UTM

UNIVERSITI TEKNOLOGI MALAYSIA

CASE STUDY

NAME	MOHAMAD HAIKAL BIN SADRI
MATRIC NO	A20HP0078
LECTURER	DR. NINA DIANA BINTI NAWI

Case study on Industry 4.0 and Education

The Integration of Information Communication and Technology (ICT) Improves Future Teaching and Learning Process in Malaysian Secondary School

As we are living in the hyper-connected world, technology has become one of the main pillars in shaping modern societies and creating unlimited paths to the future. The transformations from the Industrial Revolution 4.0 is remarkable. With the introduction of these exponential technologies creating a paradigm shift to bring changes across the world, many industries have responded to it resulting in Agriculture 4.0, Business 4.0, and Healthcare 4.0. The education system is nonetheless different. Education 4.0 is mainly consuming technology-based tools and resources which incorporates Artificial Intelligence to alter the teaching-learning process in a traditional classroom that aligns with the emerging fourth industrial revolution (Sharma, 2019). This new educational paradigm increases the personalization in education as it uses smart tools to assist the teaching-learning process. Personalised learning through communication tools, learning management software, and smart school management systems are able to increase students' engagement behaviorally and cognitively in classrooms (Fedena, 2018). In order to keep momentum, both teachers and students are directed very closely at developing the competence of new modern innovation at all levels in an effort to maximize the use of teaching and constructive learning technologies. As stated in The Malaysian Education Blueprint 2013-2025, under Shift 7, the Information and Communication Technology (ICT) has been incorporated across all 10,000 schools in Malaysia have gained access to a 4G network through 1BestariNet. The ICT also introduces the students to new distance-learning programs to study the subjects at their own pace with qualified teachers in the country.

According to Ebrahimi (2018) research and statistic, the usage of ICT in public Malaysia secondary schools has proven that education system in Malaysian secondary schools has heavily invested on incorporating schools with technologies as shown in Figure 1. Nevertheless, the percentage of teachers who use technology in education is still unable to pass the bar minimum due to some drawbacks. These drawbacks may occur because of the lack of expertise in new technology and the shortage of technology available at their schools. Besides, in Figure 2 the data is depicted based on the ICT training that is received by teachers and students. Although

teachers join the governmental ICT training, it is still not efficient which result in the limitations of students to use technologies in their education at school.

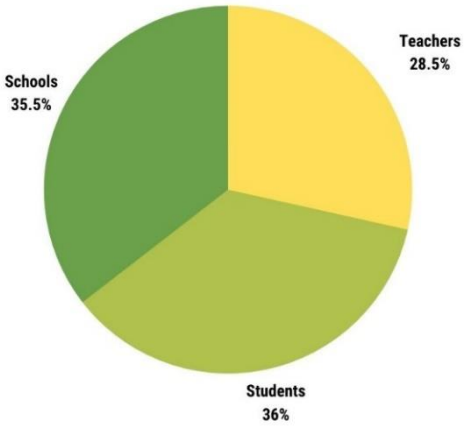

Figure 1 Percentage of Schools, Teachers, and Students in Malaysia That Use ICT for Education

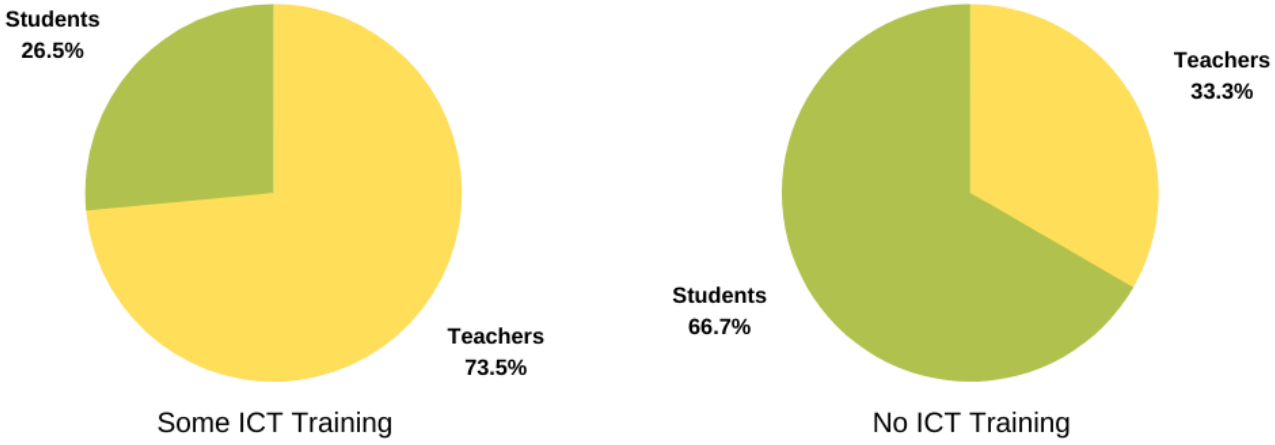

Figure 2 Percentage of Teachers and Students in Malaysia Who Claimed to Receive ICT Training

The issues to integrate artificial intelligence in Malaysian secondary schools can be attributed into three challenges which are students learn with different learning styles, teacher's reluctance to new technology and, shortage of materials and resources.

Every student has different learning styles and preferences. Some prefer to learn by reading, some by seeing, and others by asking questions. This will be a challenge for the students to adopt a new learning style with technology. Dunn &Griggs (2000) stated that learning style is the way students begin to focus, interpret, internalize, and recognize challenges in new academic knowledge. Although technological instruments are being implemented in classrooms, that doesn't certainly gauge the efficiency of students during the learning process (Rose et al, 2006, as cited in Viorica-Torii, & Carmen, 2013). Grasha (1996) claimed students' learning styles are the essential qualities that influenced their ability to acquire knowledge and to interact with teachers and the peers and engage in learning experiences. In order to address this issue, the paradigm of education has shifted from teacher-centered learning to student-centered learning strategy. This allows the students to be more active and responsible for their own learning at their own pace. They will have personal time and space to adapt their learning styles with the technology. According to Kaput's (2018) research, she identified the seven principles of student-centered learning and the outcome of these principles will lead the students to success as shown in Figure 3. One Young World (n.d.) also said that this learning strategy encompasses immersive methods to help students' in building transferable skills that are essential for their personal development, such as decision-making, problem-solving, and presentation skills. In addition, the information technologies integration through this learning strategy can enhance the productivity of students and encourage higher-order thinking skills. In fact, the Instructional technology today is actively advancing to embellish the teaching and learning outcomes to give educators and learners satisfaction and reach their expectations (Hirumi, 2002). This is aligned with the objectives of SCL principles which to foster individual's constructivist development whereby the learners may develop their own understanding. Saxena (2013) stated that this helps students to interpret a multi-angle problem that directs them through their own learning process. Therefore, the student-centered learning strategy is certainly a good way to help students to match their learning styles with the technology in a classroom.

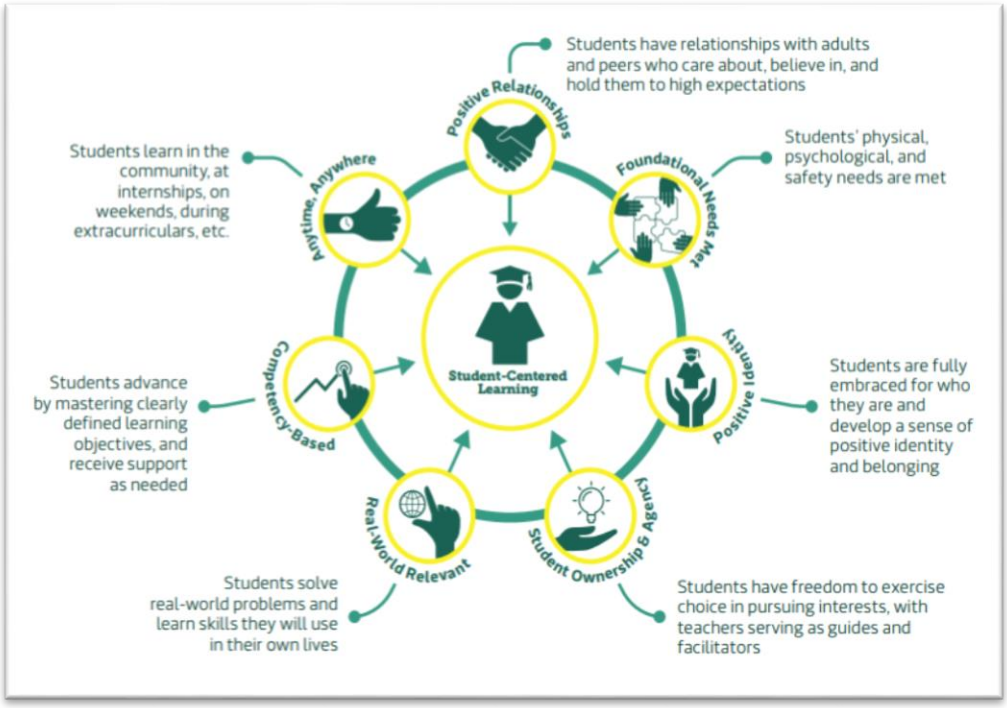

Figure 3 The Seven Principles of Student-Centered Learning

Furthermore, the rise of digital natives that speaks "technological-language" has massive impacts on the teaching-learning environment within the current school structures. This generation is well equipped with digital skills. On the other hand, the acceptance of teachers pertaining to technology tools implementation in the education establishment has become an issue. A study found that teachers' behavior can be an indicator of the usage of new technologies in a modern classroom environment (Habibu et al,2012). Watson (1999) argued that new technologies in education need a major transition, and every teacher will address the changes differently. He elaborated that teachers' perspectives towards these changes are important as it reflects their action in classrooms. Becta (2004) also claimed that teachers' attitudes may be influenced by their understanding of how these technologies will able to make their pedagogy more meaningful. The low confidence in teachers also contributes to this problem. There are some teachers who aren't comfortable teaching with technology in front of the student whom they believe were more skilful than them (Becta, 2004). A study by Bingimlas (2009) revealed that lack of self-confidence may demotivate teachers from using digital tools in classrooms. In order to overcome this issue, the Ministry of Education Malaysia should provide optimal professional ICT programs and training sessions for the teachers to change the way they perceive modern technologies. Trach (2019) wrote teachers need to be ready to hit the ground and employ many skills and knowledge about digital technology. This is important for

their career development and to design effective teaching materials that promote diverse, motivational, and attractive teaching in modern classrooms. Mitchell et al. (2016, as cited in Allen, 2018) found that the students' involvement will increase when the technology is applied to the curriculum. Downes and Bishop (2015, as cited in Allen, 2018) also stated with the help of technologies, the students can enhance their academic performances in the school including those who were not actively participate is surprisingly became encouraged. Since these students are from i-Generation with tech-savvy expertise, they have the skills to operate smart devices for learning and personal use. Moreover, teachers and students are able to maximize the leverage of technology-based tools in classrooms and have more personalized opportunities in learning. Consequently, the teachers and students are able to maximize the leverage of technologies and this will form a new culture in modern classrooms where the students can work with the technology-based tools in learning and working towards on realizing the Education 4.0 in Malaysia.

Lastly, the Information Communication and Technology implementation has a great potential to enlarge the number of students with science literacy and strengthen the STEM curriculum in schools. However, the shortage of equipment tools, materials, and, resources have obstructed this teaching-learning process. According to Sicilia's (2005, as cited in Habibu et al, 2012) research, teachers complained about how limited it was to gain access to computers. Groups of teachers found out that insufficient computers, copies of the software, internet access are key obstacles to the integration of technology in educational institutions (Habibu et al, 2012). Gryzelius (2015) further elaborated in IDEAS that to ensure the ICT in schools occupied with robust security and fast internet connectivity, it requires a huge budget and large infrastructural investments, especially in rural areas. The Ministry of Education Malaysia, therefore, has initiated strategic planning to tackle this issue in three phases. Based on The Malaysian Education Blueprint 2013-2025, under Chapter 6, the first phase, 2013-2015, has been designed to ensure that the foundations for ICT in schools are adequately established. The second phase, 2016-2020, will emphasize more developments in the use of ICT in Malaysian education and set high-quality standards for schools and teachers to integrate ICT into classrooms. And the third phase 3, 2021-2025, will be concentrate on establishing the ICT thoroughly implemented into education and certify that ICT is an ongoing process. Consequently, Ministry of

Education Malaysia can provide the students with good quality education as well as a properly implemented STEM curriculum in schools. The STEM curriculum is a crucial education to foster students' capabilities to face the benefits and challenges of both globalization and a knowledge-based economy (Science National Foundation, n.d., as cited in Engineering for Kids, 2016). STEM curriculum has been embedded in Malaysia's education system since 2017 and it's not solely to spark an interest in pursuing a STEM career in students, but also to develop contextual problem-solving among the youths. The contextual problem can increase students' interest and affect the outcome of learning to be more purposeful as it applies the real-world issues that are relevant to our daily life (Pilot & Bulte, 2006 as cited in Loh et al, 2019). Sustainable Development Goals (2019) mentioned that Siemens Stiftung, a non-profit corporate foundation, has introduced "STEM and creativity" into its international education program by incorporating design thinking as a new pedagogy in STEM lessons. This design thinking method allows students to solve problems with a sense of empathy and react to the problem as if they are confronting it. The teachers and students have suggested selecting their challenge from the SDGs that is including economic, social, and environmental challenges of the 21st century. This is to nurture the youth with 21st century skills, innovative mindsets, and positive attitudes through the solution-based approach in order to embrace current and future challenges and successfully achieving the SDGs listed in the 2030 Agenda by the UN as depicted in Figure 4.

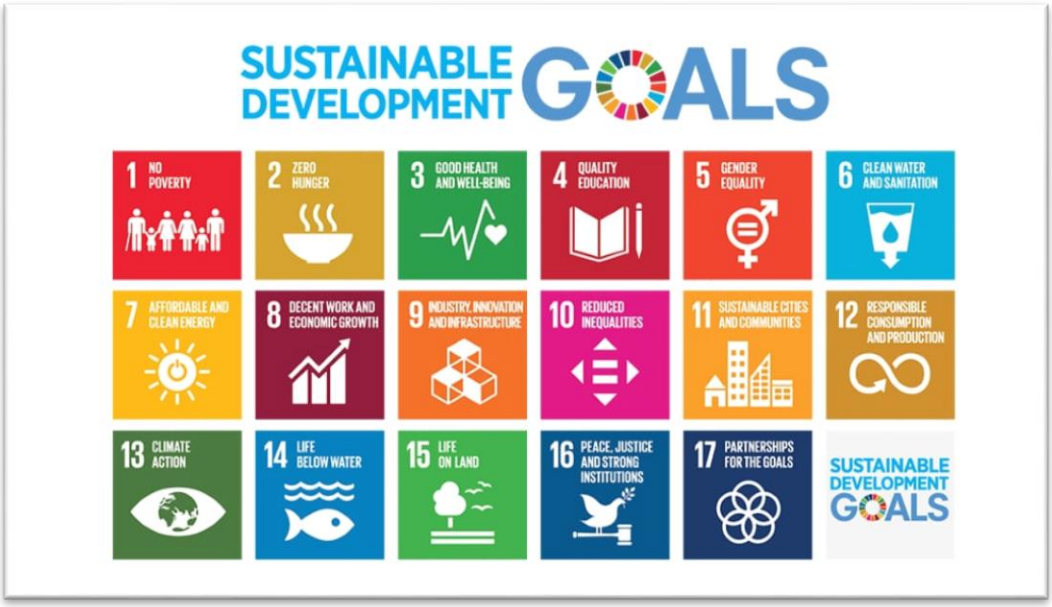

Figure 4 A Collection of 17 Interlinked Goals of The Sustainable Development Goals by The United Nation

In conclusion, the integration of Information Communication and Technology in Malaysian secondary schools will certainly make a door for our education systems to a bright future. However, the issues of students struggle in adjusting their learning styles with technology, the teachers' behavior towards the technology, and insufficient tools and resources must be addressed in order to ensure the ICT is properly implemented in schools. In this case, better planning is necessary. The policymakers should also step in to handle the hurdles and reinforce new educational policies that are aligned with the vision and mission of Education 4.0. After all, the students are the ultimate stakeholders in the educational ecosystem. Besides, from my perspective, the successful implementation of ICT in Malaysian secondary schools will also create new paradigms for our education to gradually adopting Artificial Intelligence (AI), robotics, and Internet of Things (IoT) into the system like the other developed countries such as Norway, Finland, and South Korea. Because good quality education is producing a sophisticated person and improving a person's economic well-being. And as the world moves into the Fourth Industrial Revolution, there is a sense of urgency for us to direct our attention and energy to the rapid growth of economic and technological development. The emergence of new modern creations and fresh technological ideas that keep revolutionized human civilization will bring ample positive and negative effects. The world is changing and there is no going back.

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