

ICT Curriculum Implementation in Primary Education

Aldagigi AHMED *
Hironari NOZAKI **
Kyoko UMEDA ***

Introduction

In this digital era, and with the rapid development of technology, technology has become an integral part of everybody's daily life. Therefore, individuals who are not well equipped with the necessary technical knowledge and skills are more likely to struggle in maintaining various aspects of their daily life. Thus, integrating Information and Communication Technology (ICT) in education has become inevitable. As we progress in this 21st century, traditional learning has become less and less appealing. Therefore, as an alternative educational leaders have been advocating for the implementation of ICT in schools worldwide. Their objective is to provide students with substantial 21st century knowledge and skills, such as personal and social accountability, critical thinking, digital literacy, as well as innovation skills. In fact, research has indicated that ICT in classroom significantly contributes to students' learning and constructivist instructional methods (Smeets, 2005). Further, according to the National Institute of Multimedia Education in Japan integrating ICT into the curriculum has positively influenced students' learning outcomes. Not only has it positively influenced the students' learning outcomes, but also it has contributed to the students' innovation, information, media and technology skills. With that being said, there is no doubt that the implementation of an ICT curriculum in today's classroom is an essential part of learning and teaching, in what follows I would like to address the implementation of an ICT curriculum in primary education.

Design and Method

In response to the increasing demand for the implementation of ICT in education, several education systems have been working eagerly to meet this global trend. As such, as a primary school teacher, I would like to address the implementation of ICT in primary education. This article will address two main ideas; the contribution of ICT to the learning environment, and factors that challenge the implementation of ICT in the learning environment.

The contribution of ICT to the learning environment

In the last few decades, ongoing changes in the utilization of ICT known as information and communication technologies have continuously contributed to both subtle and substantial reform in every aspect of people's life. Consequently, the massive use and the increasing dependence on multimedia devices have become an integral aspect of everyday life, mainly

* Graduate student, Teacher Training Course, Aichi University of Education

** Department of Education Administration and Governance, Aichi University of Education

*** Department of Information sciences, Aichi University of Education

amongst younger people who interact with information in varied and complex approaches. This heavily reliance and use of ICT has made media literacy a fundamental tool in obtaining and exchanging knowledge. Though education is broadly perceived as a critical tool to promoting healthy and productive citizens, some people believe that the education systems worldwide have not yet fully fathomed the potential of ICT in serving its purposes (Charalambidis, 2014). In fact, some have questioned whether or not the current setting of a learning atmosphere is in alignment with students' 21st Century norm of life, and preparing them to perform their personal and social duties accordingly. When comparing the nature of students' interaction with information inside and outside the classroom, one can tell these two worlds are totally irrelevant. In other words, when students' knowledge and skills are far from being authentic and irrelative, and are not providing them with 21st century's ICT knowledge and skills, students become less motivated and interested in school, and in some cases they might seek out these knowledge and skills from outside the school (Valentín et al., 2013). In short, schools should provide students with meaningful learning environments which are authentic, reflective of real life experiences, and suitable for all students' needs. Nevertheless, this objective cannot be achieved without the integration of ICT in the learning environment. Having said that, in what follows, I would like to highlight the contribution of ICT to students' learning environment.

Meta-cognitive learning

Meta cognition or meta cognitive knowledge is defined as "knowledge of the mental processes which are involved in different kinds of learning. Metacognition has two fundamental aspects: knowledge about cognition and self-directed thinking. Self-directed thinking is governed by evaluation, planning, and regulation activities" (Zare-ee, 2007, p.107). ICT may foster productive learning atmospheres in several ways. Utilizing multimedia resources, students can access an abundant amount of knowledge and critically analyze it from various point of views, making the learning environment rather authentic. Furthermore, having such quick and flexible access to information may help facilitate students' active and independent learning. With the help of their teachers, students become in charge of their own learning, and learn how to learn. In other words, by utilizing ICT students will develop strong meta-cognitive learning skills (ZAREEI, 2007). This teaches students to become more aware of their own knowledge, their ability to comprehend and to process new information. Acquiring such skills leads students to be self-assessors and self-regulators. Being self-assessors, the students can reflect and assess their own learning ability and development. Being self-regulators, the students can design, choose, and deploy learning methods when obtaining new knowledge (Lai, Tsai & Yu, 2011).

Digital literacy

The implementation of ICTs in school increases students' digital literacy. Digital literacy is defined as "the interest, attitude and ability of individuals to appropriately use digital technology and communication tools to access, manage, integrate and evaluate information,

construct new knowledge, and communicate with others in order to participate effectively in society” (Kim, Kil, & Shin, 2014, p.30). This definition also implies that one should possess a fundamental understanding of the concepts of digital etiquette and digital law when accessing information.

When students are exposed to a learning environment where they interact and utilize ICT tools, they eventually develop information technology competencies that are essential for the constructive utilization of ICT (Lai, Tsai & Yu, 2011). Additionally, such interaction with ICT is believed to enhance students’ critical thinking and decision making skills. Not only will it enhance students’ critical thinking skills, but it may also foster their mathematical thinking and problem-solving skills; and it may also enrich creativity and innovation skills in students. These potentials of the implementation of ICT in school can contribute to both the students’ learning outcomes as well as a strong foundation of ICT competency (Suryani, 2010).

Student affect

Student affect can be defined as students’ attitude towards learning (Popham, 2014). These attitudes include interest, self-efficacy, value, motivation and so on. As such, in order for learning to take place, educators most collectively target their student attitudes. In fact, teachers can utilize and implement ICT in their instructional strategies in targeting this aspect of students’ learning. For example, Ascd (2008) suggested that the achievement gap identified between students who come from diverse cultural backgrounds and students of majority backgrounds was not because of their learning ability. Rather, it was the adverse consequence of the instructional quality that was implemented in school. Further, learning preferences have also been suggested to play a crucial role in students’ failure in school. Having said that, I clearly see the benefit of implementing ICT as useful tool in closing such achievement gaps. Another important function of implementing ICT in classrooms is to spark students’ motivation and attitudes towards learning. As a teacher, I know for a fact how much students’ motivation to learn impacts their attitude towards learning. Students’ motivation can be sparked by understanding their interest, value, beliefs and cultural background, and this can be approached by a successful implement of ICT in students’ learning (Valentin et al., 2013). For example, through the use of ICT in classrooms teachers would be able to apply the notion of multiple means of representations. Students can demonstrate their understating of new knowledge via visual or auditory means, and so on. Not only will it contribute to the wellbeing of students’ interest, self-efficacy, values, and motivation, but it will also enable them to learn essential ICT skills and knowledge that are practical in today’s digital world.

Factors challenging the implementation of ICT in the learning environment

There is no doubt that the implementation of ICT in education can be a challenge. In fact, the “2nd Survey of Schools: ICT Education”, carried out by the European Commission in 2019, highlighted several factors that may challenge such implementation including:

- Connectivity

- Coding and gender gap
- Professional teacher development

Connectivity

The survey indicates that by 2025 the Internet connectivity will be an inevitable requirement by all European schools. As a matter of fact, schools' access to the Internet is a requirement for a successful ICT implementation, and to ensure up-to-date information or any deployed learning management applications. Furthermore, the demand for bandwidth-demanding applications such as Adobe Connect or blackboards by schools has been rapidly increasing. Nonetheless, the survey suggested that currently less than 20% of students are enrolled in schools with high-speed Internet access. Moreover, within the EU, the survey highlighted that not all EU countries have access to high-speed Internet, and some are falling behind. The findings of the survey suggested that the Internet connectivity in schools is still far behind and needs to be tackled, and it requires collective efforts to overcome (Deloitte & IPSOS, 2019).

Coding and gender gap

Coding knowledge and skills in today's digital world are fundamental skills if one is to be more productive and is to engage at social and economic levels in today's society. Coding requires and fosters essential skills, such as critical thinking and problem solving skills. However, according to the abovementioned survey, less than 20% of students have participated in coding activities. Moreover, although a study claimed that though female students demonstrate considerably higher ICT skills than their male counterparts, they are more likely to shy away from coding activities. Interestingly, 2 in 10 female students have never participated in coding tasks (Deloitte & IPSOS, 2019). This gap is believed to be caused by female students' self-efficacy and self-concepts in coding and programming. It is this negative perception of self-efficacy and self-concepts in their own abilities of coding and programming that prevents them from participating in such activities. As such, educational leaders need to address this issue in order it to alleviate such challenges (Kim, Kil, & Shin, 2014).

Professional teacher development

In order to successfully implement ICT in education appropriate for 21st century skills, schools are ought to prepare and design a learning environment, in which students' ICT knowledge and skills will be fostered. However, this kind of learning environment system requires highly skilled teachers who know how and when to implement ICT. Unfortunately, since the adoption of ICT in education is still at its early stages in many countries, most teachers are not well equipped to take on this task. In fact, professional ICT development sessions or workshops are still not mandatory in many countries, and the majority of teachers tend to acquire such knowledge and skills on their own. According to the Ministry of Education, Culture, Sports, Science and Technology in Japan, merely 19.2% of teachers underwent ICT training. It is for this reason that many teachers tend to have a negative attitude towards the implementation of

ICT in learning and prefer conventional teaching methods over teaching approaches using ICT (MEXT, 2011). In other words, teachers' negative self-efficacy toward the utilization of ICTs in learning is a major challenge which requires an urgent action to tackle. One way to tackle this challenge is to provide training to teachers via e-learning platforms, or face-to-face workshops in professional teacher development centers. In short, ongoing teachers' professional ICT development is an important key to ensure a proper ICT integration in school, and educational policy makers are sought to take action and formally engage all teachers in professional ICT development sessions in order for ICT education to realize its potentials.

Conclusion

In light of the above discussion, it is well established that the use of ICT in classroom contributes positively to instructional quality and learning outcomes. Not only does it contribute to the teaching and learning, but also students perceive an ICT-enhanced environment as more stimulating and appealing than in a conventional learning environment. In addition to that, such interaction with technology will certainly prepare them to be highly productive and competitive twenty-first century citizens. However, the implementation of ICT in education comes with some challenges which can be addressed with the local or international policy makers in order for the approach of ICT in education to reap its benefits.

ACKNOWLEDGMENTS

This work was supported by JSPS KAKENHI Grant Number 17H01994.

We thank prof. Oliver Mayer for comments on English expressions.

References

1. Ascd, M. S.-S. (2008). Chapter 2. Diverse Teaching Strategies for Diverse Learners. Retrieved January 5, 2020, from <http://www.ascd.org/publications/books/107003/chapters/Diverse-Teaching-Strategies-for-Diverse-Learners.aspx>
2. Charalambidis, D. (2014, September). ICT in the Future Classrooms and Teaching: Preparing the Knowledge Workers of the 21st Century. In *IFIP International Conference on Artificial Intelligence Applications and Innovations* (pp. 56-62). Springer, Berlin, Heidelberg.
3. Deloitte & IPSOS. (2019, April 2). 2nd Survey of Schools: ICT in Education. Retrieved January 4, 2020, from <https://ec.europa.eu/digital-single-market/en/news/2nd-survey-schools-ict-education>.
4. Kim, H. S., Kil, H. J., & Shin, A. (2014). An analysis of variables affecting the ICT literacy level of Korean elementary school students. *Computers & Education*, 77, 29-38.
5. Lai, Y. S., Tsai, H. H., & Yu, P. T. (2011). Integrating annotations into a dual-slide PowerPoint presentation for classroom learning. *Journal of Educational Technology & Society*, 14 (2), 43-57.
6. MEXT. (2011, April 28). The Vision for ICT in Education - [mext.go.jp](http://www.mext.go.jp). Retrieved January 9, 2020, from http://www.mext.go.jp/component/a_menu/education/micro_detail/__icsFiles/

afeldfile/2017/06/26/1305484_14_1.pdf.

7. Popham, W. J. (2014). *Classroom assessment : What teachers need to know* (7th ed.) Pearson.
8. Smeets, E. (2005). Does ICT contribute to powerful learning environments in primary education? *Computers & Education, 44* (3), 343-355.
9. Suryani, A. (2010). ICT in education : Its benefits, difficulties, and organizational development issues. *Jurnal Sosial Humaniora, 3* (1), 13-33.
10. Valentín, A., Mateos, P. M., González-Tablas, M. M., Pérez, L., López, E., & García, I. (2013). Motivation and learning strategies in the use of ICTs among university students. *Computers & Education, 61*, 52-58.
11. Zare-ee, A. (2007). The relationship between cognitive and meta-cognitive strategy use and EFL reading achievement. *Journal of Applied Psychology, 2* (5), 105-119.