



The Study on Awareness, Ability and Policy Suggestions to Meet Job Requirements of the Digital Transformation

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The discourse that revolves around the Fourth Industrial Revolution in Vietnam has witnessed participation from policy makers, business circles, and academics. This study sought to explore the future of Vietnamese workforce's awareness and competencies in meeting labour market needs in the Fourth Industrial Revolution. To capture these awareness and competencies, the study used the mixed method. Questionnaires were initially conducted with 800 third- and fourth-year students who were studying in four fields: social sciences and humanities, science and technology, natural sciences, and finance and banking in public and private universities in Ho Chi Minh City. Thirty lecturers and managers from private and state-owned enterprises were then invited to participate in interviews to gain a multidimensional perspective. Analyses showed the large proportion of students had heard of the Fourth Industrial Revolution primarily from the media, which led to a difference in both awareness and behaviour towards the Fourth Industrial Revolution. The survey students had a positive outlook on employment trends, but felt doubtful and diffident about job-seeking after graduation. From a multidimensional perspective, the study also pointed out obsolete knowledge, traditional teaching, and the shortage of connection between universities and enterprises. The present study provided significant implications for higher educational institutions in the development of future training programmes to prepare the future workforce for the digital economy.

Keywords: career adaptability, digital economy, higher education students, pedagogical studies, the Fourth Industrial Revolution

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INTRODUCTION

There is the consensus that the Forth Industrial Revolution has taken qualifications and experiences of employees into consideration (Schröder, 2016). Since the digital revolution in industrial production is at the core of the Forth Industrial Revolution, workers are increasingly expected to acquire an ample range of interdisciplinary knowledge. For instance, salespeople will be able to start manufacturing operations directly from a tablet and provide real-time production information on the status of their orders to clients. To ensure networking beyond company boundaries, workers will also require advanced skills (e.g., Information Technology, Artificial Intelligence, and data analytics) and soft skills (e.g., communication capacities, decision-making, and organizational skills) (Assante et al., 2019). Hence, there is undoubtedly demand for changes in requisite qualifications and experiences of the employees in the course of introducing the Forth Industrial Revolution.

This development has led to an insufficient qualification of employees, which is encountered by most of the countries in their path to the Forth Industrial Revolution (Elder et al., 2019; Hariharasudan & Kot, 2018; Mian et al., 2020; Schröder, 2016). Indeed, there is a shortage of skilled workers who work in non-routine cognitive occupations in the region of the Association of Southeast Asian Nations (Elder et al., 2019). Particularly, in Vietnam, shares of workers in high-skilled occupations was very low (11 per cent) in 2017. Such high-skilled occupations are programming, data management, and evaluation and research, which is significant for the implementation of the Forth Industrial Revolution. In the similar vein, there is a shortage of workforce even in non-academic technical jobs, such as automation technology and mechatronics (Schröder, 2016). By the same token, if there are no mandatory actions on the development of employees' qualifications on time, a scarcity of skilled workers will continue and even get worse.

In the journey to prepare employees for the Forth Industrial Revolution and to develop their qualifications, it has become critical to gain a deep insight into awareness and competency of knowledge workers in Vietnam regarding the Forth Industrial Revolution. Since there is a few study to address this area of research in detail, particularly in Vietnam, our study shed some light on the following questions:

1. How are students in Vietnam aware of the concept of the Fourth Industrial Revolution, opportunities, and challenges that await them in the near future?
2. Standing on the threshold of their career after graduation, what are students' capacities for future career adaptation?
3. How do universities help their students in adapting to future careers through the training provided?

Literature Review

Career Adaptability Towards the Digital Transformation

The primary argument for this research is based on the theory of career adaptability (Savickas, 2005; Savickas & Porfeli, 2011). Career adaptability depends on the way that

individuals construct their careers through four dimensions of concern, control, curiosity, and confidence (Savickas, 2005). When school-to-work transitions occurs, adaptive individuals are conceptualized as (a) being concerned about, or aware of their occupational futures; (b) controlling themselves and the environment to meet their vocational future through assertive, decisive, and conscientious actions; (c) displaying curiosity by being open to new experiences, experimenting with possible selves, and reflecting the fit between self and the work world; (d) strengthening the confidence to solve the complex problems that are involved in career decision making and occupational choice. Otherwise, this adaptation is also influenced by individual external factors that are the social support of parents, families, and school environment (Sulistiani & Handoyo, 2018). In particular, school support enhances students' career adaptability to facilitate a successful school-to-work transition (Han & Rojewski, 2015; Tian & Fan, 2014).

Opportunities and Threats of the 4IR Jobs

There is a high expectation that the Fourth Industrial Revolution can provide a wealth of employment and income opportunities (Elder et al., 2019). Indeed, the report on preparing for the future of work in Association of Southeast Asian Nations countries asserts that there is a positive tone of news media containing the term "employment". Particularly, in Vietnam, 85 per cent of days in the period from 2017 to 2018 witnesses the second most positive coverage of the word "employment" in written media. In a similar vein, from the 42,000 youth in six Association of Southeast Asian Nations countries, 51.7 per cent of respondents shows the optimistic attitude to the technology-employment connection (World Economic Forum, 2018b). In this sense, in Vietnam, approximately 46 per cent of respondents expects that technology will increase the number of jobs while about 37 per cent of respondents replies that technology will reduce the number of jobs. Coinciding with the report and the survey, Schröder (2016) reveals that the Fourth Industrial Revolution fortunately renders new business models increased, which makes new jobs emerge. Additionally, Vietnam's National Industrial Development Policy until 2030 with a vision toward 2045 (Resolution No. 23 NQ/TW, March 2018) promotes industrial human resource, particularly a highly qualified workforce by ensuring higher income and access to social benefits. Indeed, this policy document points to a "review [for] adjust[ed] and supplement policies to ensure social welfare for employees in the industrial sector, including policies on wages, insurance and labour protection". Such policy is also supported in Resolution No. 35/ NQ-CP on Enterprise Development Policy to 2020, May 2016. It is another document that calls for a proposal to "reduce 30% of personal income tax of workers in the fields of IT, hi-tech or agriculture and agricultural hi-tech processing, etc.". By the same token, the Fourth Industrial Revolution can enable the creation of income and new employment opportunities.

Despite the reported benefits, threats that the Fourth Industrial Revolution leads to changes in the world of work are largely founded (Pejic-Bach et al., 2020; Schröder, 2016). Indeed, in expectation of creating a national ecosystem for technological growth, the profile of jobs in the Fourth Industrial Revolution are different (Elder et al., 2019).

Particularly, the job profile is not significantly focused on production and assembly that are taken over by low-skilled workers (Pejic-Bach et al., 2020). Such workers who do repetitive, routine tasks, and physical demanding have challenges in job-seeking. Conversely, an increase is seen in jobs that are related to data science and information technology, such as machine operation, software maintenance, and hardware maintenance jobs (Pejic-Bach et al., 2020). Such jobs require high-skilled workers, such as information technology specialists and educated data scientists who have multi-skilled professionals and interdisciplinary knowledge. Hence, the Forth Industrial Revolution can bring a restructuring of employment.

Higher Education in the 4IR

Higher education has a significant role to play in shaping qualifications and experiences of the future knowledge workers in the digital economy (Gleason, 2018; Abdvakhidov et al., 2021; Coşkun et al., 2019). Indeed, to develop qualifications of the future workforce, the higher education system or the universities have laid out three education strategies to internationalize its education (Gleason, 2018). Particularly, these education strategies are (i) to improve and develop international connections, (ii) to achieve and use deep skills, such as evaluative and analytical capacities, team collaboration, and problem-solving capabilities, (iii) to help students acquire strong digital capabilities, such as cybersecurity and data analytics. In addition to these three education strategies, these strategies are combined with a distinctive pedagogical approach (Gleason, 2018). This distinctive pedagogy is learner-centred and experiential learning, particularly problem-based and project-based learning, which enhances close interactions of students with faculty both inside and outside the classroom. Aside from three education strategies and a distinctive pedagogical approach, the other primary initiative to prepare graduates of Higher Education Institutes in meeting the challenges of in the Fourth Industrial Revolution is Future Ready Curriculum, including a curriculum structure, learning delivery, and assessment (Ministry of Higher Education Malaysia, 2018). A curriculum structure allows convergence of disciplines, flexible and non-conventional curriculum, industry partnership, and a global curriculum. The learning delivery includes student-directed learning, including heutagogy, paragogy, and cybergogy. Assessment emphasizes on what students can and cannot do through assessment of both learning outcomes and learning process, rather than concentrating on knowledge achievement. By these means, higher education institutions in Singapore and Malaysia, have shaped their workforce to be ready for the Forth Industrial Revolution (World Economic Forum, 2018a).

In comparison with the readiness of Singapore and Malaysia for the Fourth Industrial Revolution, the readiness of Vietnam is nascent and underdeveloped (Truong & Nguyen, 2017; WEF, 2018). According to the Decision No. 16/CT-TTg “On Strengthening Access to the Fourth Industrial Revolution” that was issued by Vietnam’s Prime Minister in May 2017, the Ministry of Education and Training (MOET) has been assigned to “raise the capacity of research and teaching in tertiary education institutions, strengthen the education of basic skills, knowledge, creative thinking, and adaptability to the requirements of in the Fourth Industrial Revolution” (Thủ tướng Chính phủ (Prime Minister), 2017). To meet the Vietnamese Government’s demands on adapting

for the future workforce in the Fourth Industrial Revolution, the Vietnamese HE has been pressured due to some constraints of policy, pedagogy, knowledge, and skills. Firstly, the MOET has not developed specific strategic policies to make the necessary educational shift towards the Fourth Industrial Revolution (Lieu et al., 2018). The slow changes in educational policies to respond contextual constraints were supported by Nha (2017). Secondly, although there are some positive shifts in teaching and learning practices to a more Western-styled education in both general and advanced programs, centralisation in curriculum and assessment, shortages of learning resources, class size, and Confucian educational ideology inhibit teachers and students from a student-centred approach, formative assessment, and the provision of timely and individual feedback (Tran, 2019). The third constraint is that most Vietnamese universities only use single subject module approaches and embedded some relevant content in existing courses and programs in the Fourth Industrial Revolution (Lieu et al., 2018). The problem is that the current embedding curricular cannot equip students with deep and disciplinary knowledge. For instance, Hanoi University of Science and Technology provides Internet of Things (IoT), big data, and Artificial Intelligence (AI) as selective modules for talented students, while the University of Information Technology at Vietnam National University in Ho Chi Minh city offers those core technologies of the Fourth Industrial Revolution as research topics for doctoral degrees. Finally, most Vietnamese universities cannot still equip students with necessary skills and creativity for the world of work due to a shortage of autonomy over the curriculum and the absence of authentic work-integrated learning in most programs (Nghia, 2017; Tran et al., 2016). For example, Vietnamese graduates and final-year students severely lack skills to complete work duties effectively, such as “interpersonal and communication skills” and “career development skills” (Nghia, 2018).

METHOD

Research Setting and Participants

The study was conducted in public and private universities in Ho Chi Minh City. To ensure 190 – 210 students in each field of university study, the participating students in the study primarily were learning at Polytechnic University, University of Social Sciences and Humanities, University of Economics and Law, International University, University of Science, University of Technology (HUTECH), University of Economics and Finance, and University of Technology and Education. The results of quota survey in the study are shown in Table 1 as follows:

Table 1

Characteristics of quota sampling

		Natural science	Social sciences and humanities	Economics and foreign trade	Science technique and technology	Total
Public	N	142	153	151	151	597
	%	74.0	75.0	75.1	74.4	74.6
Private	N	50	51	50	52	203
	%	26.0	25.0	24.9	25.6	25.4
Total	N	192	204	201	203	800
	%	100.0	100.0	100.0	100.0	100.0

Source: Knowledge Workers in the Digital Economy Survey, 2018

The research participants were 800 students that were selected by using stratified quota sampling procedures. To gain a multidimensional perspective, 30 lecturers and managers from private and state-owned enterprises were invited to participate in in-depth interviews. Demographic information of participating students is presented in Table 2.

Table 2
Demographic characteristics of the samples

	Demographic characteristics	Frequency	Valid Percent
Sex	Male	376	47,0
	Female	424	53,0
Academic year	The fourth year	328	41,0
	The third year	472	59,0
Age	Age below 21 years old	475	59,4
	The 21-22 age group	187	23,3
	The 22-year-and-over age group	138	17,4
Student ranking	Excellent	8	1,0
	Very good	125	15,6
	Good	534	66,8
	Ordinary	133	16,6
School type	Autonomous schools	260	32,5
	Public non-autonomous schools	337	42,1
	Private schools	203	25,4
Field of university study	Social sciences and humanities	204	25,5
	Natural sciences	192	24
	Finance and banking	201	25,1
	Science and technology	203	25,4
N = 800			

Source: Knowledge Workers in the Digital Economy Survey, 2018

According to Table 2, the sample was stratified on the basis of sex, academic year, age, student ranking, school types, and fields of university study. They are considered as the main independent variables to determine factors that affect students' awareness and capacities in the Fourth Industrial Revolution. First, there was no significant difference in the percentage of males and females, with 53 per cent and 47 per cent respectively. Second, a total of 800 students participated, with 59 per cent of the third-year students and 41 per cent of the forth-year students. At these academic years, students are about to graduate to become human resources for the labour market over the next one or two years, and they have more experience in learning and practice. Third, students aged below 21 years old accounted for 59.4 per cent while students in the 21-22 age group and the 22-year-and-over age group made up 23.3 per cent and 17.4 per cent respectively. In terms of student ranking, the participating students who were good accounted for 66.8 per cent in comparison with only 16.6 per cent of ordinary students, 15.6 per cent of very good students and 1 per cent of excellent students. Moreover, the total number of participating students was also distributed according to school types. Students who were learning at public non-autonomous schools accounted for 42.1 per cent while those at autonomous schools and private schools made up 32.5 per cent and

25.4 per cent respectively. In addition to school type, the study also provides the most general view with a balance of student proportions in four different fields of university study: social sciences and humanities (25.5 per cent), science and technology (25.4 per cent), natural sciences (24 per cent), and finance and banking (25.1 per cent).

Research Instruments

This study was based on the pragmatic worldview that allows to combine quantitative research and qualitative research in understanding the mentioned research problem (Creswell & Creswell, 2017). In the first phase, the questionnaire consisted of 15 items, including respondents' background information (6 items), awareness of the Forth Industrial Revolution (3 items), awareness of opportunities and challenges in the Forth Industrial Revolution (2 items), students' self-assessment of the importance and achievement level of knowledge and attitude (2 items), and students' assessment on training quality of universities (2 items). For instance, the items for awareness of the Forth Industrial Revolution are "Have you ever heard the Forth Industrial Revolution?", "If you have heard the Forth Industrial Revolution, which channel(s) did you get access?", "How much did you understand the Forth Industrial Revolution?"; the items for awareness of opportunities and challenges in the Forth Industrial Revolution are "Please indicate the following career opportunities and challenges that the Forth Industrial Revolution can bring to you on the scale of 1 to 5 (1: challenge and 5: opportunities)", "In which of the following aspects do you think Vietnamese workers can compete with other workers in Southeast Asia?"; the items for self-assessment of the importance and achievement level of knowledge and attitude are "Please indicate the importance level of the following knowledge and attitudes on the scale of 1 to 5 (1: not significant and 5: highly significant)", "Please indicate the achievement level of the following knowledge and attitudes on the scale of 1 to 5 (1: not achieved and 5: highly achieved)"; the items for self-assessment on training quality of universities are "Which following teaching methods are you currently accessing?", "How do you assess the current training programmes?". In the second phase, in-depth interviews included four main questions in terms of lecturers and managers' perspective on the Forth Industrial Revolution in Vietnam, its opportunities and challenges to the labour force, strength and weakness of Vietnamese students, and comparison of Vietnamese students with other students in the Southeast Asian countries.

Procedures for Data Collection and Analysis

The data collection was conducted from June 20th to August 25th, 2018. Regarding data collection procedure recommended by Creswell (2012), after obtaining permission from schools and head lecturers, the researchers had five minutes at the start of a lecture to introduce the study and distribute information statements and questionnaires to participants. Students spent around 15 minutes to complete the questionnaire. For the in-depth interview, after obtaining permissions from lecturers and managers, the purpose of the study, the time of the interview, the plans for using interview results, and the availability of a summary of the study were conveyed to them before starting the interview. During the interview, all interviews were recorded with the consent of the lecturers and managers for audio recording. Each interview lasted from 30 to 40

minutes. With respect to data analysis, quantitative data from the questionnaires were analysed by using the SPSS 22 software in terms of descriptive statistics and ANOVA. Qualitative data were transcribed and analysed by using Nvivo for analysis.

FINDINGS

Students' Awareness of the Fourth Industrial Revolution, Its Opportunities, and Challenges

Students' Awareness of the Fourth Industrial Revolution

A concern about students' awareness of the Fourth Industrial Revolution is that there was a gap between hearing about the Fourth Industrial Revolution and deeply understanding the concept, which led to a difference in both awareness and behaviour. Indeed, slightly more than 93 per cent of the 800 surveyed third- and fourth-year students in Ho Chi Minh City had heard of the Fourth Industrial Revolution, either from the media (81.6 per cent) and/or lecturers (44.8 per cent). In other words, the large proportion of students indicated that the majority of their information on the Fourth Industrial Revolution were derived from other people in chats or news on the internet. For example, one fourth-year female student in the Department of Chemical Engineering at a public university explained, "I have heard a lot – listening from the internet, from relatives, from former interns in an internship. The Fourth Industrial Revolution is an era of machine that replaces human. Machines can be linked together and manipulated by connecting software." In this sense, the qualitative data in this study also showed that most of the respondents, especially those in social sciences and humanities or finance and banking fields, often used some phrases as "hear vaguely", "not really get it", "hear that it is important" and "not search for it" to talk about their understanding of the Fourth Industrial Revolution in the digital economy.

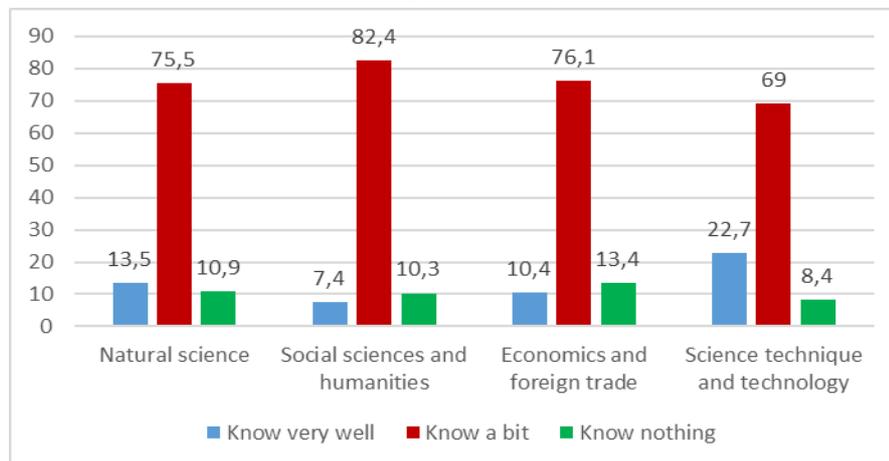


Figure 1

Respondents' understanding of the Fourth Industrial Revolution, by field of university study (%). Source: Knowledge Workers in the Digital Economy Survey, 2018.

In accordance to the qualitative data, a chi-squared test revealed a correlation between the levels of understanding about the Fourth Industrial Revolution and the respondents' field of study (value = 58.797; degrees of freedom = 4 and asymptotic significance (two-sided) = 0.000). There was a general tendency to focus on the “know a bit” response in each field of university study: social sciences and humanities (82.4 per cent), economics and foreign trade (76.1 per cent), natural sciences (75.5 per cent), and science and technology (69 per cent). By the same token, the students lacked clarity about the Fourth Industrial Revolution, and the media significantly influenced on students' awareness of the Fourth Industrial Revolution. Here we can see there is the need for improving the effectiveness of the Fourth Industrial Revolution communication since Sulistiani and Handoyo (2018) indicated that career adaptability is influenced by the social support of parents, families, and school environment.

In addition to the impact of media on students' understanding of the Forth Industrial Revolution, having an internship or a part-time job made a significant difference in the way that students responded, especially if their working context was a digital technology start-up (table 3).

Table 3

Understanding of the Fourth Industrial Revolution, by whether respondents had ever had an internship or part-time job (%)

	Internship or part-time job				Total	
	Had one		Never had one		Total	
	No.	%	No.	%	No.	%
Know very well	85	16.0	23	8.6	108	13.5
Know a bit	394	74.2	212	78.8	606	75.8
Know nothing	52	9.8	34	12.6	86	10.8
Total	531	100.0	269	100.0	800	100.0

($X^2(14) = 9.202, p = 0.010$)

Source: Knowledge Workers in the Digital Economy Survey, 2018.

Based on the finding, since students with part-time jobs achieved more confidence in the understanding of the Fourth Industrial Revolution than students without part-time jobs, the former could be regarded as those who had practical experience in their careers. Although the general trend was still “know a bit” about the Fourth Industrial Revolution, there was considerable difference among respondents who “know very well”, based on who had had an internship or part-time job (at 16 per cent) and those who have never had such an experience (at 8.6 per cent). Indeed, a director of the Small and Medium Enterprise in the field of information technology (IT) software in Ho Chi Minh City explained, “Our company is aiming at students in the second and third years who have direction and passion. We will invest them in doing small projects which are suitable for them to develop. Although we know that when they graduate, they can go the other way, their grey matter is already used. They improve their skills and understanding about technology as well as profession. We also have benefits.” Hence, students adapted to the Forth Industrial Revolution due to their concern and confidence in their career-making decision (Savickas, 2005).

Students' Awareness of Opportunities and Challenges in the Fourth Industrial Revolution

In the context of the Forth Industrial Revolution, the surveyed students had a positive outlook on employment trends, but felt doubtful and diffident about job-seeking after graduation.

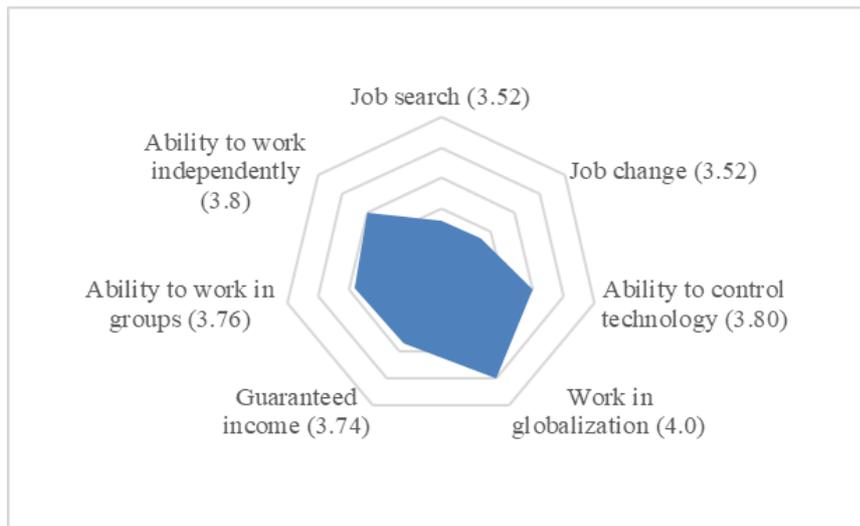


Figure 2

Respondents' assessment of opportunities and challenges for job seeking in the digital economy. Source: Knowledge Workers in the Digital Economy Survey, 2018.

The results showed that the surveyed students highly appreciated “work in globalization” at 4.0, “ability to control technology” at 3.8, “ability to work independently” at 3.8, “ability to work in groups” at 3.76, “guaranteed income” at 3.74 while they assessed “job search” and “job change” at a low point (3.52) on a scale for which 1 is “challenges” and 5 is “opportunities”.

In particular, there was a gap in the opportunity assessment between students with and without any intention of seeking information and communications technology (ICT)-related work.

Table 4
 Respondents' assessment of opportunities and challenges of job intention in information and communications technology

	Have no intention of ICT work		Intend to seek ICT work		Sig. t-test
	Mean	SD	Mean	SD	
Job search	3.48	1.19	3.64	1.17	0.083
Job change	3.44	1.06	3.76	1.12	0.000
Ability to control technology	3.76	1.06	3.91	1.07	0.064
Work in globalization	3.99	1.02	4.06	0.92	0.332
Guaranteed income	3.68	1.01	3.91	1.02	0.003
Ability to work in groups	3.70	1.06	3.88	1.03	0.044
Ability to work independently	3.81	1.07	3.79	1.06	0.799

Source: Knowledge Workers in the Digital Economy Survey, 2018.

The results of the t-test (table 4) show a difference in the opportunity assessment for ICT jobs between the students intending to pursue this field and the students who had no intention of ever working in this area, in terms “job change” (p value = 0.00), “guaranteed income” (p value = 0.003) and “ability to work in groups” (p value = 0.04). In the similar vein, young people have a tendency to appreciate any jobs that bring real benefit to their lives and greater income (Nguyen, 2018; Kono et al., 2010).

As the surveyed students were aware, they were less competitive to seek jobs than South-East Asian labour. The results revealed that the respondents assessed competition factors at a low point, at less than 50 per cent.

Table 5
 Respondents' awareness of the competition for labour in Vietnam and South-East Asia

Competition	Responses		% of cases
	No.	%	
Salary	314	22.8	40.5
Specialized knowledge	345	25.0	44.5
Foreign language	126	9.1	16.3
Information technology	232	16.8	29.9
Working attitudes	361	26.2	46.6
Total	1,378	100.0	177.8

Source: Knowledge Workers in the Digital Economy Survey, 2018.

In particular, they assessed their skills, including “foreign language” and “information technology” at a low point (at 16.3 per cent and 29.9 per cent respectively). In contrast, they assessed their “working attitude”, “specialized knowledge”, and “salary” at a much higher point (at 46.4 per cent, 44.5 per cent, and 40.5 per cent respectively). In this sense, the major barriers to students' career adaptability towards the Fourth Industrial Revolution are skills, particularly language and information technology skills instead of specialized knowledge. Indeed, university training programs emphasize the importance of specialized knowledge much more than skills. In relation to this, Han & Rojewski (2015) and Tian & Fan (2014) noted that school support enhances students' career adaptability to facilitate a successful school-to-work transition.

Students' Ability to Meet Job Requirements in the Fourth Industrial Revolution

Importance and achievement levels of knowledge

The respondents assessed the knowledge that they had learned in their field of study in terms of importance and achievement level at a significant level (figure 3).

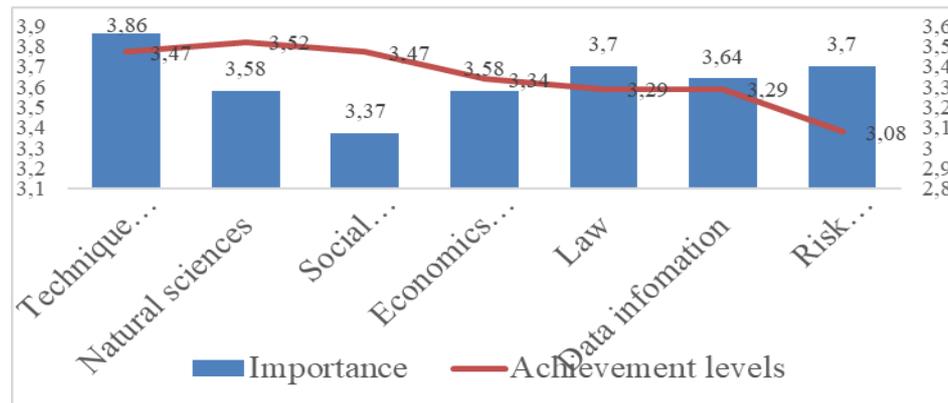


Figure 3 Respondents' awareness of the importance and achievement level of knowledge. Source: Knowledge Workers in the Digital Economy Survey, 2018.

To measure the respondents' awareness of the importance of knowledge, the study used a five-point Likert scale, with 5 as "highly significant" and 1 as "not significant". The study also used the same scale for their awareness of the achievement levels of knowledge, with 5 as "above average" and 1 as "below average". The result revealed that the most highly rated importance of knowledge was "technique and technology"

$$\bar{x}\bar{x}$$

with $\bar{x}\bar{x} = 3.86$ while the second rated importance of knowledge were "risk

$$\bar{x}\bar{x}$$

management" and "law" with $\bar{x}\bar{x} = 3.70$. There was also a gap in their awareness of the achievement levels of knowledge, which rated "risk management", "law" and

$$\bar{x}\bar{x}$$

$$\bar{x}\bar{x}$$

$$\bar{x}\bar{x}$$

"economics and finance" at an average level ($\bar{x}\bar{x} = 3.08$; $\bar{x}\bar{x} = 3.29$ and $\bar{x}\bar{x} = 3.34$, respectively) and "technique and technology", "data information" and "social sciences and humanities" at above-average levels.

In the analysis of the achievement level of knowledge in each field, there was a difference in achieving "technique and technology" and "data information" between the science and technology field and the natural sciences field. Such knowledge is extremely important in the Fourth Industrial Revolution. The results of the ANOVA test in the study are shown in the following table:

Table 6
Respondents' achievement level of knowledge, by field of study

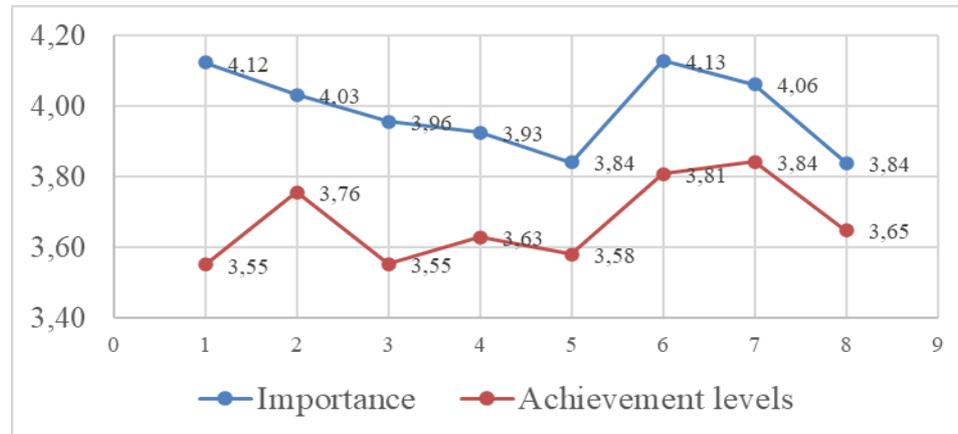
	Natural sciences	Social sciences and humanities	Finance and banking	Science and technology	Sig. ANOVA
Knowledge	Mean	Mean	Mean	Mean	
Technique and technology	3.59	3.17	3.41	3.70	0.000*
Natural sciences	3.79	3.25	3.45	3.59	0.000
Social sciences and humanities	3.41	3.77	3.49	3.22	0.000
Economics and finance	3.25	3.25	3.69	3.18	0.000
Law	3.28	3.28	3.41	3.18	0.012*
Data information	3.55	3.28	3.52	3.65	0.001
Risk management	3.06	3.10	2.96	3.18	0.107

Note: (*) is a result of a non-parametric Kruskal-Wallis test. Source: Knowledge Workers in the Digital Economy Survey, 2018.

In addition, although the average scores of risk management in every field of study were quite equal, they tended to be lower than other scores of other knowledge. Equally, students had trouble with knowledge in risk management.

Importance and achievement levels of attitude

There was wide disparity in students' assessment between the importance and achievement levels of necessary attitudes in the Fourth Industrial Revolution. Such assessment was measured by using a five-point Likert scale, with 1 as "not significant" and 5 as "highly significant". The results are shown in the following figure:



- 1. Risk tolerance at work
- 2. Work under pressure
- 3. Persistence at work
- 4. Adaption to job change
- 5. Management of personal values
- 6. Self-study
- 7. Responsibility for work and society
- 8. Adaptation to multi-cultural environment

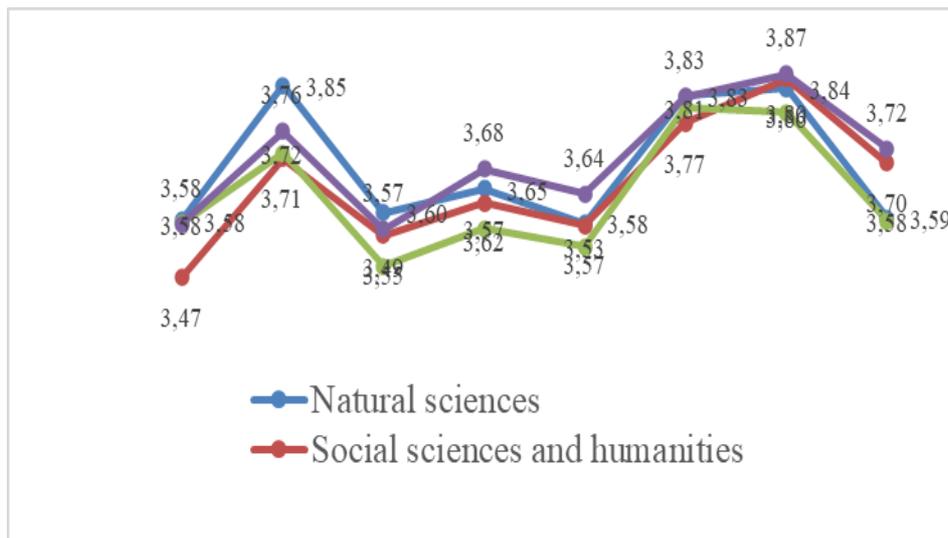
Figure 4

Respondents' assessment on the importance and achievement levels of attitude

Source: Knowledge Workers in the Digital Economy Survey, 2018.

The measurement criteria for the importance and achievement levels of necessary attitudes in the Fourth Industrial Revolution were at an important level in the range of 3.55 to 4.13. However, if an overall average score was calculated, a score assessing the importance of attitude was higher than a score of achievement levels of attitude (3.99 and 3.63, respectively). Indeed, the director of the Strategic Development Institute of a public university confessed that “We often feel very embarrassed with enterprises when receiving complaints about interns’ attitudes.” Specially, with reference to a well-known start-up IT business director in Ho Chi Minh City (one of the country’s few young business leaders who was selected to meet with US President Obama when he visited Vietnam), the director emphasized to “recruit those with good attitudes” since “they do not pass most professional tests”. By the same token, when there is a mismatch between recent graduates’ knowledge and their future occupations (International Labour Organization, 2018), it is significant that recent graduates need to achieve necessary attitudes in the Fourth Industrial Revolution.

In comparison across the fields of university study, although there was no difference in the assessment of achievement level among the fields of study, the scores of the respondents in the social sciences and humanities field and the finance and banking field was lower than those in the other fields. As the data in figure 5 indicate:



1. Risk tolerance at work
 2. Work under pressure
 3. Persistence at work
 4. Adaption to job change
 5. Management of personal values
 6. Self-study
 7. Responsibility for work and society
 8. Adaptation to multi-cultural environment

Figure 5
 Respondents’ assessment of achievement level of attitude, by field of study. Source: Knowledge Workers in the Digital Economy Survey, 2018.

In particular, their assessment of “risk tolerance at work” was the lowest in achievement. However, one of the most significant attitude indicator in the Fourth Industrial Revolution in the digital economy context that was highly evaluated by students was “self-study”.

Moreover, attitudes were highly achieved when the respondents had had internship experience, as the scores in table 7 indicate:

Table 7
Differences in the mean of achievement level of attitudes between respondents who had had an internship and those who had not had one

Attitudes	Experienced an internship		Not experienced an internship		Sig. t-test
	Mean	SD	Mean	SD	
1. Risk tolerance at work	3.66	0.870	3.33	0.981	0.000
2. Work under pressure	3.89	0.893	3.49	1.032	0.000
3. Persistence at work	3.65	0.881	3.36	0.947	0.000
4. Adaption to job change	3.74	0.908	3.42	0.901	0.000
5. Management of personal values	3.69	0.976	3.35	0.980	0.000
6. Self-study	3.92	0.941	3.58	0.929	0.000
7. Responsibility for work and society	3.93	0.936	3.67	0.954	0.000
8. Adaptation to multi-cultural environment	3.73	0.970	3.49	0.909	0.001

Source: Knowledge Workers in the Digital Economy Survey, 2018.

There were differences in the mean value of achievement level of attitudes between respondents who had experienced an internship and those who had not. As expected, internship experience led to higher achievement levels of attitudes. By the same token, when students have hands-on experience, they realize the important role of attitudes, which motivates them to practice and improve their attitudes more.

Students’ Assessment on Training Quality of Universities

It is clear that universities and lecturers have a significant role in raising students’ awareness and qualification to adapt to the Fourth Industrial Revolution and the digital economy (Han & Rojewski, 2015; Tian & Fan, 2014). Yet, our research revealed that they only gradually tended to meet the changing needs of employers. The satisfaction of the surveyed students on teaching methods is shown in the following table:

Table 8
Assessment of respondents’ satisfaction on teaching methods

	Fields of study				Total
	Natural sciences	Social sciences and humanities	Finance and banking	Science and technology	
Traditional learning	85.9	95.1	91.0	88.1	90.1
Online learning	10.4	11.8	28.9	19.8	17.8
Field-study learning	24.0	24.6	8.5	13.4	17.5
Project-based learning	9.4	7.9	7.5	11.9	9.1
Total	100	100.0	100.0	100.0	100.0

Source: Knowledge Workers in the Digital Economy Survey, 2018.

In particular, traditional learning among four teaching methods was reported as the most popular in all four study fields. Online learning, which is a specialized learning pattern in the digital economy, was still relatively new. For example, despite the dynamic and major transformations in the finance and banking field, online learning accounted for the highest percentage (at 28.9 per cent) of teaching methods in that field. Project-based learning models did not implement much, accounting for the smallest proportion of available methods in all four fields.

The respondents in all four fields appeared to have a pessimistic view of training programmes that emphasize theory more than practice. As the scores in figure 6 indicate:

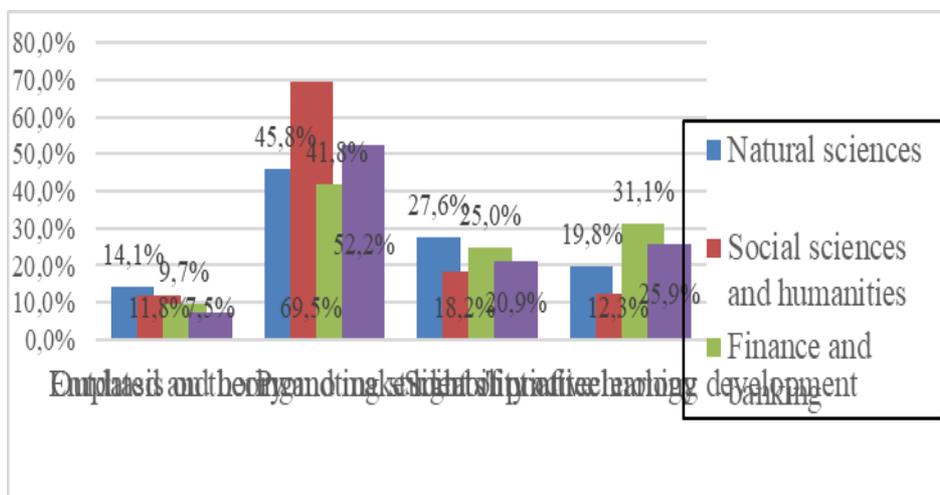


Figure 6

Respondents' assessment of training programmes (%). Source: Knowledge Workers in the Digital Economy Survey, 2018.

In particular, the largest proportion of the respondents assessed that training programmes placed emphasis on theory and made light of practice. Coinciding with the quantitative data, the analysis of the interview responses also indicated that current training programmes at universities were inappropriate for the changing market trends. Talking about the training programmes, the director of a Strategic Development Institute also said that:

“Now there are 120 credits in the credit-based training programmes. Among 120 credits, the specialized subjects are only worth around 20 credits, which helps students prepare their future job. Although the universities include the output standards, including knowledge, skills, and attitudes to join the ASEAN University Network, they still feel confused about them. Frankly, enterprises are changing quickly, but the schools are changing slowly and students cannot adapt to these changes. In our study on workers in industrial parks two years ago, there was the small proportion of students working as

manual workers. It means that the trained human resources do not match the needs of the market”.

Equally, the former Dean of Faculty of International Relations at a public university revealed issues of the training programmes as follows:

“Even though universities promise to offer students a credit training program which they can choose the subjects themselves, the program still follows a yearly old frame. Only few subjects are available, so students have no choice and learn all of these to gain enough credit. That is the first level of making education and students out of date. Currently, graduates cannot meet employers’ recruitment needs although the schools get the employers’ comments on training programmes. The reason is that there are still subjects of no importance to employers, such as philosophy, civilization history and Vietnamese culture foundation. Nevertheless, employers finally realize that universities have no specialized training on trade, import and export service, accounting and auditing. Therefore, universities are not the one to provide enterprises with human resources which they need. Hence, there is no connection between universities and enterprises.”

Indeed, there are still subjects of no importance to employers, such as philosophy, civilization history and Vietnamese culture foundation, which is obligatory for Vietnamese HE students to learn political indoctrination and accounts for about 25 per cent (Vallely & Wilkinson, 2008). By the same token, there was a shortage of connection between universities and enterprises in terms of training programmes.

DISCUSSION

The study revealed that students had heard the concept of the Fourth Industrial Revolution primarily from the media without the clarity of that concept. This is understandable since the general discussions of the Fourth Industrial Revolution in Vietnam is widely derived from the media and at events and not from thorough domestic reports and research (Truong & Nguyen, 2017; Elder et al., 2019). This is also because most Vietnamese universities only embed some content of the Fourth Industrial Revolution in existing courses and programs, which inhibits students’ deep understanding (Lieu et al., 2018). Another significant finding was that while the Fourth Industrial Revolution was acknowledged as opportunities, the majority of the participants pointed out that they felt diffident and doubtful about job-seeking after graduation, especially those students who had not had an internship or part-time job. In particular, the language barrier and information technology barrier inhibited the students from adapting to the Fourth Industrial Revolution. In this sense, Nghia (2017, 2018) noted that Vietnamese graduates and final-year students severely lacked necessary skills for the world of work. In addition to the students’ awareness of opportunities and challenges in the Fourth Industrial Revolution, the study also revealed that there was a mismatch between the respondents’ ability in terms of knowledge and attitude and their future occupations in the Fourth Industrial Revolution. The reason is that specialized knowledge that is learned at universities quickly becomes so obsolete that it cannot satisfy the demands for the labour market (Tran et al., 2016; Truong & Nguyen, 2017).

Regarding pedagogy, teaching in Vietnam was predominantly traditional learning, which was revealed by the majority of participants. In other words, this study, in concurrence with Chau & Truong (2019), stated the inclination of the authoritative role of teachers in knowledge transmission. This might be because Confucian educational ideology has shaped students' perspectives to give their teachers highest possible authority and respect in the class (Nguyen, 1989; Tran, 1999). Students' respect to teacher authority is also supported by the study that indicates that they favour listening to their teachers' lecturing (Tran, 2019). Equally interesting, the survey results pointed out the lack of connection between universities and enterprises. Previous studies also shared this finding, and further explained that the linkage between universities and enterprises in Vietnam is rather weak due to some barriers, such as ineffectiveness in the existing collaboration programs, difference in the research objectives, and limitation in practical experience (e.g., Hoc & Trong, 2019; Nguyen, 2020).

CONCLUSION

The finding showed that the media played a role in either promoting or confusing students' perception and awareness of the Forth Industrial Revolution. Analysis results from the students and professors also showed that higher education institution or universities played an extremely significant role in training human resources to prepare for the world of work in the Forth Industrial Revolution. Nevertheless, training high-skilled human resources to meet the needs of the labour market was a challenge for universities. Indeed, training programmes at tertiary level focused more on knowledge than skills, attitudes, and self-study. Such knowledge even became outdated and impractical for students in the digital revolution since there were many theoretical and idealistic subjects and the shortage of connection between universities and enterprises. In this sense, students also encountered the language and information technology barriers. Consequently, employers were not satisfied with graduates, which reflects a waste in universities' training.

In consideration of all constraints in obsolete knowledge, traditional teaching, and University – Industry linkage, the reforms in curriculum and pedagogy and the concept of Triple Helix can be applicable in the context of Vietnamese Higher Education. In response to the market demands and learners' expectations, the Ministry of Education and Training must grant universities more empowerment and autonomy in designing curriculum that should allow students to develop life-long learning and insights of how they know what they know. In terms of the reform in traditional teaching, the pedagogy needs to be student-centred and individualized to enhance deep, creative and flexible learning. Moreover, it is also necessary not only for finding a set of interactions between universities, enterprises, and the government but also for developing an action plan that connects them tightly and effectively. While universities lay the foundation of social knowledge to guarantee high-quality human resources and enterprises are the motivation contributing to high-quality human resources, the government must assure the fastest and most stable coordination.

The paper provides novel data from the case of Vietnam that reflects knowledge at global level of the major barriers to competency and awareness of the Forth Industrial

Revolution concept. Equally, higher educational institutions can also benefit from this research in the development of future training programmes to shorten a gap between existing workers and required workers in the digital transformation. Nevertheless, the limitation of this article is that it is descriptive with Chi square and T-test statistical tests, so it is not possible to analyse the influencing factors most clearly. However, the research results are suggestive for the following studies in analysing more closely the role of University and Enterprise in supporting students to adapt to meet job requirements of the digital transformation.

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