

A research on students' readiness for Education 4.0 program

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Abstract

Background/Objectives: The purpose of the study is to find out the factors affecting student readiness for education 4.0. **Methods/Statistical analysis:** Based on 361 samples, this quantitative research was conducted: reliability testing, exploratory factor analysis, correlation coefficients and linear regression. The result shows that there are four key factors affecting readiness including Self-regulation, Creativity, Upgrade and Attitude. **Findings:** The result of t-test shows that the group of students who had experienced online learning had higher readiness for the education 4.0 than the others. **Improvements/Applications:** The advantages that students realize when being involved in the 4.0 education system will help them greatly improve their skills and knowledge.

Index Terms

Education 4.0, Readiness, Internet self-efficacy, Online communication self-efficacy, Self-regulation, Creativity, Self-discovery, Upgrade, Collaboration, Attitude.

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I. INTRODUCTION

According to the World Economic Forum (WEF), by 2020, many jobs in the global labor market will disappear, people will lose 5 million jobs due to being replaced by robots.

The Industrial Revolution 4.0 could create the risk of breaking the labor market around the world including Vietnam with automation machines that can replace humans. Therefore, to keep up with the impact of the Industrial Revolution 4.0, Education 4.0 is assessed as an appropriate education model. Rajan Saxena [1] et al. (2017) said that education has undergone four stages, namely:

Education 1.0: From ancient period to the Middle Ages, education was imparted on a person-to-person basis, so it was limited in scale and informal in nature;

Education 2.0: The invention of the printing press allowed people to get access to basic education, thus created a culture of scientific inquiry;

Education 3.0: The emergence of internet and IT changed the mode of delivery, providing a technology platform to learn;

Education 4.0 puts the learner at the center of the ecosystem and empowers him or her to structure individual paths keeping in mind the final outcome.

In fact, many educational institutions in Vietnam have actively approached the new wave of educational technology, to deploy training based on MOOC courses, bring AI and VR into designing the study system or deploy intelligent digital learning systems.

Hanoi National University is developing at the university level of 2.0 - UniWood, but there are also many premises for the 4.0 model. That is to prioritize research and development of basic technologies of industry 4.0 such as gene technology, Internet of things technology (IoT), nanotechnology, materials, energy and especially 3D printing technology but always ensure the balance of the economic social-environmental triangle of sustainable development.

To research about the readiness of student, some of definitions of readiness have been explored as follows: Readiness is formed by the changing in nature of work that forces persons to adapt with new situations (Katherin Prince et al., 2017) [2].

Readiness is defined as a measure of how a new problem is proposed and applied (Semih Caliskan et al., 2017) [3]. More specifically, readiness in applying technology 4.0 is the organizational capacity and the ability to adapt other involved educational solution (management, key personnel, professors and students) to an electronic model.

There are many factors affecting the readiness in applying technology 4.0 such as e-commerce, electronic payment, e-learning. According to Akaslan and Law (2011) [4], readiness, especially in learning, is the ability of an organization or individual to take advantage of learning. The research about student

readiness is necessary in order to study the current phenomenon.

Theoretically, the study aims to find out the factors affecting student readiness for the Education 4.0. In terms of practical implications, the research results will provide useful information for universities so that they can identify students attitude toward the importance of Education 4.0 and help universities design their own educational models in accordance with standards of Education 4.0 and make a premise for research in the future.

II. LITERATURE REVIEW

A. Previous Studies

Katherine Prince et al (2016) [2] predicted the main characteristics of work in the future readiness as the rise of smart machines, the decline of full-time employees, accelerating technology and proposed a framework to redefine with four scenarios in the future of readiness: partnering for mobility, checking for upgrades, finding new meaning, working with platforms.

There are two important uncertainties that could affect readiness by 2040: “will there be high or low technological displacement of human workers?” and “will the societal response be systemic and international or market driven?”. Besides, Alan S. Waterman (2011) [5] mentioned how to measure happiness in suitable way and conception of philosophy of happiness.

The goal of identity formation is identified as discovering the nature of one’s daimon which includes the discovery of personal potentials, choosing one’s purposes in living, and finding opportunities to perform those potentials and purposes in living. The contributions of these subjective experiences and predictors to the goals and processes of identity formation will be explored. In addition, “Learner readiness for online learning: Scale development and student perceptions” (M.-L. Hung et al, 2010) [6] is a study whose purpose of this study was to develop and validate a multidimensional instrument for college students’ readiness for online learning.

Readiness Scale (OLRS) was validated in five dimensions: self-directed learning, motivation for learning, computer/internet self-efficacy, learner control, and online communication self-efficacy

B. Self-efficacy

Bandura (1997) defined self-efficacy as a level of how an individual ability of his or her behavior in order to achieve the desired goals. Self-efficacy involved how much effort an individual put into solving problems in a tough situation, to reinforce spirit against adversity and seek immediate solutions. (Ipek & Acuner, 2011) [7].

During learning process, self- efficacy seems to be an important factor that can impact on student behaviors (Pajares, 2006; Schunk, 2003) [8,9]. Some researchers also examined the influence of student self-efficacy on motivation and learning (Schunk, 2003) [9].

Besides, Compeau and Higgins (1995) [10] said that internet self-efficacy of students has an effect on results of the ways they used internet in daily life. In this study, self-efficacy is measured in two aspects: internet and online communication. Therefore, we suggest two hypotheses:

H1: Internet self-efficacy positively affects students readiness for education 4.0.

H2: Online communication self-efficacy positively affects student readiness for education 4.0.

C. Self-regulation

Schunk et al (2003) [9] defined self-regulation as a process in which students activate and maintain systematically awareness, influence, and orientation to achieve their goals. In addition, Shyu et al (1992) [11] have indicated that self-regulation is a level of how students can orient their own experience and learning process.

According to research, Artino et al (2008) [12] and Peachter et al (2010) [13] have showed that there is a positive relationship between using self-regulation strategies and student performance and satisfaction with online courses. The research also indicated a statistical relationship between self-regulation learning outcomes and the course outcomes. Thus, the next hypothesis is *H3: Self-regulation positively affects student readiness for education 4.0.*

D. Creativity

Creativity is the ability to create new knowledge (Dacey & Lennon, 2000) [14]. Creativity is also about applying knowledge and skills in new ways to achieve a valuable goal (Vernon, 1989) [15]. Students who are flexible in solving problems creatively have showed a high level of performances in Doss's study (2018) [16]. Besides, Jules and Sundberg (2018) [17] recommended that employees could extend their time working for a company by applying creativity and innovation in the workplace.

Fleenor (2018) [18] has also indicated that creative courses would show a reliable forecast for student confidence and capability to prepare for various environments. The following hypothesis is proposed *H4: Creativity positively affects student readiness for education 4.0.*

E. Self-discovery

E. Katherine Price et al (2016) [2] has pointed out that self-discovery is the deep understanding of oneself to pursuit their own passion, to find a work that is meaningful for them and useful for the community. Self-discovery is also the formation of thorough awareness of one's personalities by searching for intrinsic nature and value to identify goals, values and beliefs (Waterman, 2011) [5]. Schwartz et al (2000) [19] has previously showed the relationship between self-discovery and identified achievements. Self-discovery gives us a great chance for understanding ourselves and becoming successful (Vansteenkiste et al 2009) [20].

Thus, it is hypothesized that *H5: Self-discovery positively affects student readiness for the education 4.0.*

F. Upgrade

Upgrade was defined as the activity of using programs that allow users to enhance their professional skills in the workplace. Katherin et al (2017) [2] also supposed that upgrade is the improvement of a professional worker's performance from one project to another through improving his/her skills, digital tools and social knowledge. Consequently, Katherine Prince et al (2017) [2] has mentioned upgrade as an essential factor for helping us adapt to new environments and jobs as well as distinguish qualified employees from others.

The next hypothesis is *H6: Upgrade positively affects student readiness for the education 4.0.*

G. Collaboration

Collaboration is described as how people share their specialist knowledge in the process of collective studying (Cronin et al, 2018) [21]. Caniglia (2018) [22] has showed that collaboration promotes research and education in a sustainable way. Collaboration helps education take advantage of differences in culture, language and nationality by presenting challenges and strategies used in international cooperation all around the world. Particularly in education 4.0, collaboration is a tool to help students connect with people and the environment around them to collect necessary knowledge for themselves quickly and easily.

This is the basic of the following hypothesis *H7: Collaboration positively affects student readiness for the education 4.0.*

H. Attitude

Davis (1989) [23] has defined attitude as a function of belief that refers to advantage and disadvantage perception of behaviors. In particular, Woodrow (1991) [24] has found out a positive attitude

towards technology is necessary to make any educational program successful. Arbuthnott (2009) [25] has also showed another evidence suggesting that attitudes can have a strong impact on behavior, involving planning for an upcoming activity.

The following hypothesis is proposed *H8: Attitude positively affects student readiness for the education 4.0*

I. The difference between groups

There are many studies on difference between factors in a group, such as gender, region, age and experience. Yi-Shun Wang (2009) [26] has pointed out the enormous difference of mobile learning acceptance among ages, genders and education backgrounds. In our study, we propose that different groups of gender, rank (junior and senior students), GPA score have different readiness for education 4.0.

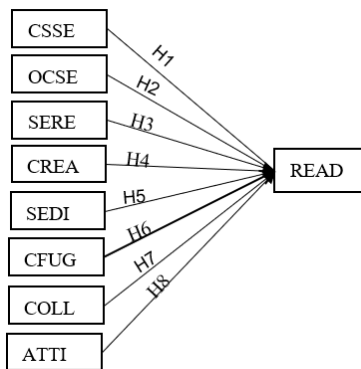


Fig. 1 The proposal model research for the education

III. RESEARCH METHODOLOGY

We adopted the questionnaire survey for data collection and examined our hypotheses by applying the linear regression method to validate the model.

The measurement instruments for variables in the questionnaire were developed from previous studies to enhance the variability and reliability. Responses to the various variables related to the perceptions of the individual subjects were measured using Likert-type scale.

The research was conducted with convenience sampling method and then processed with SPSS software. We designed online survey to collect answers from Vietnam National Universities (VNU) students who had known about or studied with education 4.0. Following is the research process.

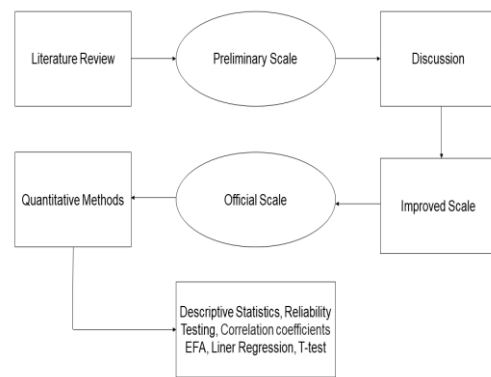


Fig. 2 Research methodology

IV. RESULTS

A. Sample Information

The survey completed with 370 valid samples including 214 females (59,3%) and 156 males (40,7%). Most of the respondents were at third and fourth year (65,7%); 159 students are studying Economics and Administration (44%). The majority of respondents had a GPA score at least 7.0/10 (86,7%). Most of the respondents had experienced studying online (64,8%).

B. Reliability analysis

Regarding Table I, all variables were tested for reliability. All items were acceptable and reliable to measure the constructs: all constructs had a Cronbach’s Alpha (CA) of more than 0.60 (from 0,753 to 0,873).

TABLE I. REALIABILITY AND CORRELATION MATRIX

	CA	ATTI	COLL	SEDI	SERE	OCSE	CREA	CFUG	READ
ATTI	0,873		.566**	.289*	.441**	.370**	.364**	.496**	.704**
COLL	0,754	.566*		.372*	.457**	.372**	.425**	.554**	.541**
SEDI	0,831	.289*	.372**		.498**	.319**	.423**	.428**	.335**
SERE	0,753	.441*	.457**	.498*		.294**	.477**	.433**	.492**
OCSE	0,751	.370*	.372**	.319*	.294**		.360**	.455**	.368**
CREA	0,746	.364*	.425**	.423*	.477**	.360**		.449**	.481**
CFUG	0,794	.496*	.554**	.428*	.433**	.455**	.449**		.544**
READ	0,866	.704*	.541**	.335*	.492**	.368**	.481**	.544**	

*. Correlation is significant at the 0.01 level (2-tailed).

C. EFA Analysis

After EFA analysis, there are 8 independent measurements: 5 items belong to CSSE, 4 items belong to ATTI, 6 items belong to SEDI, 7 items belong to CFUG, 4 items belong to SERE, 3 items

belong to CREA, 3 items belong to OCSE and 3 items belong to COLL and 1 dependent measurement: 4 items belong to READ.

D. Correlation coefficients

There was a significant relationship between those independent variables and dependent variables (Table 1). The Pearson correlation coefficient (r) highest is 0,754 and lowest is 0,541.

E. Linear Regression

The relationships between 7 constructs, namely, CSSE, OCSE, SERE, CREA, SEDI, CFUG, COLL and ATTI with 1 construct: READ, were tested by multiple regressions. The results of these relationship, which is shown as model (a) in Table II, revealed that 59,6% of the variance in Readiness can be explained by variance in the four constructs ($R^2 = 0,596$; $p < 0,001$).

TABLE II. LINEAR REGRESSION

	Beta	t	Sig.
(Constant)		-0,244	0,808
CSSE	0,017	0,414	0,679
ATTI	0,484	10,881	0,000
COLL	0,068	1,463	0,144
SEDI	-0,020	-0,488	0,626
SERE	0,112	2,517	0,012
OCSE	0,007	0,169	0,866
CREA	0,156	3,589	0,000
CFUG	0,147	3,186	0,002

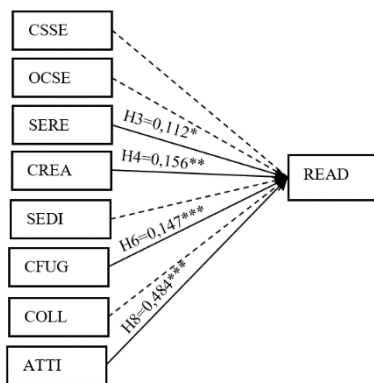


Fig. 1 The Model after analyzing

Attitude was the greatest influence on Readiness ($\beta = 0,484$; $t = 10,881$; $p < 0,0005$). Relationships of the other three constructs, namely Upgrade (CFUG), Self-regulation (SERE) and Creativity (CREA) with Readiness had low coefficients ($\beta = 0,198$; $\beta = 0,106$; $\beta = 0,145$).

The rest of the postulated constructs| with Readiness Education were rejected in this study, namely Computer searching Self efficacy ($\beta = 0,017$; $t = 0,414$; $p > 0,05$), Online communication Self efficacy ($\beta = 0,007$; $t = 0,169$; $p > 0,05$), Self-discovery ($\beta = -0,02$; $t = -0,488$; $p > 0,05$) and Collaborations ($\beta = 0,068$; $t = 1,463$; $p > 0,05$).

F. T-test

The students who had experienced online learning ($M = 3,91$; $SD = 0,65$) reported significantly higher levels of readiness for education 4.0 than those who had not ($M = 3,63$; $SD = .32$), $t(1) = 3,663$, $p < 0,0005$. Those different groups containing gender, GPA score and rank showed insignificant levels of readiness.

V. CONCLUSION

This study determined key factors affecting student readiness for the education 4.0 through conducting quantitative research. The results show that 4 factors influent student readiness for education 4.0 while the remaining 4 factors do not. Attitude is the most direct and significant factor affecting the readiness of students of VNU.

Attitude is the level of reaction and expression of an individual when preparing to adapt to new changes or participate in new environment. When they realize that participating in the 4.0 education system is a smart decision, they will pay much attention to it that affects the readiness.

In addition, educational institutions need to create more opportunities for students to practice creative skills, encourage learners to use knowledge in life to create new ideas. Moreover, there should be more academic seminars in order to provide useful information for students about the education 4.0.

Self-efficacy has significant impact on student readiness for education 4.0. Learning on Web is very different from learning in the traditional environment. The instruction on Web provides more flexibility and freedom than in research materials.

Learners are allowed to choose the amount of content, sequences and learning speed with the maximum freedom. In order to improve self- efficacy, learners must set up their long-term learning plan and follow it, know how to manage their time and control their emotions. It is necessary to know how to evaluate results and make quick adjustments.

Creative ability is one of the important factors that influent and play a decisive role in the readiness of students for education 4.0. Learners must have three main qualities: identifying problems in a new way, synthesizing knowledge, creating and developing ideas. Upgrade is one of the important factors that have a direct and significant impact on readiness.

The advantages that students realize when being

involved in the 4.0 education system will help them greatly improve their skills and knowledge. Therefore, the readiness to participate in this system is also higher. The results of t-test show that there is no difference among groups such as gender, rank and GPA score. However, the readiness of students who have experienced online learning is higher than that of those who have not.

Collecting samples with convenience sampling method is a limitation of this topic because the representation of the sample is not high.

In addition, the next drawback is the sample quality as most students may have known briefly about the education 4.0 but have not deeply understood it. Therefore, the proposal model cannot be utilized well in this current time.

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