influence and be influenced by a national or international legal, institutional and political environment. A central role for the development of the potential of ICTs in education could be given to civil liberties in the countries,

including freedom of expression, transparency of institutions and protection of human rights (World Bank, 2000, pp. 29-30).

Conclusion

Indeed, "Technology offers unprecedented opportunities" but it depends mostly on how it is used and the access to ICTs cannot be seen as a predictor for significant success or improvements in educational quality and equity. Even, conversely, if not regulated and navigated, the potential of ICTs in education could be harmful through wasting students' and teachers' time which result in insufficient learning activities, or through exposure to online risks such as violations of privacy or online bullying.

To be correct politicians should not hyperbolize the positive effects that ICTs could have for improvement of quality or reducing the inequality in education, and to rely on ICTs to do their work as policymakers, responsible for the implementation of educational reforms and changes in the ways of learning and teaching through ICTs.

References

European Commission (2012): *Rethinking Education: Investing in skills for better socio-economic outcomes*. Strasbourg. https://www.cedefop.europa.eu/en/content/rethinking-education-investing-skills-better-socio-economic-outcomes (Accessed 11 February 2020).

European Commission (2019): *2nd Survey of Schools: ICT in Education*. Luxembourg: Publications Office of the European Union. https://ec.europa.eu/digital-single-market/en/news/survey-schools-ict-education (Accessed February 2020).

Fraillon, J., Ainley, J., Schulz, W., Friedman, T. & Duckworth, D. (2019): *Preparing for Life in a Digital World. IEA International Computer and Information Literacy Study 2018 International Report*. https://www.iea.nl/sites/default/files/2019-11/ICILS%202019%20 Digital%20final%2004112019.pdf (Accessed February 2020).

IEA (2019): *Results from the International Computer and Information Literacy Study (ICILS) 2018*. https://www.iea.nl/publications/study-reports/infographics/icils-2018-infographics (Accessed February 2020).

Mueller, P. & Oppenheimer, D. (2014): The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological Science*, 25(6), 1159-1168.

OECD (2000): *Schooling for Tomorrow Learning to Bridge the Digital Divide*. Paris: OECD Publications.

OECD (2008): *ICT in Innovative Schools: Case Studies of Change and Impacts*. https://www.oecd.org/site/schoolingfortomorrowknowledgebase/themes/ict/41187025.pdf (Accessed February 2020).

OECD (2015): *Students, Computers and Learning: Making the Connection*. Paris: OECD Publishing.

Pelgrum, W. & Law, N. (2003): *ICT in education around the world: trends, problems and prospects*. Paris: UNESCO, International Institute for Educational Planning.

World Bank (2000): *Are poor countries losing the information revolution?* infoDev working paper. Washington, DC: World Bank.

Dr. Vesselina Kachakova, Institute of Philosophy and Sociology, Bulgarian Academy of Science, Bulgaria