Research and Innovation in Technical and Vocational Education and Training Vol. 1 No. 2 (2021) 261-267

RITVET

Homepage: http://publisher.uthm.edu.my/periodicals/index.php/ritvet
e-ISSN : 2785-8138

Level of Knowledge and Readiness of FPTV Final Year Students on Industrial Revolution 4.0

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DOI: https://doi.org/10.30880/ritvet.2021.01.02.031
Received 06 January 2021; Accepted 23 May 2021; Available online 28 September 2021

Abstract: The industrial revolution 4.0 was a revolutionised manufacturing technology that allows the manufacturer company to use internet connectivity to gather a large amount of data to develop customised products and services. Meeting the challenges of IR 4.0, all students in Higher Educational Institutions need to get out of their comfort zone and be prepared for this new era. Lack of creative and innovative thinking along with incompetence in the subject area indicates a lack of knowledge and readiness for IR 4.0. This study aims to examine the level of knowledge and readiness among final year students in Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn, Malaysia (UTHM) to face the challenges of Industry Revolution 4.0 and also to see the relationship between knowledge and readiness to the Industrial Revolution 4.0. This descriptive study uses questionnaires based on Likert Scale. The data obtained were processed and analysed using the Statistical Package for the Social Sciences (SPSS) software. This study was conducted on 144 FPTV final year students from all courses. The results show that the level of knowledge of industrial revolution 4.0 is high (*M=4.52, SD=0.30*). Further findings on the level of readiness for the industrial revolution 4.0 also show a high level (*M=4.14, SD=0.50*). Results of the Spearman correlation indicated that there was a significant weak relationship between the level of knowledge and level of students' readiness towards IR4.0, ($r = .42$, $p < .005$). These results show that FPTV final year students have prepared themselves with the relevant knowledge and skills to become quality human capital to withstand the changing industrial revolution.

Keywords: Industrial Revolution, Knowledge, Readiness

1. Introduction

The Industrial Revolution 4.0 will fundamentally alter the human living ways, work and communication. These revolutions are using automation, simulation, data analysis, internet connection and other physical processes to improve the efficiency of the manufacturing processes. Machines can

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be streamlined automatically to meet human needs through systems such as Cyber-Physical Systems (CPS), advanced management programs, the Internet of Things (IoT) or Industrial Internet (Rifkin, 2014). This means all sectors, including the education sector, needs to prepare knowledge and study platforms to use all of these new technologies

According to Radin and Yasin (2018), low levels of creativity and innovation among students producing something is one of the problems that need to be handled. The new learning trend that combines MOOC (Massive Open Online Course) and traditional education will help students adapt to the IR 4.0 technology (Vu Anh & Le Quoc, 2019). With this new learning method, the students can acquire both skills and knowledge through mobile connectivity and cloud computing apps. However, this learning method will require some time to be fully realised and adapted (Becker, 2012)

Kergroach (2017) stated that the transformation of technologies on IR 4.0 shows a massive impact on the structure of labour qualification, skills on demand and policy challenges. Many studies related to IR 4.0 have highlighted the lack of skills as the reason why graduates are not employed by employers (Ahmad et al., 2015). This shows the importance of readiness among students to adapt to challenges and interdisciplinary, thus fulfilling the job requirements. Furthermore, students need to use all the facilities given by the institute to gather new knowledge and skills applicable in the future. Therefore, the level of knowledge and readiness among FPTV final year students on IR 4.0 needs to be measured as well as the relation between these levels.

2. Methodology

Marican (2006) states that research methodology is an action plan that details how a study is conducted. The study was descriptive research using a survey instrument. Questionnaires were used to obtain feedback from respondents to identify the level of knowledge and readiness towards Industrial Revolution 4.0. The data obtained from this random sample are then analysed, and the results were analysed again using statistical tests to come out with the conclusion to the objectives.

2.1 Population and sample

In this study, the researcher's population comprises students of Bachelor of Vocational Education in a Malaysian Technical University. The total number of samples involved is 144 students, covering 7 fields of study namely Catering, Electrical and Electronics, Building Buildings, Creative Multimedia, General Machines, Welding and Air Conditioning.The study population comprises FPTV final year students at University Tun Hussein Onn Malaysia, Johor. The number for the samples in this study is based on Krejcie Morgan's table to determine which sample represents the population accurately. A total of 144 people participated in the study. The sample of FPTV final year students consist of 76 males and 68 females. Table 1 shows the number of population and sample that has been selected.

Table 1: Number of population and sample

Program	Population	Sample
General Machining	24	20
Building Construction	18	10
Catering	30	20
Welding and Metal Fabrication	31	20
Electrical and Electronic	22	12
Multimedia Creative	72	32
Refrigeration and Air-Conditioning	39	30
Total	236	144

2.3 Research instrument

This study uses a close-ended questionnaire and is divided into three (3) parts that carry out a different purpose. Part A contains four (4) items related to student demographics. Part B contains eight (8) items that include questions related to knowledge of Industrial Revolution 4.0 and part C contains ten (10) items related to the readiness of students for Industrial Revolution 4.0. The answer choices for the questions in this section are designed using a nominal scale of which respondents are required to fill in the blank space and indicate (/) in the box provided. The researcher uses Likert Scale, which consists of five types of scale representing the level of agreement of the respondents, as shown in Table 2. This is supported by Budiaji (2013) which states that using a number of scales such as 3, 4 and 5 produces an index reliability, and validity. The findings from the questionnaire will be analysed using SPSS software.

Table 2: Score value scale

Score Value	1	2	3	4	5
Scale	Strongly Disagree	Disagree	Intermediate	Agree	Strongly Agree

2.4 Instrument validity and reliability

For the quantitative study, validity and reliability of the study is very important (Dawson, 2009). Validity can be defined as the agreement about the item's quality and the test score is considered to be a suitable measurement (Adisa et al., 2020). In this study, the researcher uses two types of validity: face validity and content validity. Face validity aims to examine the questionnaire in terms of the usage of appropriate language and its layout. Content validity pertains to the degree, in which the instrument has been thoroughly assessed, can be measured. Thus, the researcher has the questionnaire examined by three lecturers in the Faculty of Technical and Vocational Education, Universiti Tun Hussien Onn Malaysia.

2.5 Data Analysis

The data that has been collected will be analysed by using an SPSS application. The researcher divided the data analysis into two methods. First, to measure the level of knowledge and readiness among FPTV final year students on IR 4.0, the researcher will be using the mean score in this study. The results of the analysis are determined by score level according to the Table 3.

Table 3: Score level

Total Score	Level
3.68-5.00	High
2.34-3.67	Moderate
1.00-2.33	Low

The Spearman Correlation test then is used to identify the relationship between two variables using the ordinal scale as the measurement scale in which the variables involved are knowledge and readiness. Before the data can be used to analyse the relation between each variable, the researcher needs to ensure the data meet the normality assumption. To support the normality of the study data, the researcher refers to Shapiro-Wilk calculations as shown in table 4.

Table 4: Shapiro-Wilk (Sig.)

Item	Shapiro-Wilk(Sig.)
Knowledge	0.00
Readiness	0.00
Total	0.00

The Shapiro-Wilk normality test explains that if the significant value is more than (> 0.05), then the data is normal. However, while the significant value is less than 0.05 (<0.05), the observed data is not normal. Therefore, the results from this test found that the distribution data were not normal.

3. Results and Discussion

In this section, the researcher has divided into three parts of data interpretations. Every part will obtain a different result that will carry out each conclusion. The result of FPTV final year student's knowledge and readiness on IR 4.0 is determined with a table's assistance.

3.1 Level of students' knowledge on IR 4.0

A total of 8 items for students' knowledge of IR4.0 were analysed. Overall, the mean value of FPTV's final year students' level of knowledge in terms of industrial revolution 4.0 is high (*M = 4.52, SD = 0.30*). Specifically, item B1 "I've heard about the industrial revolution 4.0", shows the highest mean (*M = 4.69, SD = 0.465*). Meanwhile, item B6 "I was exposed to the subject of Industrial Revolution 4.0", has the lowest mean value (*M = 4.30, SD = 0.517*). Table 5 shows the results of the analysis.

The study's findings show that overall, respondents have a high level of knowledge regarding the industrial revolution 4.0. It is possible that the respondents consisting of FPTV final year students have knowledge of the industrial revolution 4.0 due to the new learning method that combines both traditional and MOOC which has already been applied to every subject in every course from the beginning of the semester. This allows the students to blend in with these new learning trends. With individual learning education becoming popular nowadays, higher education institutions must better understand learners' study techniques by providing them with new learning platforms (Vu Anh & Le Quoc, 2019).

Table 5: Mean Range Level Knowledge

Item	Mean (M)	Standard Deviation (SD)	Level
B1. I've heard about the Industrial Revolution 4.0	4.69	0.465	High
B2. IR4.0 is an era of digital technology and automation	4.65	0.546	High
B3. IR4.0 uses the Internet of things as the primary medium	4.59	0.493	High
B4. IR4.0 requires interaction with robots	4.66	0.475	High
B5. I know the elements of the Industrial Revolution 4.0	4.40	0.557	High
B6. I was exposed to the subject of Industrial Revolution 4.0	4.30	0.517	High
B7. I was prepared with IR4.0 related skills with the course I took	4.38	0.488	High
B8. I know the challenges of the Industrial Revolution 4.0	4.52	0.567	High
Overall average	4.523		High

The findings are not consistent with Abd Ghoni et al., (2018) findings where they found out that Polimas' fourth-semester students' knowledge of industrial revolution 4.0 was modest. Supported by a survey conducted by Ilias and Ladin (2018) on the Ipoh campus Teacher Education Institution (IPG) students also found that the level of knowledge of the industrial revolution 4.0 to be moderate. This may be due to several factors that need to be considered, such as the different syllabus provided, the disclosure of the innovation programs and the equipment being supplied around the campus. FPTV also provides and creates opportunities or programs as an exposure for the students. One of them is a subject

syllabus based on information technology and the main campus; UTHM has created programs related to creativity and innovation based on industrial revolution 4.0 where the entire faculty should be involved.

3.2 Level of student's readiness towards IR 4.0

A total of 10 items for students' readiness towards IR4.0 were analysed. Overall, this section's mean value was high (*M=4.14, SD = 0.50*). The highest mean value is item C10 "I'm interested in delving more deeply about the industrial revolution 4.0", (*M=4.66, SD = 0.605*). While the lowest mean interpretation is for item C5 "IR4.0 is a technological capability that does not directly involve humans", (*M= 3.74, SD = 1.327*). Table 6 shows the results of the analysis.

Furthermore, the study also found that students have high levels of readiness towards the Industrial Revolution 4.0. The findings are in line with the findings of Ahmad et al. (2019) where they identified that all the students are ready towards Industrial Revolution 4.0. One of the factors that contribute to this finding is due to the technical skills that FPTV students have that are related to the job task required during Industrial Revolution 4.0. The correlation result confirmed that knowledge on industrial revolution 4.0 has a weak relationship with the readiness among students. Researchers argue that knowledge and readiness are two related things. With specific knowledge, the individual will be better prepared to face new things. According to Haberman (2001), a person cannot master something well if their knowledge does not fully master what they learn and will cause them to be unwilling to do something unskilled. This, to some extent, shapes the individual's competence related to what they are involved.

Table 6: Mean Range Level Readiness

Item	Mean (M)	Standard Deviation (SD)	Level
C1. I got information about IR4.0 during a seminar	3.77	1.049	High
C2. I learned about IR4.0 through the subject matter in the classroom	4.14	0.735	High
C3. I got information about IR4.0 through media	4.45	0.565	High
C4. I got information about IR4.0 through friends	4.22	0.759	High
C5. IR4.0 is a technology capability that does not directly involve humans	3.74	1.327	High
C6. I understand about IR4.0	3.99	1.071	High
C7. I understand the challenges of IR4.0 in the industry	3.92	1.034	High
C8. I am ready to receive IR4.0 related information at the industry level	4.52	0.567	High
C9. I am ready for the challenges of the industrial revolution 4.0	4.35	0.713	High
C10. I'm interested in delving more deeply about the industrial revolution 4.0	4.66	0.605	High
Overall average	4.1438		High

3.3 Relationship between knowledge level and readiness level among final year students toward Industrial Revolution 4.0

A Spearman Correlation analysis is used to test the relationships between the level of knowledge and readiness of the student. The result for this study sample (N = 144) indicates that there is a significant weak correlation between students' knowledge (M = 4.52, SD = 0.298) and students' readiness (M = 4.14, SD = 0.502) with ($r = 0.42$, $p < 0.05$) (see Table 7). This result also indicates that there is a significant relationship between the level of knowledge and level of readiness. That being the

case, Ho1 affirmation that stated that there was no significant relationship between the level of knowledge and the level of readiness of FPTV final year students in facing the industrial revolution 4.0 is rejected.

Table 7: The correlation between students' knowledge of the industrial revolution 4.0 and student readiness of the industrial revolution 4.0

Level of Knowledge and Readiness towards the Industrial Revolution 4.0	r = 0.42 sig = 0.000 N = 144

4. Conclusion

Industrial Revolution 4.0 has changed the lifestyle and the way of thinking about education. The change that happened is not just a lifestyle and a way of thinking, but an evolution of the concept of education. This change occurs clearly to ensure all students have a piece of knowledge and readiness before they graduate. With all the knowledge about IR 4.0, they can adapt and improve themselves to change their job requirement, problem-solving, and critical thinking.

This study found that FPTV final year students have a high level of knowledge and readiness to face the industrial revolution 4.0. This is because all students are already aware of the importance of experience in this new industrial revolution technology. This also becomes a trend for the student community to become more creative and have critical thinking ability and complex problem-solving. In addition, the researcher has found that there is a significant relationship between knowledge and readiness. Therefore, it is an aspiration that this study will assist stakeholders in implementing improvements to enhance their efforts in producing quality human resources to improve the industry and the country's economy.

Acknowledgement

The authors would like to thank the Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia for its support.

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