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CONTENTS

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Investigating Readiness of The Arrival of Industrial Revolution 4.0 Among Students in Higher Learning Institution

Nurul Munirah Binti Azamri [1], Nadiah Binti Zubbir [2]

Universiti Teknologi MARA (Perak)[1,]
Universiti Teknologi MARA (Shah Alam)[2]
moonazamri89@uitm.edu.my

Abstract

This study is intended to identify whether the students of higher learning institutions are ready of the arrival of the current worldwide emergence of Internet of Things (IOT) which then leads to the Industrial Revolution 4.0 (IR 4.0). The updated advancement has been identified to bring positive results towards integration of this emergence and the students' learning. This is in turn suggests for the concept of IR 4.0 to be implemented onto them. In order to deal with the challenge brought by IR 4.0, Professor Klaus Schwab, Founder and Executive Chairman of the World Economic Forum has enlightened that university students must enhance their 4C elements which are Critical Thinking and Problem Solving, Communication, Collaboration and Creativity. A total of 50 students from different courses of Diploma level participated in this study. A set of questionnaires was distributed to collect relevant findings. This study reveals that the students are ready for the arrival of IR 4.0 as they are encouraged with various learning styles, interest, motivation and student's engagement in the new norm of the industrial revolution. The outcomes from this study will assist students and also instructors through the implementation of IR 4.0 in teaching and learning process in the classroom.

Keywords: Internet of Things (IOT), Industrial Revolution 4.0 (IR 4.0), Critical Thinking and Problem Solving, Communication, Collaboration and Creativity.

Introduction

New era has evolved which then lead to the emergence of Internet of Things (IOT) and Industry Revolution 4·0 (IR 4.0). Both have become part of the concepts in order to achieve the exact momentum locally and internationally when they become the core initiative of the government in every aspect in human beings' living. The government has identified the importance of integrating the IR 4.0 in order to keep up with the updated advancements. Back then, the first Industrial Revolution was initiated by the creation of steam engine in the years of 1760-1830, which then followed by the second phase of the revolution that motivated by the invention of electronic power in somewhere around 1870-1914. After that, IR 3.0 was then developed to the excessive usage of computer and information technology in 2000. In order to meet the demand of today's fast changing world, IR 4.0 is developed based on the concept of economic and infrastructural advancement brought about by the automation of human activities through software. These software or applications used are acting as a medium to stimulate business activities yet with less human power needed. In other words, it is a mean of synchronizing the physical and digital world which then leads to industrial efficiency as it enhances the connectivity of humans and machines.

Industry Revolution 4.0 (IR 4.0) is originated from the idea of *Industrie 4.0* proposed in German to be used as a high-tech strategy of a project. *Industrie 4.0* aims to shift German manufacturing into making cyber-physical systems and Internet of Things (IoT) its core as well as to focus more on production, people, environment, and security. Unlike the previous Industrial Revolution, IR 4.0 aims generally to transform industries while assisted by information and communication technology specifically intelligent machines. According to Aida & Norhayati (2018), artificial intelligence and digital-physical frameworks-controlled IR 4.0 as they make the human-machine interface more common.

IR 4.0 demanded that human capital be equipped with not only the high-tech industrial set but also the capability to think critically, innovatively, and creatively. According to the Founder and Executive Chairman of the World Economic Forum, Professor Klaus Schwab, IR 4.0 urged university students to develop 4C elements which are

Critical Thinking and Problem Solving, Communication, Collaboration, and Creativity. This demand has urged the education industry to cater to the future market necessities and make changes based on the design principle of IR 4.0. In 2018, the Ministry of International Trade and Industry (MITI) has produced the National Policy of Industry 4.0. In this policy, MITI addressed its concern on the challenges faced in coping up with the market requirement of the human capital of IR 4.0. MITI stated that Malaysia has a prominent number of required talents, skills, and knowledge shortage for IR 4.0.

To face this upcoming challenge, the Malaysia Ministry of Education (MoE) (n.a) has developed the Malaysian Education Blueprint 2013-2015. Among the outcome stated in the blueprint is to develop thinking skills consisting of life-long learning, critical thinking, reasoning, creative thinking, and innovation. Despite that, Meylind, Faaizah & Naim (2016) expressed their concern that education needs to adjust their method of training students to prepare them for IR 4.0. Even Professor Klaus Schwab (n.a) stated his concern that organization (in this case education) are unable to cope up with changes from IR 4.0. Based on this concern, a hypothesis can be formed stating that there are possibilities that students from higher education are unaware of IR 4.0. Therefore, this study aims to investigate awareness of the arrival of Industrial Revolution 4.0 amongst students in the higher learning institution.

Literature Review

Education runs in 21st century based on embracing the digital technology as the future generation is expected to cope with the race of the fast-changing world nowadays. As they have to live with the changing times, they are molded to be tech-savvy especially in dealing with the education sector. Higher Education Minister, Dato' Seri Haji Idris Bin Jusoh recently mentioned that higher education institutions have to be prepared to adapt and make changes in their curriculum and the way to teach and deliver the syllabus to the students so that the graduates are eligible to fill in demand jobs which are going to emerge in future. In the Education 4.0 framework, challenges of the fourth Industrial Revolution (IR 4.0) are addressed in relation to the Malaysia Education Blueprint for Higher Education 2015-2025. The future graduates who are equipped with ICT and collaborative skills are also required to possess critical and creative thinking and communication skills. Statistics depict that the number of unemployed graduates in Malaysia is tormenting. Employers are seeking for fresh graduates who are provided with the capabilities to face the industry compared to the passive ones as they are expected to function adequately in their job. In order to meet this demand, educators have to make sure that the education framework provided for the students as well as their way of delivering are relevant in accordance with IR 4.0. Awareness of the students towards this emergence should be enlightened in order to guide the students to lead in the correct path in their learning period. The majority of previous researches on IR 4.0 and education focus on effect/impact and current trend. Meylind, Faaizah & Naim (2016) studied the current trend overview of Malaysian higher education system towards IR 4.0. They explored their data from the perspective of Malaysian and discovered that the Malaysian government is ready for IR 4.0 and Education 4.0 and is making necessary preparation to welcome them. This preparation in education can be seen through the redesigning of the higher education system and the creation of Malaysia Education Blueprint 2015-2025.

Anealka (2018) discussed the nine trends of Education 4.0 to be used as ideas for teaching language classrooms. She revealed that educators need to adopt technologies in their teaching as proposed in Education 4.0 as this idea describes the learning preference of students in the current generation. She suggested that the flipped classroom approach is adapted into learning activities to support students' Social-Emotional Learning. Generally, Anealka (2018) urged educators to welcome the changes proposed by Education 4.0 to build a creative teaching design.

Aida & Norhayati (2018) discusses the repercussion of IR 4.0 in the education system. They revealed that information management is the biggest issue faced by the education industry in Malaysia. They shared their concern on how education organization could manage big data and Artificial Intelligent (AI) ethically. Aida & Norhayati (2018) suggested that Malaysia needs to form a Code of Ethics and Responsible Conduct to monitor IR 4.0 advances.

Benešová & Tupa (2017) wrote their paper on the identification of job roles in companies. They discovered that there will be a requirement for companies to hire educated and skilled workers when it comes to the field of computing, self-learning algorithms, and data analysis. They discussed that in the future there will be needs to create new curricula and disciplines, as well as transforming existing ones.

Puncreobutr (2016) discussed the new challenges of learning from Education 4.0. He stated that learning management needs to transform according to the changing behavior of the learner. Learning management needs to take into account not only 21st Century Skills but also Social & Virtual Learning. However, this proves to be a challenge to learners' ability to discover further.

As mentioned before, the current studies on education and IR 4.0 revolves around effect/impact and current trends. Every study discussed here emphasizes the challenges faced by education industries from IR 4.0 and how to overcome them. These studies support the concern stated by Professor Klaus Schwab (n.a) and specifically explored certain issues of the education for IR 4.0. However, studies do not look at students' perspectives and research on IR 4.0 awareness has become a part of the research instead of the main focus. Thus, this study catered to the lack of studies that involve students' perspective and focuses on the IR 4.0 awareness aspect of education.

Research Objectives

The main purpose of the study is to inspect the readiness of the arrival of Industrial Revolution 4.0 among Diploma students in a higher learning institution. Hence, the objectives of the study are to:
1. Identify the percentage of Diploma students who are ready for the arrival of Industrial Revolution 4.0.
2. Discover how Industrial Revolution 4.0 can assist the students' learning.

Research Questions

This study pursued in answering the following research questions:
1. What are the percentages of students' readiness for the arrival of Industrial Revolution 4.0?
2. How can Industrial Revolution 4.0 assist the students' learning?

Methodology

Sampling

This study employed cluster random sampling technique in order to gather all the data. In this study, the respondents were 50 Diploma students in a same higher learning institution. The respondents were required to answer three questions which being asked in the questionnaire.

Research Instrument

This study aimed to explore on the readiness of the Diploma students towards Industrial Revolution 4.0 using a set of questionnaires. Three questions were being asked to 50 Diploma students and this instrument has provided quantitative and qualitative data which then analysed thematically.

Results

Research Question 1

Are the students ready for the arrival of Industrial Revolution 4.0?

Responds	Percentage
Yes	95%
No	5%

Table 6.1.1

Based on Table 6.1.1, 95% of the 50 respondents responded that they are ready of the arrival of Industrial 4.0 meanwhile 5% responded negatively about it. Although majority of the respondents gave positive responds, most of all the respondents did not really understand what 'Industrial Revolution 4.0' is and the researcher had to explain in details of what does the subject matter means. Then only the respondents were able to elaborate their responses in the next question.

Research Question 2

How can Industrial Revolution 4.0 assist the students' learning?

Based on the responses done by 50 respondents, there are a few areas on how Industrial Revolution 4.0 assists their learning. These responses are analysed thematically and simplified into few themes and projected in Table 6.2.1

Areas that assisted by IR 4.0	Percentage
Motivation	15%
Student engagement	15%
Interest	25%
Varying learning styles	45%

Table 6.2.1 Areas assisted by IR 4.0

According to Table 6.2.1, it is exhibited that IR 4.0 has provided the students with various learning styles (45%) where they are able to explore not just in the classroom but in the industry field. One of the respondents (Respondent 19) stated that he experienced a lesson where his lecturer assigned the students to come out with

an innovation which has not been in a normal physical class before. Other than that, Respondent 24 specified there was once when one of her lecturers in English classroom asked the students to think of a product to be marketed to the new millennials and then they have to speak in front of the class about the product, and according to her, it was a fun activity as it initiated their confidence to speak in English besides letting them practice their communication skill and also the students' creativity. Secondly, interest is the second highest factor of all (25%). Respondent 13 claimed that Industrial Revolution 4.0 does attract her to participate in a more active manner as it provides space for her to explore on her creativity by assistance of the internet. Students' engagement and motivation marked the same number (15%) of the total respondents' answers.

Discussion

This study was conducted to obtain information on the readiness of Diploma students on the arrival of Industrial Revolution 4.0. The participating students' readiness is at high level yet it can be concluded that they are still not aware of the concept of the fourth industrial revolution as they still have to be explained on the subject matter before they can start answering the next subjective question. This means that more works need to be done and more efforts have to be implemented in order to make the students to be ready to learn based on the IR 4.0 requirements. The findings of this study also assist the academicians to discover novel ideas in designing updated lessons in order to meet the students' needs in coping with the demands in IR 4.0 era based on the assistance as stated in Table 6.2.1. These findings suggest that the students are actually ready to learn based on IR 4.0 concept, but they are not exposed to it in a maximum way. They still need to be guided on the importance of current technological development in their learning. On the other hand, the lecturers themselves should also be ready to face this emergence of teaching method. They should practice IR 4.0 elements in their teaching process so that the students' learning process based on the concept of the current industrial revolution is effective and useful for them especially when they are working in the future.

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