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Indicators of the Characteristics of the Graduates of Rajabhat Universities at the Leap Frogging to the Education 4.0

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Abstract: ***This research aimed to develop the indicators of the graduate characteristics' at the leapfrogging to the Education 4.0 of Rajabhat Universities across the country. The samples were 4 groups, viz; 9 educational experts for interviewing on the draft of the variable to develop the indicators, 10 undergraduate students from 10 Rajabhat Universities for in-depth interviewing, 631 undergraduate students form Rajabhat Universities were operated for the exploratory factor analysis and 1,200 undergraduate students were employed for the second-order confirmatory factor analysis. The research instruments were the structured interview and questionnaires focusing on the graduate characteristics' at the leapfrogging to the Education 4.0. The research findings revealed that, the third component; the skills of the graduates consisted of the first three most significance weighted components: Students have the skills to apply technology and innovation (.774); students have skills in using information technology (.752); and students have skills to apply the knowledge for self-development (.595), respectively. The results of the second-order confirmatory factor analysis indicated that the model had structural consistency. It can be considered from the statistical values used to verify the validity of the model as follows: =150.688 df = 149; p-value = 0.4459; CFI = 1.000; TLI = 1.000; RMSEA = 0.003; SRMR = 0.017 and df = 1.011***

Keywords: Indicators, The Characteristics, Education 4.0

1. Introduction

Rapid economic and social change together with scientific and technological advancement has made it imperative for adaptation. The social, political, economic, and technological conditions have also developed rapidly through globalization and the influx of the Western culture. These changes have affected the development of the country in all aspects, such as multiple careers, blurred identity, work-study mismatch, frequent off-jobs, unpredictable future and insecurity and uncertainty. These concepts significantly change the current manufacturing landscape and to achieve them is necessary to establish learning and education programs accordingly.(Paravizo et al,2018 :Sinlarat,2012).These cause structural problems to Thai society inevitably. Therefore, Thailand needs to change its role in order to be able to adapt itself to the changing situations. Human resource must also be prepared for future changes. Educational organizations are important in preparing the world for a knowledge society or learning society. That is, educational organizations must adapt themselves to be the learning organizations arranging learning systematically. It is a new learning society that focuses on learners that they do not just only gain knowledge, but they must use technology for self-learning. The students must also be encouraged to dare to think and they must be the ones who create new innovations. Teachers are required to change their teaching methods such as reducing technical learning approaches and memorization, but focusing on learning and improving the learners' skills instead.The learners are also required to have the skills to live in a modern world and develop themselves throughout life. These qualifications of the leaners are called "Education 4.0" by many educators (Tingsapat, 2014; Pattrawat, 2016; Panich, 2012; Sunan Siphai and Boonchoom Srisa-ard, 2015).

Education 4.0 is the education of the production era. It is the era that needs productivity or products for the benefit of the learners' communities and other communities. The specific skills for Industry 4.0 technologies that the educational systems need to provide to their graduates need to take into account several modern educational trends. These tends include: opportunities to learn at diverse times and places; personalized learning based on student's capabilities; use of new learning devices, tools, and resources; remote engineering labs; implementation of project-based and problem-based learning approaches; use of experiential and collaborative learning; student involvement in curriculum design; and increase mentoring approaches. (Elbestawi et all, 2018)This is consistent with the Prime Minister' concept that focuses on the two major policies: strength from within and connect to the world. "Thailand1.0" is also connected to "Thailand3.0" to become "Thailand4.0"that gets off the traps of imbalance, inequality and middle income country with two main strategies: closing the gap and creating wealth together. The process of education, therefore, should focus on the development of people on creativity to develop innovations, learning through Internet, creating Smart Famer & Smart Startup and being specialized labors by using the province-based education. The skill that should be emphasized is developing people to create new products which are their own concept, not foreign concepts. It is the time of teaching and learning that requires the creation of innovators and children and young generation are native digital. Traditional teaching and learning in the classroom that the students have to memorize the content of the lesson plan based on the curriculum or the traditional exam are not suitable for the modern education. Next generation

education needs to focus on the pursuit of self-learning in order to create new knowledge, expand old knowledge, think and apply knowledgethat is suitable for the learners themselves, and the society based on situations (Tingsapat, 2014;Sinlarat, 2015; Hannongbua, 2016;Piantit, 2016).

According to the concept of adaptation to Thailand 4.0", the concepts of developing the characteristics of Thai people in Education 4.0 have been proposed by a lot of academics. One concept that has attracted the attention of the academics is the concept of CCPR of Sinlarat (2015), which features the characteristics of four desirable graduates as follows.1) Critical thinking: graduates have to use the skills of critical thinking, criticism and judgment to not believe, not follow or not do anything without consideration and they have to choose, analyze and use their ideas carefully for not to be fooled, not to be possessed or become a tool of anyone. They are also required to have their own ideas.2) Creative thinking: graduates are required to have initiative ideas to create new things and develop the exist things as well as consider new things. 3) Product-Oriented, Productive: graduates must be creators of new concrete things and work. 4) Responsible: graduates are required to have responsibility on duty, morality and ethics, self-responsibility, and responsibility on family, society and environment.

The researcher, therefore, was interested in developing the indicators for developing the characteristics of the graduate characteristics' at the leapfrogging to the Education 4.0of Rajabhat University in Thailand. The results of the analysis will be the guidelines for the higher education institutions to produce the graduates that respond to the world change. Also, the higher education institutions and the related organizations can obtain important information that will be the guidelines for the promotion and the development of characteristics of graduate characteristics' at the leapfrogging to the Education 4.0 which affect the education and the development of the country.

2. Methodology

Question: What are the indicators of thegraduate characteristics' at the leapfrogging to the Education 4.0of Rajabhat Universities?

Objective: To develop the indicators of the graduate characteristics'at the leapfrogging to the Education 4.0of Rajabhat Universities

Population and sample

1) The population in this study was the students studying in Rajabhat Universities across the country.
2) There were four sample groups as follows.

2.1 Nine educational experts.

2.2 Ten students participated in the study of the development of indicators of the graduate characteristics' at the leapfrogging to the Education 4.0. Multiple-case studies were employed to deeply understand the context of the study about the understanding of the characteristics of graduates in Education 4.0.

2.3 A total of 631undergraduate students from Rajabhat Universities were used for the exploratory factor analysis for the study of the development of indicators of the graduate characteristics' at the leapfrogging to the Education 4.0. The concept of Fan & Wang was used to identify the sample size. It suggested that the sample size should be100-200people (Fan & Wang, 1998).Multi-stage sampling method was employed to select the samples.

2.4 A total of 1,200 undergraduate students from Rajabhat Universities were used for the second order confirmatory factor analysis for the development of indicators of the graduate characteristics' at the leapfrogging to the Education 4.0. To determine the sample size used for the development of the indicators, the concept of determining the number of samples to develop and validate the model was employed. Therefore, the sample size of about 5 to 10 times of the number of the parameters estimated in the model was used (Hair and et al., 1998).In this study the estimated parameters were 69. Therefore, a ratio of 10 persons per parameter was used, so the sample size included690 people. The sample size was increased to 1,234people obtained by using multi-stage random sampling method.

Research instruments

1) The interviews with educational experts and the undergraduate students on the graduate characteristics' at the leapfrogging to the Education 4.0
2) The questionnaire on the graduate characteristics' at the leapfrogging to the Education 4.0 obtained from the development of the indicators.

3. Methods

The study process of the development of the indicators of the characteristics of the graduates in Education 4.0 was as follows.

Step1:Qualitative research methodology was used for constructing the graduate characteristics' at the leapfrogging to the Education 4.0 by studying theories, textbooks, academic literature, and related research papers pertaining to characteristics of the graduate characteristics' at the leapfrogging to the Education 4.0the concepts of foreign academics before making the content analysis for drafting of variables of the development of indicators of the graduate characteristics' at the leapfrogging to the Education 4.0 before using them in the interviews for the opinions of 9 educational experts. The data were analyzed and summarized to create the variables of the graduate characteristics' at the leapfrogging to the Education 4.0.

Step2: Developing and modifying variables of graduate characteristics' at the leapfrogging to the Education 4.0of Step 1 by Qualitative Methodology of multiple case studies by in-depth interviews were administered with 10 students who were the representatives of each institute before making another inductive analysis to modify the variables of graduate characteristics' at the leapfrogging to the Education 4.0 to be in consistency with the reality.

Step3: Using Quantitative Methodology by Exploratory Factor Analysis to develop the indicators of the graduate characteristics' at the leapfrogging to the Education 4.0

Step 4: Examining the consistency of the model of the indicators of the graduate characteristics' at the leapfrogging to the Education 4.0between the hypothetical assumptions and the empirical data by Second order Confirmatory Factor Analysis using M-plus Program version 7.2.

4. Conclusion

1. The results of the development of the indicators of the characteristics of the graduate characteristics' at the leapfrogging to the Education 4.0using qualitative research methodology by studying theories, textbooks, documents, the research papers related to the graduate characteristics' at the leapfrogging to the Education 4.0, and 40 indicators were obtained.

The drafts were used for the interviews with 9educational experts. Then the data were analyzed and summarized to create the variables of the characteristics of graduate characteristics' at the leapfrogging to the Education 4.0. In addition, the in-depth-interviews were also administered with 10 students who were the representatives of each institute. The data were then analyzed and summarized in order to adjust the variables of the graduate characteristics' at the leapfrogging to the Education 4.0 which were completely consistent with the actual situations. Finally, 24 indicators were obtained as shown in Table 1.

Table 1: The results of the development of the graduate characteristics' at the leapfrogging to the Education 4.0

No.	The indicators of the graduate characteristics' at the leapfrogging to the Education 4.0
1	Students are creative people.
2	Students are capable of producing products.
3	Students have critical thinking skills.
4	Students are responsible people.
5	Students have leadership.
6	Students have a sense of entrepreneurship by creating a lot of work with small amount of money on investment.
7	Students have confidence in their abilities.
8	Students see the value of other humans.
9	Students critically have knowledge of the development of the world.
10	Students have morals and ethics.
11	Students are disciplined.
12	Students can solve problems.
13	Students have good interpersonal skills.
14	Students have public consciousness.
15	Students participate in local development.
16	Students have skills in using information technology.
17	Students have the skills to apply technology and innovation.
18	Students have professional skills.
19	Students have communication skills.
20	Students have the expertise in their field of study and can contribute to the integration of cross-disciplinary learning.
21	Students have the skills to apply knowledge for self-development.
22	Students have the skills to inspire themselves and others.
23	Students have collaborative skills.
24	Students have emotional management skills.

Step 3: Quantitative research methodology was employed by using exploratory factor analysis to develop the indicators of the graduate characteristics' at the leapfrogging to the Education 4.0.At this stage, the indicators obtained from Step 2 were used to ask for the opinions of the students from 10Rajabhat Universities.

For the analysis in this step, the researchers used the quantitative research method to develop the standards and the indicators of the graduate characteristics' at the leapfrogging to the Education 4.0 by using exploratory factor analysis and principal component analysis. The results of the analyses can be presented as follows: 1)KMO: Kaiser-Meyer-Olkin Measure of Sampling Adequacy, 2) Factor Extraction, 3) Factor Rotation by Orthogonal and Varimax and4)the results of the analyses were presented in Table 2.

Table 2: The results of the correlation of the variables

	Statistics	df	sig
KMO: Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.943	276	.000
Barlett's Test of Sphericity	6.831		

Table 2 showed that the value of KMO was .943; over .5 and close to 1. It can be concluded that the available data were suitable for using the principal component analysis to analyze the data. The result of Barlett's Test of Sphericity was statistically significant at .01 level (approx. chi-square = 6.831 sig = .000). This pointed out that the variables were correlated and appropriate for using the principal component analysis to analyze the data.

The results of the analysis indicated that the Eigen values and the percentages of the variances of the first component were (9.474 and 39.474); those of the second component were (1.710 and 7.127); and those of the third component were (1,299 and 5,413). The percentage of the cumulative variances of the three components was 52.013. This indicated that the Eigen values of all three standards were more than 1. In addition, the variance of the total indicator can be described by each component as 39.474%, 46.601%and 52.013%, respectively.

After Factor Extraction was operated for the graduate characteristics' at the leapfrogging to the Education 4.0, three components, which were the first component, the second component and the third component were found. In addition, the Eigen value and the percentage of variance of the first component was the highest (9.474 and 39.474) while the Eigen valuesand the percentages of the second component and the third component were relatively low. Therefore, the first component was very different from other components, and it seemed inappropriate to classify in any characteristic groups. Therefore, Factor Rotation was operated.

According to Factor Rotation in Table 2, it was found that the number of components was the same. The importance of the first component was distributed to the second component and the third component. The Eigen values and the percentages of variance were as follows: the first component (4.520 and18.832), the second component (4.041 and 16.836) and the third component (3.923 and 16.346). All

three components were able to describe the variance of the common characteristics as of 52.013%. According to the results of the analysis, the components were grouped and named as presented in Table 3-5.

Table 3: The first component: social responsibility

No.	Variable	Characteristics of the graduates in Education 4.0	Factor loading
1	n	Students have public consciousness.	.734
2	j	Students have morals and ethics.	.719
3	k	Students are disciplined.	.705
4	m	Students have good interpersonal skills.	.678
5	h	Students see the value of other humans.	.652
6	d	Students are responsible people.	.596
7	w	Students have collaborative skills.	.572
8	l	Students have problem solving ability.	.512
9	o	Students participate in local development.	.424
		Eigen Value:4.520 The percentage of variance:18.832	

From Table 3: the first component: social responsibility, it can be described by nine indicators with the factor loading ranging from .424 to .734. It consisted of thefirst three most significant weighted components: “Students have public consciousness.” (.734); “Students have morals and ethics.” (.719) and “Students are disciplined.” (.705), respectively. The first componentwas the variance source of the standard as of 4.520, accounting for18.832% of the total variance. It can be clearly seen that most indicators described the characteristics of graduates 4.0 of Rajabhat university students as having social responsibility, so it was named as social responsibility.

Table 4: The second component: creative productivity

No.	Variable	Characteristics of the graduates in Education 4.0	Factor loading
1	c	Students have critical thinking skills.	.738
2	b	Students are capable of producing products.	.735
3	a	Students are creative people.	.693
4	e	Students have leadership.	.672
5	g	Students have confidence in their abilities.	.527
6	f	Students have a sense of entrepreneurship by creating a lot of work with small amount of money on investment.	.514
7	i	Students critically have knowledge of the development of the world.	.498
		Eigen Value: 4.041 The percentage of variance: 16.836	

From Table 4: the second component: creative productivity, it can be described by seven indicators with the factor loading ranging from .498 - .738. It consisted of the first three most significant weighted components: “Students have critical thinking skills.” (.738); “Students are capable of producing products.”(.735); and “Students are creative people.” (.693), respectively. The second component was the variance source of the standard as of 4.041, accounting of 16.836 % of the total variance. It can be clearly seen that most indicators described the graduate characteristics’ at the leapfrogging to the Education 4.0of Rajabhat university students as having creative thinking for producing products, so it was named as creative productivity.

Table 5: The third component: skills of the graduates at the leapfrogging to the Education 4.0

No.	Variable	Characteristics of the graduates in Education 4.0	Factor loading
1	q	Students have the skills to apply technology and innovation.	.774
2	p	Students have skills in using information technology.	.752
3	u	Students have the skills to apply knowledge for self-development.	.595
4	v	Students have the skills to inspire themselves and others.	.530
5	t	Students have the expertise in their field of study and can contribute to the integration of cross-disciplinary learning.	.528
6	r	Students have professional skills.	.521
7	x	Students have emotional management skills.	.504
8	s	Students have communication skills.	.454
		Eigen Value: 3.923 The percentage of variance: 16.346	

From Table 5: the third component: skills of the graduatesat the leapfrogging to the Education 4.0, it can be described by eight indicators with the factor loading ranging from .454 - .774. It consisted of the first three most significant weighted components: “Students have the skills to apply technology and innovation. (.774); “Students have skills in using information technology. (.752); and “Students have the skills to apply knowledge for self-development.” (.595), respectively. The third component was the variance source of the component as of 3.923, accounting of 16.346% of the total variance. It can be seen that most indicators described the graduate characteristics’at the leapfrogging to the Education 4.0of Rajabhat university students about the skills of graduates at the leapfrogging to the Education 4.0, so it was named as skills the of graduatesat the leapfrogging to the Education 4.0.

Step4:The consistency of the model of the measurement of the indicators of the graduate characteristics’at the leapfrogging to the Education 4.0 in terms of hypothesis and the empirical data were verified by the second order confirmatory factor analysis using the Mplus Version 7.2 program. The results were as follows.

Table 6: The statistical results of the second order confirmatory factor analysis of the indicators of the graduate characteristics’ at the leapfrogging to the Education 4.0

Component	Indicator	Factor loading (b)	Standardized factor loading (β)	SE	Z	R^2
Social responsibility	n	1.000**	0.662**	0.022	30.212	0.439
	j	1.002**	0.661**	0.021	31.399	0.438
	k	1.031**	0.663**	0.020	33.363	0.440
	m	1.065**	0.699**	0.019	36.111	0.489
	h	0.831**	0.563**	0.025	22.449	0.317
	d	0.925**	0.620**	0.023	26.435	0.385
	w	1.031**	0.680**	0.020	34.605	0.462
	l	1.183**	0.807**	0.022	36.402	0.651
	o	1.258**	0.780**	0.025	30.701	0.608
Creative productivity	c	1.000**	0.650**	0.021	31.560	0.335
	b	0.992**	0.659**	0.019	34.397	0.435
	a	0.878**	0.578**	0.023	25.688	0.335
	e	1.159**	0.690**	0.017	39.518	0.476
	g	1.075**	0.695**	0.019	36.420	0.483

	f	1.062**	0.653**	0.019	35.042	0.426
	i	1.102**	0.683**	0.019	36.021	0.466
Skills of graduates 4.0	q	1.000**	0.632**	0.019	33.236	0.399
	p	0.939**	0.592**	0.020	49.464	0.351
	u	1.162**	0.781**	0.014	47.209	0.610
	v	1.067**	0.681**	0.018	52.630	0.464
	t	1.088**	0.709**	0.017	54.184	0.503
	r	1.059**	0.712**	0.016	52.131	0.507
	x	-4.794**	-0.080*	0.030	50.217	0.006
	s	1.094**	0.719**	0.016	60.693	0.517

When the standardized factor loading (ß) of the model was considered, almost all indicators were statistically significant at .01 levels, except the indicator X:"Students have emotional management skills." which was statistically significant at .05 levels. The indicator with the highest factor loading was the first component: the indicator L: "Students have problem solving ability." (ß = 0.807); followed by the third component: the indicator U:"Students have the skills to apply knowledge for self-development."(ß =0.781); and the first component: the indicator O:"Students participate in local development." (ß = 0.780), respectively.

When the coefficient of determination (R^2) of all indicators was considered, it was ranged from 0.006 - 0.651. The indicator with the highest coefficient of determination (R^2) was the first component: the indicator L: "Students have problem solving ability."(R^2= 0.651), followed by the third component: the indicator U: "Students have the skills to apply knowledge for self-development." (R^2= 0.610); and the first component: the indicator O: "Students participate in local development." (R^2 = 0.608), respectively.

Table 7: The statistical results of the second order confirmatory factor analysis of the components of the graduate characteristics' at the leapfrogging to the Education 4.0

Component	Factor Loading (b)	Standardized factor loading (β)	SE	Z	R^2
Social responsibility	1.000	0.856	0.016	53.665	0.733
Creative productivity	0.970	0.871	0.013	65.766	0.758
Skills of graduates 4.0	1.134	0.972	0.012	81.975	0.945

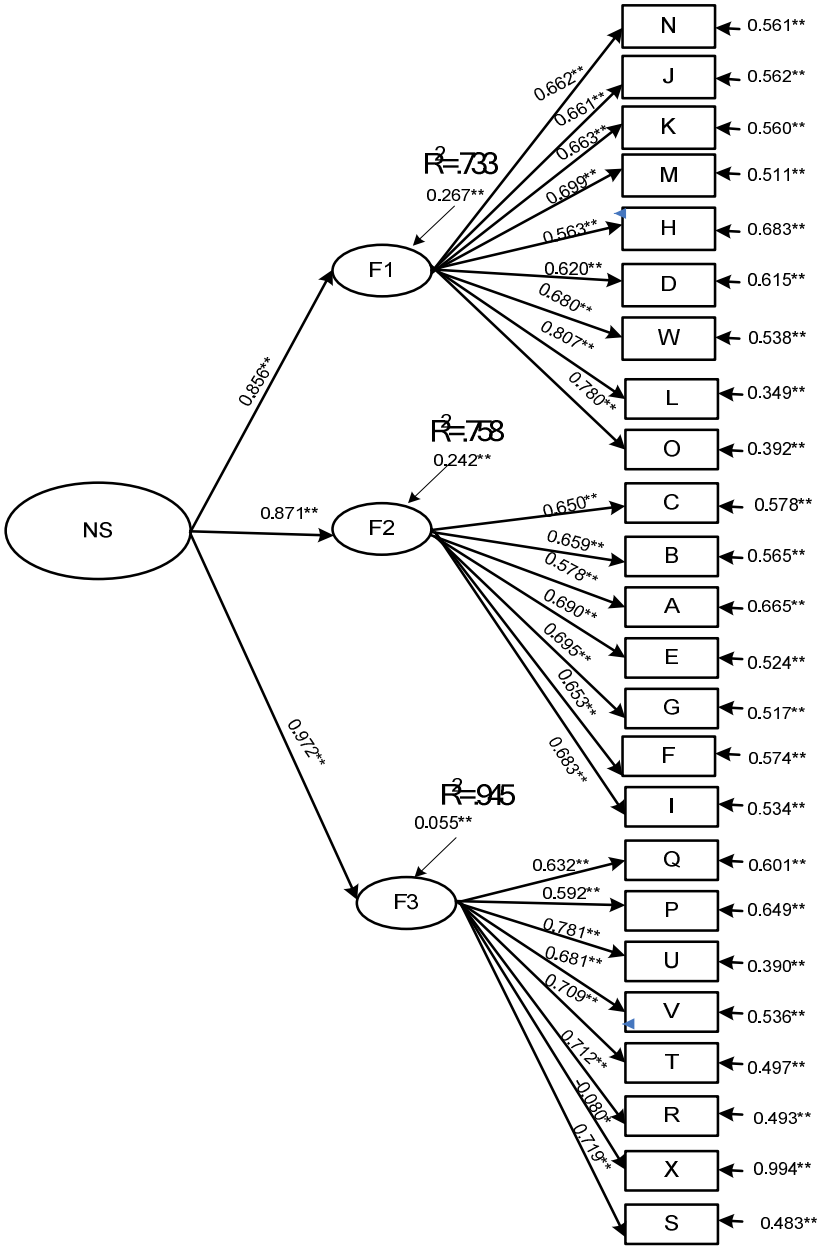
When the standardized factor loading (ß) of the model was considered, all of the components were statistically significant at .01 levels. The component with the highest factor loading was the third component which was skills of the graduates at the leapfrogging to the Education 4.0(ß =0.972), followed by the second component which was creative productivity (ß =0.871), and the first components which was social responsibility (ß =0.856), respectively.

When the coefficient of determination (R^2) of all components was considered, it was ranged from0.006 - 0.651. The component with the highest coefficient of determination (R^2) was the third component: skills of the graduates at the leapfrogging to the Education 4.0(R^2= 0.945), followed by the second component(R^2= 0.758): creative productivity (R2 = 0.610); and the first component: social responsibility (R^2= 0.733), respectively.

Table 8: The statistic values used to verify the validity of the model by Section order Confirmatory Factor Analysis of the graduate characteristics' at the leapfrogging to the Education 4.0

Latent variable	χ^2	df	χ^2/df	p- value	CFI	TLI	RMSEA	SRMR
F	150.688	149	1.011	0.4459	1.000	1.000	0.003	0.017

From Table 8, the results of the second order confirmatory factor analysis of the graduate characteristics' at the leapfrogging to the Education 4.0 revealed that the model had structural consistency. This can be considered from the statistical values used to verify the validity of the model as follows: χ^2 =150.688วdf =149;p-value = 0.4459; CFI=1.000;TLI = 1.000;RMSEA = 0.003; SRMR= 0.017and χ^2 /df = 1.011 as shown in Figure 1.



χ^2 _150.688,*df* = 149, p-value= 0.4459, CFI = 1.000,

TLI = 1.000, RMSEA = 0.003, SRMR = 0.017, χ^2 /df = 1.011

Figure 4**:** The verification of the model by second order confirmatory factor analysis of the graduate characteristics' at the leapfrogging to the Education 4.0

It can be concluded that the model of standard measurement and the indicators of graduate characteristics' at the leapfrogging to the Education 4.0 from the second-order confirmatory factor analysis had structural consistency or was highly correlated with the empirical data. That is, all standards and indicators in the model were important standards and indicators and had relationships in supporting each other.

5. Discussion

1. The results of the development of the indicators of the graduate characteristics' at the leapfrogging to the Education 4.0 of Rajabhat University revealed 3 components and 24 indicators as follows:

The first component: social responsibility**:** It isthe component of graduates at the leapfrogging to the Education 4.0because Education 4.0 is the period of requiring maximum productivity or products for the benefit of own community and other communities. Therefore, the graduate characteristics' at the leapfrogging to the Education 4.0must have public consciousness, discipline, morality and ethics and good interpersonal skills. They are also required to recognize value of human being and be responsible and have collaborative skills, solving problem ability and also participate in local development. It is also in accordance with Sinlarat (2015) stating about the graduate characteristics' at the leapfrogging to the Education 4.0 that graduates must concern about society and the nation and have public consciousness, ethics, morality, self-

responsibility and responsibility for family, society and environment. Sukhothai Thammathirat Open University also discussed the characteristics of the desirable graduates that students must be responsible (Sukhothai Thammathirat Open University, 2012). It is also in accordance with the research of Thanuworraphat (2012) studying the desirable characteristics of graduates for the entrepreneur: a case study ofEnglish for Communication Graduates, Faculty of Social Sciences and Liberal Arts, University of North-Chiang Mai. The results showed that the desired characteristics of the graduates required by the entrepreneur were interpersonal skills and responsibility. These results were consistent with the study of Pangsri and Rittirod (2014) study ingideal Thai graduates characteristics according to Thailand Qualification Framework for Higher Education (Tqf:Hed) of graduate students, Khon Kaen University. The results revealed that ideal Thai graduates' characteristic according to TQF was responsibility. Buakreun (2016) also studied the development of performance criteria and indicators for the quality of graduates in autonomous universities.The results showed that responsibility was one of the important components. Sakulpanyawat & Maluleam (2014) studied the development of education environment model to produce graduates having desirable features according to the National Higher Education Qualifications Framework for nursing graduates (TQF) 2009 and found thatthe desirable features that were influenced the most were interpersonal relationship and responsibility.

The second component: creative productivity**:** It is the component of graduate characteristics'at the leapfrogging to the Education 4.0 because the Education 4.0 is an era that needs creative products that can generate income on the basis of less capital with more productivity. Therefore, the graduates at the leapfrogging to the Education 4.0 must have critical thinking ability and the ability to produce products. In addition, they must be creative, have leadership and confidence in their ability and they are required to critically have knowledge of the development of the world. These are consistent with the study of Sinlarat (2015) stating that Thai Education 4.0 should be creative and productive. The education should focus on creative thinking, and the creative thinking must be converted to products. Therefore, the graduates or new generation workers in the future must be creative and productive persons. Creativity is a feature that is required by every organization in the society because creative people do not stop thinking and they will always try to find better, more appropriate, and more effective ways in doing things. Creative thinking and productive ability are the basis of knowledgeable workers in the future, and they are important foundations for developing other abilities in producing valuable and beneficial products to the country. The development of creativity in various aspects of people is a reflection of the country's progress, in particular, the roles of creativity in inventing, applying, or modifying new things which are helpful or troubleshooting. These are consistent with the vision for higher education development of the 9th National Economic and Social Development Plan which clearly defined that "Higher education institutions produce graduates with self-consciousness in self-creating productivity." It is also in accordance with the National Education Act of B.E. 2542, Chapter 4, on the topic of education management in Section 28, paragraph 2stating that "The course content must be both academic and professional." (Office of the National Education Commission, 2002). In addition, it is line with the concept of the proposes and the guidelines for Thai education management in order to enhance Thai education to Education 4.0, which define that the higher education institutions should focus on the development of learning strategies that focus on the development of learners, product creation, learning management, creative education and production (Kamdit, 2016). It also corresponds to the research of Buakreun (2016)studying the development of performance criteria and indicators for the quality of graduates in autonomous universities and found that the indicators included creativity, work processes, and performance.

The third component: skills of the graduates at the leapfrogging to the Education 4.0:It is the component of the graduates at the leapfrogging to the Education 4.0 because the Education 4.0 is an era where skilled graduates are needed to be into the future world. These include skills in applying technology and innovation, skills in using information technology, skills in applying knowledge to self-improvement, skills in inspiring themselves and others, professional skills, emotional management skills and having the expertise in their field of study which contribute to the integration of cross-disciplinary learning. These are in accordance with the Office of the Basic Education Commission (cited in Arunpiboon, 2014) suggesting that teachers in the 21st century need to focus on 3R x 7C learning activities, which are the skills of the 21st century people who are aware of information and have the ability to read and write through technology media, use computer and read and write via electronic media and have critical thinking and problem solving skills and be professional and skillful in learning. This is consistent with the ideas of Tewa-aksorn (2012)mentioning that Thai children in the 21st century must have three important attributes. First, they must have a variety of skills and be able to solve problems. Second, they have to look at the world as a small world which is not limited only in Thailand. They are also required to look for new opportunities. Lastly, the new generation of Thai children needs language skills. Onwimon (2013) also presented his views on the 21st century students that teachers must teach 21st century skills which include learning and innovation skills as well as creativity, critical thinking, communication, collaboration, information, media and technology skills related to the assessment of information from digital technology and lifestyle and occupational skills to students.

6. Suggestions

The results can be applied to the university students in any countries in order to know that how many the graduate characteristics' at the leapfrogging to the Education 4.0 they have.

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