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GENDER INFLUENCES ON ACADEMIC PERCEPTION OF EDUCATION 4.0 IN A COMPREHENSIVE UNIVERSITY

Azuraidah Taib (a)*, Yunita Awang (b), Shazalina Mohamed Shuhidan (c),
Zaiza Norsuriati Zainal@Zakaria (d)
*Corresponding author

(a) Universiti Teknologi MARA, Faculty of Accountancy, Universiti Teknologi MARA, Cawangan Terengganu, Kampus Dungun, Sura Hujung, 23000 Dungun, Terengganu, Malaysia, azura015@uitm.edu.my
(b) Universiti Teknologi MARA, Faculty of Accountancy, Universiti Teknologi MARA, Cawangan Terengganu, Kampus Dungun, Sura Hujung, 23000 Dungun, Terengganu, Malaysia, yunita@uitm.edu.my
(c) Universiti Teknologi MARA, Faculty of Accountancy, Cawangan Selangor, Kampus Puncak Alam, 42300 Bandar Puncak Alam,Selangor, Malaysia, shazalin@uitm.edu.my
(d) Universiti Teknologi MARA, Faculty of Accountancy, Universiti Teknologi MARA, Cawangan Terengganu, Kampus Dungun, Sura Hujung, 23000 Dungun, Terengganu, Malaysia, zaiza676@uitm.edu.my

Abstract

The emergence of the Fourth Industrial Revolution (IR 4.0) has significantly contributed to the current development and landscape of the world. Education is one of the disciplines that has been impacted by this revolution. IR 4.0 has influenced the production of Education 4.0 which involves the creation of new innovative opportunities by combining human and technological potential. A country's performance in addressing IR 4.0 is determined by the quality of educators. Having competence as well as the ability to adapt to new technology and global concerns is essential for educators. Based on that, new educational knowledge and literacy should be instilled in every educational institution. This study attempts to investigate the influence of gender on academic perception of Education 4.0. The quantitative approach by means of questionnaires is used to gauge the academics' perceptions about Education 4.0. The questionnaires, which are in Google Forms, were distributed to 352 academicians using WhatsApp and Telegram at a selected Comprehensive University (CU). A total of 127 people took part in the survey. According to the data, the majority of respondents have a positive attitude toward Education 4.0. Education 4.0 appears to be important to CU students; increased university costs; changes in the classroom learning environment; larger societal benefits; efficiency of the teaching and learning process; and, finally, its evolution process in developing wiser and better educators and students. Further analysis of male and female relationships shows no difference in the perception with respect to gender.

Keywords: Academician, Education 4.0, Gender, Industrial Revolution 4.0, Perception

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1. Introduction

The industrial revolution was an economic transformation that began in northwestern Europe in the 18th century. The revolution accelerated in the 19th century and spread worldwide in the 20th century (McCloskey, 1981). An industrial revolution of this magnitude was identified as the catalyst for changes in today's global economic and technological advancement. In the context of IR4.0, all aspects of business and industry are represented as a new wave of technology.

IR 4.0 has an impact on business, governance, and people, with no exceptions for the education sector, giving rise to the term Education 4.0. In other words, Education 4.0 was a reaction to IR4.0's demands, in which humans and technology collaborated to create new possibilities (Anealka, 2019). There are nine trends in Education 4.0 which contribute to the changes in major learning responsibilities, like the change in roles from instructors to learners in the learning world or from school children to business executives. The trends are varied time and place, personalised learning, freedom of choice, project-based learning, field experience, data interpretation, drastic changes in exams, student ownership, and increase importance of mentoring (Fisk, 2017). Although technological advancement did not change the underlying ethos of the education system, it did enable teaching, learning, and assessment to be handled by machines (Intelitek, 2018).

Education 4.0 reflects the transition from the traditional “chalk and talk” method to immersive learning via digitized platforms. Students are trained rather than taught because they should be able to learn on their own rather than being taught by teachers who use a limited traditional methodology. Similarly, in accordance with IR4.0, students should be exposed to as many opportunities as possible to prepare for future occupations. To prepare students for the demands of the 21st century labour market, there should be a collaboration between Education 4.0 and IR 4.0. When it comes to technology in education, teachers should be supportive of the shift and never perceive it as a threat to the traditional teaching profession (Fisk, 2017). There should also be changes in the role of teachers as well as the ecosystem of universities to meet the needs of the current technologically driven environment (Pauline & Norwaliza, 2020).

Thus, transformation in Higher Education is expected. The Ministry of Higher Education (MoHE) has recently introduced the Malaysia Education Blueprint 2015-2025 for digitalised and balanced education philosophies (Kassim & Teng, 2018). As the education sector is affected by IR4.0 demands, many parties namely the education authority, management team, academics and students must be in support of the Education 4.0 process. There are expectations in the education system to manage and produce graduates who can adapt to the needs of the industry (Kassim & Teng, 2018). It is important that issues regarding Education 4.0 are understood based on the perspective of academics as they have a significant role in implementing changes to the education sector in terms of the curriculum, system, and the environment. Based on that, the aim of this study is to identify the perception of academics at a comprehensive university regarding Education 4.0. This study also attempts to determine the relationship between gender and the level of perception of the academics on Education 4.0. It is important to identify the perception of academics as they will have to utilise the digital tools to fit with the learning preference of 21st-century or Gen Z students who are raised with technology. The structure of this paper is as follows. The next section discusses the literature review followed by an explanation of the research

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methodology. The following part discusses the research findings, while the final section summarises the study's conclusions.

2. Literature review

2.1. Education 4.0

Terms in Information and Communication Technology (ICT) such as Big Data, the Internet of Things, virtual and augmented reality, and machine learning have recently become essential aspects of the industry value chain (Mogos et al., 2018). The advancement in technology brought about by IR4.0 has an impact on education. In accordance with IR 4.0, advancements in educational teaching and learning methods have resulted in a shift away from traditional face-to-face delivery and toward more interactive methods. The transition of technology resulted in significant advancements in every business domain, including education, giving rise to the buzzword "Education 4.0". The collaboration between humans and technology in Education 4.0 opens new opportunities as a result of the requirements of IR4.0.

Education 4.0 is a new age which involves the integration of technology into most of the aspects of educational pedagogy, where a greater focus is given on internet usage and virtual environments (Meylinda et al., 2018). Technology in education has created a new paradigm for teaching and learning. Academicians have shifted to various tools and technologies to enhance their communication with audiences and having an interactive engagement with them. Today’s current teaching and learning in many educational institutions are turning to online delivery of courses such as Massive Open Online Courses (MOOC), blended learning, electronic books, simulations, text messaging, podcasting, blogs and webs. Online learning is done via technology such as computers or mobile devices, that connect to the internet, and utilises a learning platform (Moore et al., 2011). Online courses are designed as a platform to share information, to cater to the various learning styles of students, and to provide choices in representing information.

Learning management is the focus of Education 4.0, where students can develop their skills by utilising new technology as a response to societal changes. Education 4.0 also allows teachers and students to utilise information and technological advancement to support the teaching and learning process (Puncreobutr, 2016). The learning management of Education 4.0 is to equip individuals with life and innovative skills such as critical thinking, design and selective thinking, productive and problem-solving thinking, entrepreneurial thinking, responsible thinking, social conscience thinking, and scenario thinking. These 21st-century skills also include skills to develop a nation and its people with critical thinking, creativity and innovation, cross-cultural understanding, information and media literacy, and career and learning skills (Puncreobutr, 2016). By considering all the factors, the Ministry of Higher Education (MoHE) has come out with the Malaysia Education Blueprint 2015-2025 as an initiative to align Malaysia’s education system with global trends.

Techniques involving teaching and learning are also essential in the global evolution of education. Siti Hajar (2019) suggested that one of the methods to improve Malaysia’s education system is to increase the usage of technology into the teaching and learning process. This is required to help students learn better than conventional teaching methods. Aligning Education 4.0 with IR4.0 is thus critical to ensuring

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that students are prepared to meet the digitised market opportunity. The requirement is consistent with the requirement of IR4.0, which states that universities must be relevant in the industry. In aspects of lecturers' teaching abilities, lecturers are anticipated to use a variety of teaching strategies in each session to affect the developing active involvement that met the students' demands and reflected the Education 4.0 attributes (Anggraeni, 2018). There are clearly huge challenges faced by scholars in meeting the needs of Education 4.0 in the aspects of knowledge and skills.

There are nine trends associated with Education 4.0 proposed by Fisk (2017). These trends are formed based on the changes in teaching and learning; they are:1) Learning can be conducted anywhere, 2) Learning is personalised according to students' needs, 3) Students can choose what they want in learning, 4) Students are involved in more project-based learning, 5) Students experienced more hands-on learning via internship and mentoring, 6) Theoretical knowledge are applied to real-life experience, 7) Method of assessment is different than in conventional platforms, 8) Students' input are taken into account when constructing the curricula, and 9) The responsibility of learning is switched from the instructor to the students. These trends indicate the necessity for a change in the teaching and learning process where they place a great emphasis on both the teachers and the students' knowledge and skills.

As a result, academics and educators should take the initiative to become more technologically savvy. Consequently, to provide new skills and knowledge, universities must provide educational trends that allow for the combination of technology and modern industry that is pertinent to societal needs (Mogos et al., 2018).

3. Perception on Education 4.0

Education 4.0 and IR 4.0 are becoming common to the academic world, especially to the students. The awareness about Education 4.0 and IR4.0 among these groups is significantly shown in past research (Omar & Hasbollah, 2018; Rafiq, 2019). This may be a result of universities' exposure to their academics and students. Rafiq (2019) conducted a study on the readiness and potential economic effects of IR4.0 of Malaysian public university students. It was found that most of the respondents (90%) know and possess a certain level of understanding about IR 4.0 as well as future expectations on it. This may indicate that Malaysian public universities are aware of IR 4.0 and exercising curricula in accordance with Education 4.0. It also proved that the Malaysian government (Ministry of Higher Learning Institution and Ministry of Education) is persistently aware and currently preparing to welcome the IR 4.0 and Education 4.0 to the current practice (Maria et al., 2018). However, what about the perception of academics? Do they perceive Education 4.0 as compulsory to them? Do they have a positive perception or rather see education 4.0 as a threat to them? The emergence of Education 4.0 is a response towards IR 4.0 which involves the usage of technology in the process of e-learning. In the era of Information and Communication Technology (ICT), computers, the Internet, radio, as well as other electronic devices are the technological tools and resources that are used in the communication, creation, dissemination, storage, and management of information. As tools and resources for educational change and reform, ICT helps expand access to education, strengthen and promote educational quality (Kisla et al., 2009). Moreover, e-learning platforms are highly preferred by students if compared to other learning platforms and tools (Bujang et al., 2020). Thus, this study will focus on the perception of educators regarding Education 4.0 where they are

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required to relearn and prepare themselves with the digital tools to adapt to the learning preference of the 21st-century or Gen Z students.

Omar and Hasbollah (2018) studied the awareness, perception, and behaviour of accounting students towards IR 4.0. It was found that most of the students are aware of the emergence of IR 4.0 albeit lacking in detailed information regarding it. Interestingly the students are very much interested to know further details of IR 4.0. A survey on the perspective of Millennials regarding the readiness and potential economic effects of IR 4.0 found that 40% of the respondents agreed that Malaysia's infrastructure is ready to accept IR 4.0 (Rafiq, 2019). Thus, the Ministry of Education should provide adequate facilities for learning institutions to ensure that they can effectively use IR 4.0 technology (Siti Hajar, 2019). A recent study by Rosnah and Mahaliza (2020) found that universities and their academicians are ready to embrace the challenges of Education 4.0.

3.1. Gender and perception

Another interesting characteristic in the development of Education 4.0 or specifically online teaching and learning is the different perception among males and females. Cai et al. (2017) noted that the differences in attitude regarding the usage of technology in education between genders have long been discussed. Over the years, there are different views between genders, with some studies showing that males are more favorable to online teaching and learning environments. A study regarding different genders in self-regulated online learning by Yukselturk and Bulut (2009) found that there are no significant differences between males and females in terms of motivational belief, variables of self-regulated learning, and programming achievement. A similar finding was obtained by Hung et al. (2010) which indicated that no statistical difference was present among male and female students on the scale of online readiness. However, high achieving students portrayed a higher level of readiness in self-directed learning, online communication self-efficacy, learning motivation, and learner control aspects.

Ashong and Commander (2012) found that the perception of students regarding online learning is influenced by both ethnicity and gender. Females possessed a higher level of positive perception than males in terms of the elements of the online learning environment which are teacher support, student interaction and collaboration, personal relevance, authentic learning, and student autonomy. Another study by Hung (2016) regarding the readiness of teachers to conduct online learning found that male teachers portrayed a statistically higher level of readiness in the aspect of transfer learning of self-efficacy compared to female teachers. According to Tena et al. (2016), gender differences were shown to be significant in two areas which are communication tools and the utilisation of technology in teaching. The study showed that male lecturers possess a higher level of knowledge for the communication tools whereas female lecturers utilises more technology in their teaching.

Cai et al. (2017) conducted a meta-analysis study involving 50 empirical research on gender differences. They concluded that, males still exhibit a higher level of positive attitudes towards the utilisation of technology to females. Park et al. (2019) conducted a study on the moderation of gender differences in an integrated model. The findings indicate that males are more affected by the perceived usefulness on the intention to utilise a Technology Acceptance Model (TAM). The same can be said for

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male students and educators in the context of mobile learning, where they were shown to be more likely to utilise the systems in mobile learning than their female counterpart (Al-Emran et al., 2019).

Based on the latest trend involving Education 4.0 and gender difference, it is considered an appropriate time to conduct the current research which aims to explore the perception of academics to successfully implement Education 4.0, which is in line with the technological requirements of the 21st century. This study focusses on the level of perception and the influence of gender among the academics at a comprehensive university. Thus, this study hypothesised that:

H1: There is a significant positive relationship between gender and the perception of academics towards Education 4.0.

4. Method

4.1. Sample and data

In Malaysia, there are three categories of public higher education institutions which are: research universities, institutions that focus largely on research; comprehensive universities, institutions that offer a wide range of courses and subjects; and focused universities, institutions that focus on certain disciplines that are relevant to their foundation (Kementerian Pendidikan Malaysia Pendidikan Tinggi, 2019). This study involves academics at Universiti Teknologi MARA, one of Malaysia's comprehensive universities.

This study employed one of the types of non-probability sampling which is purposive (judgement) sampling as the sample was chosen based on a specified criterion. Purposive sampling "is confined to specific types of people who can provide the desired information, either because they are the only ones who have it, or conform to some criteria set by the researcher" (Sekaran & Bougie, 2016, p. 276).

4.2. Measures

This research used a quantitative approach by means of questionnaire to gauge the academicians' awareness and perceptions about Education 4.0. The questionnaire was distributed to the population of 352 academicians at UiTMCT in three branches of Dungun, Kuala Terengganu, and Bukit Besi. Consequent to a support to the digitalization within IR4.0 the questionnaires were distributed in google-form format with the minimization of hard copy. The questionnaire items focused on general awareness and perception of Education 4.0 rather than looking into any specific IR4.0 applications or related software. The questionnaires were designed to gather demographic information from respondents as well as academics' perspectives on Education 4.0. The data were gathered from 127 respondents.

5. Result and Discussion

The Statistical Package for Social Science (SPSS) was used to analyse the collected data. A frequency distribution and a descriptive analysis was conducted to indicate the characteristics of the

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respondents and to determine the educators' perceptions regarding Education 4.0. To determine whether there is a significant difference in perception in terms of gender, an independent t-test was used.

5.1. Respondents' demographic information

Table 1 shows the demography of the respondents. Most of the responders (79.5%) are male, while the rest are female (20.5%). The respondents are made up of 2.4% for those who are less than 30 years old, 52.4% for those who are between 31 to 40 years old, 33.3% for those who are 41 to 50 years old, and 11.9% for those who are more than 51 years old. Many of the respondents have a master's degree (89.8%), while 10.2% of the respondents have a PhD qualification. As for their faculties, most of them are from the Faculty of Accountancy (20.5%) while the least came from faculty of Chemical Engineering (0.8%). The respondents profile revealed that the respondents are highly qualified academicians who serve in various faculties and thus indicate their credibility to provide invaluable feedback on Education 4.0.

Table 1. Respondent Profile

Respondent profile		Frequency	Percentage (%)
Gender	Male	101	79.5
	Female	26	20.5
Age (Years)	30 and below	3	2.4
	31-40	66	52.4
	41-50	42	33.3
	51-60	15	11.9
Qualification	Master's degree	114	89.8
	Ph.D.	13	10.2
Faculty	FKE	22	17.3
	FKK	1	0.8
	FKM	5	3.9
	FP	26	20.5
	FPHP	15	11.8
	FPP	15	11.8
	FSG	2	1.6
	FSKM	23	18.1
	OTHERS	18	14.2

5.2. Reliability of the instrument

Cronbach's Alpha is a test that determines how reliable instruments are. A Cronbach's Alpha value of greater than 0.6 (refer Table 2) suggests that all items in the surveys are reliable and can be used for further analysis (Nunnally, 1978).

Table 2. Reliability Statistics

Cronbach's alpha value	N of item
0.829	11

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The next section elaborates on subsequent analysis conducted for the mean score and an independent t-test.

5.3. Mean analysis for academics' perception of Education 4.0

Landell (1997, as cited in Abdul Halim et al., 2017; Idrus & Abdullah, 2018) defined the level of mean score, which is summarised in Table 3 below.

Table 3. Interpretation of mean score

Level of perception	Mean Score
Low	1.00 to 2.33
Medium	2.34 to 3.67
High	3.68 to 5.00

Source: Landell (1997) as cited in, Abdul Halim et al. (2017), Idrus and Abdullah (2018)

The mean score on the academics' perception on Education 4.0 is summarised in Table 4 below.

Table 4. Descriptive statistics for perception of academicians on education 4.0 in comprehensive university (CU)

		N	Minimum	Maximum	Mean	Std. Deviation
1.	In my opinion the current academicians lack of exposure on the Education 4.0.	127	1	5	3.80	.987
2.	In my opinion the current students lack exposure on the Education 4.0	126	1	5	3.64	1.077
3.	I believe learning Education 4.0 is important to CU's students.	125	1	5	4.38	.703
4.	I believe Education 4.0 will change the learning methods in my class environment.	127	2	5	4.25	.734
5.	I believe Education 4.0 will improve efficiency of teaching and learning process in CU.	127	2	5	4.21	.674
6.	I believe Education 4.0 will bring greater benefits to the society.	126	2	5	4.22	.680
7.	I believe education 4.0 is the next evolution of education processes, which make educators and students become smarter and better.	127	2	5	4.19	.675
8.	I believe education 4.0 will give huge impact towards CU graduates employability.	127	2	5	4.20	.756
9.	I believe Education 4.0 will involve significant cost to CU.	127	2	5	4.28	.712
10.	I believe CU is ready for Education 4.0 implementation.	127	1	5	3.23	1.078
11.	I believe Malaysian education environment is ready for Education 4.0.	127	1	5	3.54	.853

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With reference to Table 3 and Table 4, the findings showed that the items on academics' perception had mean scores ranging from 3.23 (SD=1.078) to 4.38 (SD=0.703). Items 1, 2, 10 and 11 with the mean scores between 3.23 (SD=1.078) to 3.80 (SD=0.987) indicate that the respondents have moderate to high perception about lack of exposure on Education 4.0 among the current students and academicians. Similar indications are found in terms of the readiness of Malaysian education environment for Education 4.0 and the readiness of CU towards implementation of Education 4.0. However, looking at the SD, there is an inconsistency among the respondents for items 2 and 10 in relation to the lack of exposure about Education 4.0 among the current students, and the readiness of CU to implement Education 4.0.

Meanwhile, high mean scores between 4.19 (SD=0.675) to 4.38 (SD=0.703) for the remaining items indicate that most of the respondents perceived highly towards Education 4.0. This includes its importance to UiTM's students; its effect on class environment and efficiency of teaching and learning process; its benefits to society; and its evolution process in producing smarter and better educators and students. Education 4.0, according to the respondents, will have an impact on UiTM graduates' employability as well as the university's costs. Furthermore, the SD value demonstrates that the respondents are consistent in their responses to those issues.

The findings support Rosnah and Mahaliza's (2020) assertion that academics and the institution are prepared to deal with Education 4.0. Overall, it demonstrates that academics are ready to implement Education 4.0 in the teaching and learning environment. The current state of academic readiness is timely since students highly demand for e-learning platforms to be used in higher educational institutions (Bujang et al., 2020). The results somehow are consistent with Omar and Hasbollah (2018) and Rafiq (2019) that academics are also ready and have better understanding on Education 4.0. The findings also support Maria et al. (2018) claiming that the Ministry of Higher Learning Institution and Ministry of Education of Malaysia are aware and currently preparing the universities to welcome the IR 4.0 and Education 4.0 into the current practice.

5.4. Gender and overall academics' perception of Education 4.0

Further analysis was carried out to see if there was a link between gender and overall perceptions of Education 4.0 among academics. Table 5 summarizes the findings based on an independent t-test.

Table 5. Independent t-test analysis

Gender	N	Mean	Standard Deviation	df	T	p-value
Male	26	4.1364	.52144	125	1.595	0.113
Female	101	3.9581	.50483			

Table 5 shows that the perception of Education 4.0 for male academics achieved higher mean (M = 4.1364; SD = 0.5214) than the female academics (M = 3.9581; SD = 0.5048). However, this difference is not significant (t = 1.595; df = 125; p = 0.113). Thus, it can be concluded that there is no difference in mean perception towards Education 4.0 between male and female academics. This is similar with the findings from Yukselturk and Bulut (2009) and Hung et al. (2010) which found no significant differences in term of gender. The current finding can be explained by Malaysia's distinctive culture, in which the

majority of Malaysians use ICT positively in their daily lives (Salman et al., 2014). This may rationalise good attitudes about e-learning and plans to use it for educational purposes.

6. Conclusion

As a response to the demands of IR4.0, Education 4.0 also integrates humans and technologies to create new possibilities. Education 4.0 emphasises learning management, where students utilise new technology to improve their skills as a response to the changes in society. In terms of teaching skills, academics are supposed to apply a variety of teaching strategies in each meeting to encourage students' active involvement that met the students' demands and reflected the Education 4.0 qualities.

This study examines the perception of academics at a comprehensive university regarding Education 4.0. This study also determines the influence of gender on the perception of the academics on Education 4.0. The findings show that academics have moderate to high opinions of current students and academics at the selected Comprehensive university's lack of exposure to Education 4.0. Meanwhile, academics have a moderate opinion of the Malaysian education environment's readiness for Education 4.0, as well as CU's readiness to execute Education 4.0. Overall, the findings imply that the Malaysian education sector's degree of preparation still needs to be improved. In terms of gender, the data showed that there is no difference in terms of the average perception of male and female educators towards Education 4.0. The level of perception of Education 4.0 among academics is not affected by gender.

This research is crucial in determining the awareness and perception of academics; they are required to relearn and prepare themselves with the latest digital tools to adapt with the learning preferences of 21st-century or Gen Z students, who are born and raised with technology. This study only involves the context of a comprehensive university. Thus, future research could also include other types of public higher education institutions such as research and focused universities, as well as other comprehensive universities. Moreover, as the educational system is changing rapidly, the scope of study may be extended to Education 5.0 as well.

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