iTe(a)ch: Integrating technology in the 21st century classroom

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INTRODUCTION

In this present era, industrial revolution 4.0 or IR 4.0 has been a famous buzzword and a hot topic mentioned in many economic, social, scientific, and educational fora. It exemplifies the drive towards smart industry and manufacturing goals. The breadth and depth of these changes herald the transformation of entire systems of production, management, and human resources. This industrial transformation is experienced by ASEAN countries on an unprecedented scale with nine interrelated pillars of IR4.0 which include: automation, data exchanges, cloud computing, cyber-physical systems, robots, Big Data, Artificial Intelligence (AI), Internet of Things (IoT), and semi-autonomous industrial techniques (Mustafa as cited in Haron, 2018). Moreover, Diwan (as cited in Hussin, 2018), this IR 4.0 has led to the emergence of bio and nanotechnology, 3D printing, materials science, quantum computing, and energy storage. The IR 4.0 affects not only the business, governance and the people, but it also affects education, thus the name Education 4.0 comes into existence.

But, in the advent of these transformations, education faces the enormous challenge of transition from traditional learning to methodological innovations. Do you still remember how were you taught by your teachers when you were in the elementary grades? You were taught in the traditional style in a traditional classroom, right? The traditional style of education is burdensome and boring for the students. The teacher is the only source of knowledge and students learn what the teacher has taught them. The traditional classroom with the teacher teaching 30 or 40 students which was mainly one-way communication of information is no longer effective for modern times (Kumari and Rao, 2010).

The field of education has undertaken different revolutions. During the IR1.0, the teacher served as orchestrator of the teaching-learning process and the students were mere receptacles of knowledge. There's a lot of receiving, responding, and regurgitating. IR 2.0 was a period when teachers also served as orchestrator but there were communications, connections, and collaborations among the students and the teachers. In the IR 3.0, there was a change in the role of teachers and students. Teachers were considered as facilitators of knowledge and learners has become constructors of the own learning. These revolutions in education only imply that teachers need to change and their roles has shifted to a new and broader definition to meet the needs of the global learning community.

With the breakthrough of Education 4.0 which is in response to IR 4.0, human and technology need to be aligned to enable new possibilities. It poses a great demand for transforming teachers' roles and retooling them on technological skills providing them opportunities to master and use them towards creating an improved teaching and learning environment. The new paradigm of education also requires that teachers should be adept in integrating technological with pedagogical practices so as to develop 21st century skills among students (Garo, 2008). Teachers must be technology-driven, technology-oriented and responsible not only for teaching but also for learning. They have to take into account the needs of each student in a heterogeneous classroom, creating a student-centered learning environment that enhances creativity, curiosity, and learning motivation.

In order to adapt to Education 4.0, Thanh (2018) stressed out that teachers need to equip students with innovative capabilities, life-long learning and access to digital technology. In order to successfully integrate and respond to future work, teachers must develop among the students with the following five skills or the 5Cs: a) creativity, b) collaboration skills, c) communication, d) critical thinking, and e) continuous learning.

According to the World Economic Forum (as cited in Haron 2018), 65% of children entering primary school today will ultimately end up working in completely new job types that don't exist yet. And the key step to preparing individuals for the economy of the future is to provide quality education opportunities for all (US Government as cited in Haron, 2018). How can teachers provide quality education and respond to the demand of Education 4.0? One of the schemes is integration of technology in the 21st century classroom.

Technology is ubiquitous, touching almost every part of our lives, our communities, and our homes. Yet, most schools lag far behind when it comes to integrating technology

into classroom learning. Many are just beginning to explore the true potential technology offers for teaching and learning. When properly used, technology will help students acquire the skills they need in order to survive in a complex, highly technological knowledge-based society. Integrating technology into classroom instruction means more than teaching basic computer skills to students. Effective technology integration must happen across the curriculum in ways that research shows deepen and enhance the learning process. In particular, it must support the four key components of learning: a) active engagement, b) participation in groups, c) frequent interaction and feedback, and d) feedback and connection to real-world experts. Effective technology integration is achieved when the use of technology is routinized and transparent and when technology supports curricular goals (Sinha, 2013, p. 93).

In addition, Brady (as cited in De Leon, 2016 p. 21) stated the effective integration of technology into the educational system is complex, multi-faceted process that involves curriculum and pedagogy, institutional readiness, teacher competencies, and long-term financing. The introduction of computer and internet in the academic arena has brought a massive change to uplift both teaching pedagogy and learning of students. When teachers started to use smart boards, computers, laptops, and online learning as a replacement of chalkboards, discussion and learning has become more active and responsive. Evidently too, students' learning behavior has become interactive, self-exploratory, and student-centered.

Technology Integration: Its Definition and Impact on Teaching and Learning

Technology integration in the realm of education refers to the meaningful implementation of technology in educational settings to achieve learning goals (Kimmons, 2016). In addition, Dockstader (1999), defined technology integration as using computers effectively and efficiently in the general content areas to allow students to learn how to apply computer skills in meaningful ways. More so, it is the use of technology resources in daily classroom practices and in the management of school (Edutopia, 2007). And, it is the consistent and regular application of technological tools in the classroom to foster optimal learning, prompt, and supportive means geared toward the attainment of a common goal. It is a method that provides the expanded opportunities for the students to understand their lessons and tasks on hand (Bernardo & Gonzales, 2017).

The positive effects of technology integration have been evident to results of many research studies. According to Jarvis (as cited in De Leon, 2016), students are empowered and challenged to use technology if they feel comfortable with technology and technological change. In addition, technology reshapes the mindset of students of all ages and creates a 'neo-millenial' learning style. As a result, teachers need to modify their teaching practices to accommodate technology-based trend and meet the e-learning needs of the technologically sophisticated students (Dede as cited in De Leon, 2016).

Technology integration in classrooms will transform education. The rapid developments in technology have yielded rich sources of information and generated changes to teaching and learning in almost any discipline (Jacob as cited in De Leon, 2016). In addition, Ayas (as cited in De Leon, 2016) purported that technology integration in instructional delivery results to increased teacher efficiency, student motivation, and performance. In the study of Laboo and Honan (as cited in De Leon, 2016), posited that technology in classroom instruction does not only positively affect students' learning but also contributes to their own learning. In addition, technology gives learners the opportunity to control their own learning process and provides them with access to a vast amount of information over which the teacher has no control.

Technology in Education: Elements of a Rationale for its Use

There are many reasons technology integration is needed in education particularly in classroom instruction. Through technology integration, students gain technology skills and

knowledge that they will need in the future. Robyler (as cited in Sinha, 2013) compiled a list of reasons why technology should be used based on current researches. Among these reasons are: 1) technology provides motivation for students, 2) technology offers unique instructional capabilities, 3) technology gives support for new instructional approaches, 4) technology increased teacher production, and 5) technology skills are required for an information a.

Technology in School: Its Importance

According to Tabbada, Buendia, and Leus (2015), results of studies gave account on the importance of the use of technology in schools. Researchers have found the following results: a) students show improvements in their writing, reading, and math skills, b) technology has contributed to the decrease in dropout rates, improvement in student attendance, and enhancement of their learning skills, c) technology in school benefits the students during their higher education because it lays a strong foundation of the successful professional life of an individual, d) computers can offer livelier explanations of various subjects, e) the inclusion of technology in the process of learning makes it enjoyable activity, thus inviting greater interest from the students, and f) the knowledge from all around the world can be better brought about for the students and can be better assimilated by them.

Technology in Education: Its Importance to Learning

Technology can be a delivery vehicle for instructional lessons and helps the students build more personal interpretations of their world. It makes the students gather, think, analyze, synthesize information and construct meaning with what technology presents. Tabbada, Buendia, and Leus (2015) identified the importance of educational technology in learning and these include: a) provision of important tools to support knowledge construction for presenting students' ideas, understanding and beliefs and for producing organized, multimedia bases for learners, b) access to needed information to support learning-by-constructing, and c) comparison of perspectives, beliefs, and world views.

Technology: Its Benefits in the Classroom

According to Tabadda and Buendia (2015), there are many benefits of technology when effectively and efficiently integrated in classroom instruction. Among these benefits are: a) instructional effectiveness, b) active learning, c) critical thinking, d) cooperative learning, e) communication skills, f) multisensory delivery, and g) multicultural education.

Technology Integration: The Tools and Its Types

Many types of technology tools can be used for technology integration into the curriculum. These tools can be used in many ways to create technology-integrated activities for students. The most commonly used tools include: a) application software such as word processing software, spreadsheet software, database software, presentation graphics software, and instructional software, and b) the internet using search engines, e-mail, WebQuests, and virtual field trips. Through the use of these tools, teachers are challenged to design instructional activities so that the students are required to use technology as a tool, not just a mere mechanism for the delivery of the content. Therefore, teachers should add meaningful activities to existing lesson plans that require students to use one or more technology tools and design new lesson plans that require students to participate in meaningful activities that use technology tools.

These technology tools can be used in different types of technology integration. Bernardo and Gonzales (2017) have identified types of technology integration and some of which are applicable in the primary grades. These include: a) project-based learning, b)

game-based learning, c) learning with mobiles and handheld devices, d) instructional tools like whiteboards and student response systems, and e) student-centered media like podcasts, videos, or slideshows.

Technology Integration: Selecting Learning Activities in the Classroom

Many types of traditional learning activities can be extended for the use of technology integration. Cunningham and Billingsley (as cited in Sinha, 2013) identified a list of criteria that can be used in the selection of technology-based learning activities. These criteria include: 1) plan authentic activities, 2) promote self-directed learners, 3) go beyond one subject area, 4) use multiple approaches, 5) go beyond retelling, 6) use of higher order level of thinking, 7) keep it simple, 8) borrow ideas from others, 9) touch imagination, 10) build to promote intentionality, 11) engage the learner, 12) build on controversy, 13) use characteristics of the web, 14) build activities around current events, 15) use non-materials, events, and locations, 16) facilitate spontaneity and discovery, and 17) plan open-minded inquiry.

With the birth of Education 4.0, technology is perhaps the strongest factor shaping the educational landscape today. Particularly, the modern day or the 21st century classroom is now moving beyond utilizing and integrating technology as a delivery mode to teaching technologically sophisticated students. Technology in instructional delivery as shown in the results of research studies yielded to many positive impacts to student learning. And as we move to the idea of integrating technology in the classroom, teachers are taking on a new role in the classroom. Technology lends itself to a new role for teacher – that of facilitator and a coach. The teacher presents students with challenging real-life problems and the technology tools to solve them (Means and Olson as cited in Sinha, 2013). As teachers take on a new role, students also take on a new role – to be active participants in the teaching-learning process. The goal of technology integration in education is for teachers to apply the use of technology in a seamless manner so that it supports and extends learning goals and objectives and engages students in a meaningful learning.

REFERENCES

1. Bernardo, A. S. & Gonzales, H. T. (2017). *Educational technology 1* (1st Edition). Rex Book Store: Manila, Philippines.
2. De Leon, E. (2016). *Technology integration paramount ti 21st century education: a research-based juxtaposition*. Lorimar Publishing Inc.: Cubao, Quezon City
3. Dockstader, J. (1999). *Teachers of the 21st century know the what, why, and how of technology integration*. Retrieved from http://jan.ucc.nau.edu/~coesyl-p/principle3-article2.pdf
4. Garo, C. D. (2008). *Theories and principles of educational technology.* National Book Store: Mandaluyong City, Philippines
5. Haron, H. (2018). *Education in the era of IR4.0*. Retrieved from http://umpir.ump.edu.my/id/eprint/22486/1/Education%20in%20the%20Era%20of%204.0.pdf
6. Hussin, A. A. (2018). *Education 4.0 made simple: ideas for teaching*. Accessed from https://www.researchgate.net/publication/327392112_Education_40_Made_Simple_Ideas_For_Teaching

7. Kimmons, R. (2016). *Effective technology integration*. Retrieved from https://k12techintegration.pressbooks.com/chapter/effective-technology-integration/

8. Kumari, C. J. & Rao, D. B. (2010). *Methods of educational technology*. Discovery Publishing Home: New Delhi, India.

9. Tabbada, E. V., Buendia, M. M. &, Leus, M. J. (2015). *Educational technology 1*. Adarna Publishing Co., Inc.: Cubao, Quezon City.

10. Thanh, N. N. (2018). *What kind of teachers will continue to flourish in the fourth industrial revolution?*. Retrieved from https://namngovas.wordpress.com/2018/04/29/teaching-and-learning-in-the-industrial-revolution-era-4-0/