Online Teaching and Learning RUS Model: Innovation for University Administration in a new way of life (New Normal)) during the COVID-19 Pandemic.

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Abstract— This research aims to 1) Analyze problems and readiness 2) Develop a model and 3) Evaluate and certify an effective online teaching and learning management model. and suitable for the context of Rajamangala University of Technology Suvarnabhumi The sample group consisted of 988 administrators, teachers and students by multistage sampling. Analyze data with exploratory (EFA) and corroborative (CFA) elements. The results showed that 1) The results of the analysis of problems and readiness from students revealed that 3 condition factors, 2 4 variables, 3 demand factors, 1 4 variables and 7 factors of the appropriate model, 4 3 variables. Instructors found that 3 condition factors, 1 8 variables, 3 demand factors, 1 9 variables, and 7 appropriate components factors 4 6 variables. 2) The developed Online Teaching and Learning RUS Model consisted of a) a preparation process, b) an online teaching and learning process, and 3) an evaluation of the developed Online Teaching and Learning RUS Model at a high level. the most It can be used as a model in online teaching management of Rajamangala University of Technology Suvarnabhumi.

Keywords- Coronavirus; Covid-19; Online Teaching and Learning Model; New Normal

I. INTRODUCTION

The spread of COVID-19 virus is a present crisis facing over 200 countries around the world. It has dramatically affected the economy and spread its effect to every education level, leading to the closure of several education institutes [14,43,44,45]. In 2020, it was reported 500 million learners in 46 countries and 5 continents have been disturbed from the school closure [24,44], including Thailand where its government has announced social distancing measurement to control the spread of the disease. Ministry of Higher Education, Science, Research and Innovation has also announced measurement and monitored the situation (Ministry of Higher Education, Science, Research and Innovation, 2020) by cancelling a face-to face learning pattern and changing it to be an online one like other countries [44]. Every educational institute then has responded to the order and adjusted the teaching method to carry on effectively [9,14,19,46,36].

Rajamangala University of Technology Suvarnabhumi, an institution producing practical graduates, has been immensely affected by the situation since we are subordinate to Ministry of Higher Education, Science, Research and Innovation. The university focuses on vocational teaching and advanced technology that mostly rely on practices. It is a medium-size regional university whose problem is a lack of facilitating factors that support online classes. But it needs to adjust itself from serving face-to-face classes to online learning, according to the

regulation brought in by the ministry and worldwide practice [9,38]. This has dramatically affected the teaching method. Most lecturers and learners are not prepared and able to adjust themselves to the change. Although online learning can facilitate distance education. It does have its limitation: 1) Learners are not fully equipped with all necessary tools. They have to deal with higher internet service fee, which may cause educational disparity [8,9,11,23]; 2) Some instructors do not possess capability to teach online since they are not familiar with the technology. The others fail to comprehend the online teaching method, and only provide the content on online platform, having the students study by themselves. Some of them are deficient in techniques, giving lectures without interaction and causing boredom. Thus, students cannot practice and achieve anticipatedly academic results [8], [11,23,36,38]; 3) The sportive system that enhance online teaching is still insufficient [8,11,23,36].

According to the mentioned problems, the researchers employed research methods by firstly analyzing the problems and readiness for online teaching. Exploratory Factor Analysis (EFA), common factor analysis and Confirmatory Factor Analysis (CFA) were adopted. And the results were developed to be an effective and appropriate online-teaching model, serving lecturers and learners of Rajamangala University of Technology Suvarnabhumi under a new normal way of life.

II. OBJECTIVES

1) To analyze the problems and readiness for providing an online teaching and learning in Rajamangala University of Technology Suvarnabhumi under the new normal way of life.

2) To develop an effective and suitable Online Teaching and Learning RUS Model for Rajamangala University of Technology Suvarnabhumi under the new normal way of life.

3) To evaluate and certify the Online Teaching and Learning RUS Model by the panel of experts.

III. LITERRATURE REVIEWS

Online Learning was a concept developed since 1990 to serve the distance education in which lecturers and learners were far away from each other [25]. The concept was called in several names such as open learning), web-based learning, computer-mediated learning), blended learning), or m-learning [45]. It is a learning method whose learners choose the subject and learn by themselves via the internet without travelling. It is convenient, easily accessible everywhere and every time, and a lifelong education for all people. By doing this, lecturers must provide highly interactive activities and experiences for students employing technology and equipment such as mobile phones or laptops. Online learning, thus, is a tool to create a student-centered learning process using innovations and enhancing learning agility [7,21,31]. At present, a few concepts and principles of online teaching are given; for example, by Mishra [26] and Koehler [22]. They suggested the concept called Technological Pedagogical Content Knowledge (TPACK), a quality teaching method that focuses on the use of advanced technology, considers the quality of teaching content, and selects teaching methods suitable with technology to benefit learners. Thus, it is an integration of knowledge components in 3 dimensions: Contents Knowledge; Pedagogical Knowledge; and Technology Knowledge [30]. When TPACK is adopted to design learning process and develop an instruction model (IM) using ADDIE Model principle, a process for designing and developing online lessons with 5 phases: Analysis Phase; Design Phase; Development Phase; Implementation Phase; and Evaluation Phase [2,35], it causes benefit for teaching and learning process at present. An example is the study conducted by [41]. The research adopted the TPACK notion to measure the lecturers' efficiency of teaching based on the ADDIE Model.

Additionally, teaching format based on Gagne's notion (1985) called "learning theory of Gagne" consisting of 9 stages: motivate the learner; inform learners of learning objectives; recall previous knowledge; present the material to be learned; provide guidance for learning; active Involvement; provide feedback; testing; and providing enrichment or remediation, was adopted. His concept is widely accepted for providing the learning process, and taking part in developing online lessons to become effective and more relatable to learners since it's holding the principle of presenting interactive content and activities. Another example was the study conducted by [27]. The study adopted Gagne's learning concept to design an online teaching plan, and it was found the students' academic achievement was statistically higher. Moreover, their satisfaction toward the online class was also rated high.

Sometimes a few techniques are combined to enhance the efficiency in teaching according to the 6Ts concept based on Allington (2002), a technique that improves learner's skills and boosts the learning efficiency. It is composed of 6 components: 1) Time (T1) - to allocate time portion in teaching; 2) Text (T2) – to teach with different context and models; Teach (T3) – is a teaching technique, interesting presentation, instructional media and activities; 4) Talk (T4) – to familiarize, motivate and courage learners to take part; 5) Task (T5) – is an activity that provides practice and assignment for learners gain skills and experience; and 6) Test (T6) – is an evaluation based on real context in different models. These 6Ts techniques, when being employed in teaching, would increase the capability in teaching and learning. And they are suitable with the current situation when conventional classrooms cannot be conducted, and the contact is made via online between lecturers and learners. [5] has conducted online teaching by applying 6Ts techniques. [28] has applied 6Ts in online lessons, enhancing the learners' skills and appropriate with practical classes in which they practice their skill and gain experience. This notion can properly respond to the teaching context that

Rajamangala University of Technology Suvarnabhumi is seeking for at present. We are one among other nine Rajamangala Universities of Technology with 4 educational centers: Hantra; Wasukri; Suphanburi and Nonthaburi Center. We open six learning programs in 5 levels: vocational certificate; high vocational certificate; bachelor; master and doctoral degrees. Instruction is conducted under the philosophy of developing people's potential with vocational and advanced technology knowledge, so they obtain the aptitude of being an entrepreneur, become wanted by the job market, and fit into the country's development direction. Our determination is to provide a vocational and advanced technological education with quality and continuous development. Our obligation focuses on providing education using high technology and emphasizing practice to serve the university's identity that aims to produce practical, moral, knowledgeable and hard-working graduates.

IV. Research Methodology

This research employed a mixed method consisting of both qualitative and quantitative research and was conducted as described below.

The population of this study was composed of executives, lecturers and students from Rajamangala University of Technology Suvarnabhumi, altogether 10,299 participants consisting of 126 executives, 650 lecturers and 9,523 students.

There were two sample groups in this investigation: 1) Qualitative research – 3 executives, 7 lecturers and 10 students, total 20, were determined using purposive sampling method; 2) Quantitative research – the sample group consisting of executives, lecturers and students was calculated its size by employing Taro Yamane [47] identifying-population method together with e = .05 (error = 5%). The result of the sample size was 385. Next, probability sampling was conducted using Stratified Sampling [32]. The population was divided into different faculties, and simple random sampling was then used in each group: executives, lecturers and students. Due to the spread of COVID19 virus at present; however, the data were collected online via Google forms, sent through Line application group chat and Facebook of the sample group. The 988 questionnaires, 745 from students; 158 from lecturers and 85 from executives, were returned.

In this research, SPSS and Lisrel programs were adopted to analyze the inferential statistics using Exploratory Factor Analysis (EFA). In case the structure of relation between the observed variables was unknown, a common factor was then employed. (Hair et al., 2010, pp. 89-93). Meanwhile, Confirmatory Factor Analysis (CFA) was used in case the structure of relation between the observed variables was known [13] by obtaining the data from 988 samples of questionnaires.

V. Results

The research for developing an online teaching and learning RUS model that fits the present context and serves new normal way of life can be concluded its findings as follows:

A. The analysis of the problems and readiness for an online teaching and learning within Rajamangala University of Technology Suvarnabhumi after affected by COVID-19 virus

1) Qualitative analysis findings

The qualitative analysis was conducted by using an in-depth interview. The sample group was composed of executives, lecturers and students, total 20 participants who were interviewed in 3 main points. The points were, firstly, problems about software, technology and online-learning equipment; secondly, problems about learning and teaching activity provision; and thirdly, problems about strategies and policy that support online teaching and learning. The results can be concluded as follows: 1) problems about software, technology and online-learning equipment were discussed among the executives, lecturers and students, and they agreed that they should be supported by the basic factors of online teaching and learning especially the stability and coverage of internet signal, the variety of assisting programs with copyrights, which were easy to access and sufficient; 2) in terms of problems about learning and teaching activity provision, the executives viewed that online teaching should be only a supplement since the context of the university emphasized practice. The lecturers pointed out that the learning environment was not appropriate; students lacked discipline and finally failed to achieve anticipated academic outcomes. In students' views, they thought the content and criteria should be adjusted to fit with online learning context. The videos should be added for them to review after class; 3) In terms of problems about strategies and policy, all of the participants agreed that the university should have the policy of reducing tuition fee or supporting online learning expenses to the students.

2) Quantitative analysis findings

Qualitative analysis findings were composed of Exploratory Factor Analysis (EFA), and common factor analysis and Confirmatory Factor Analysis (CFA). The findings were as follows:

a) Exploratory Factor Analysis (EFA)

- Students

The variables obtained from the analysis of the student group's data were extracted and analyzed the factors. It was found that KMO = 0.808, 0.813 and 0.890, respectively. The Bartlett's Test of Sphericity has statistical significance at 0.05, which meant every variable had sufficient relation to receive factor analysis. When the factor analysis was conducted, it was found that common factors, when being analyzed, and when the condition of online teaching and learning at present context was rotated, 3 factors were extracted with 24 observed variables. About the need in online teaching and learning, 3 factors were extracted with 14 observed variables. And

in terms of appropriate components of the online teaching model, 7 factors were extracted with 43 observed variables. Every factor had an Eigen value higher than 1 with more than 0.5 loading factor [13].

- Lecturers

The variables obtained from the analysis of the lecturer group's data were extracted and analyzed the factors. It was found that KMO = 0.886, 0.935 and 0.816, respectively. The Bartlett's Test of Sphericity has statistical significance at 0.05, which meant every variable had sufficient relation to receive factor analysis. When the factor analysis was conducted, it was found that common factors, when being analyzed, and when the condition of online teaching and learning at present context was rotated, 3 factors were extracted with 18 observed variables. About the need in online teaching and learning, 3 factors were extracted with 19 observed variables. And in terms of appropriate components of the online teaching model, 7 factors were extracted with 46 observed variables. Every factor had an Eigen value higher than 1 with more than 0.5 loading factor [13].

- Executives

The variables obtained from the analysis of the executive group's data were extracted and analyzed the factors. It was found that KMO = 0.934, 0.896 and 0.964, respectively. The Bartlett's Test of Sphericity has statistical significance at 0.05, which meant every variable had sufficient relation to receive factor analysis. When the factor analysis was conducted, it was found that common factors, when being analyzed, and when the condition of online teaching and learning at present context was rotated, 2 factors were extracted with 12 observed variables. About the need in online teaching and learning, 3 factors were extracted with 15 observed variables. And in terms of appropriate components of the online teaching model, 5 factors were extracted with 34 observed variables. Every factor had an Eigen value higher than 1 with more than 0.5 loading factor [13].

B. Confirmatory Factor Analysis (CFA)

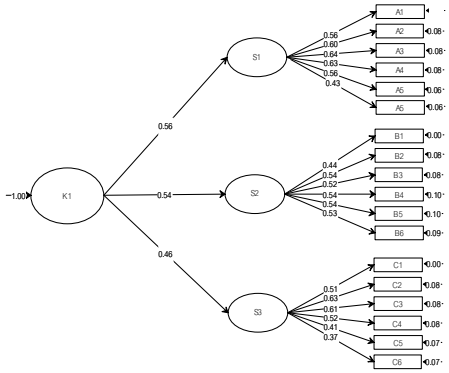
- Students

When Confirmatory Factor Analysis (CFA) was conducted, the survey results from the sample group extracted the confirmatory factors from the variables. The findings showed that there were 3 factors of online teaching and learning at present context and 24 variables.

TABLE I. THE RESULTS OF CONFIRMATORY FACTOR ANALYSIS (CFA) IN ONLINE TEACHING AND LEARNING MODEL. THE STUDENT SAMPLE GROUP.

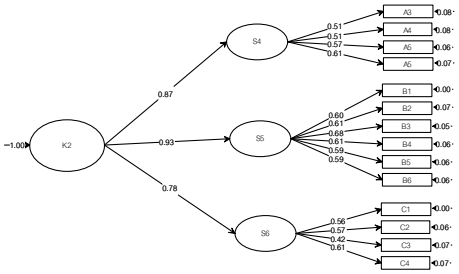
indicators	Factor weight		R^2
	β	*SE*	
The condition of online teaching and learning at present context (K1)			
S1	0.56**	0.07	0.31
S2	0.54**	0.14	0.98
S3	0.46**	0.06	0.21
The need in online teaching and learning (K2)			
S4	0.87**	0.08	0.76
S5	0.93**	0.07	0.99
S6	0.78**	0.07	0.60
Appropriate components of online teaching model (K3)			
S7	0.87**	0.06	0.75
S8	0.91**	0.05	0.83
S9	0.93**	0.06	0.86
S10	0.88**	0.06	0.77
S11	0.86**	0.06	0.73
S12	0.79**	0.06	0.63
S13	0.82**	0.07	0.67

a. * p < 0.05, ** p < 0.01



$\chi^2 = 74.11$, df =118, $\chi^2/df = 0.68$, p-value = 0.999, GFI = 0.99, AGFI = 0.98, NFI=0.99, NNFI=1.00, CFI=1.00, RMSEA = 0.000, SRMR=0.025, CN=1,626.47

Figure 1. The condition of online teaching and learning at present context model.



$\chi^2 = 40.57$, df =64, $\chi^2/df = 0.63$, p-value = 0.990, GFI = 0.99, AGFI = 0.99, NFI=0.99, NNFI=1.00, CFI=1.00, RMSEA = 0.000, SRMR=0.018, CN=1,779.22

Figure 2. The need in online teaching and learning model.

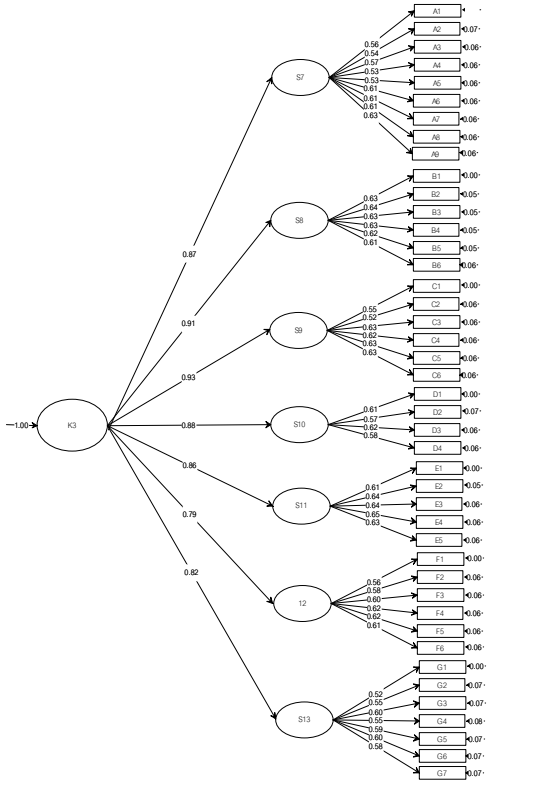


Figure 3. The factors of appropriate components of online teaching model.

Based on table 1 and figure 1-3, it was shown that the first priority the students gave to the condition of online teaching and learning at present context was overall condition of students (S1), followed by the condition of the condition of software and technology used in teaching (S2), and the last one was the condition of strategies and policy supporting online teaching and learning (S3). The point that most students placed importance on was that the software for online learning still lacked safety and privacy protection for users. The existent software and technology could not support practical subjects, and the computers could not support online learning, either.

When talking about the factor of online teaching and learning most students demanded, it was found that the need in software and technology provided for online learning came at the first place(S5), followed by the need to improve students (S4), and last the need in strategies and policy supporting online teaching and learning (S6) The demand that most students placed importance on was the software for online learning that protected safety and privacy of users, and the computers with efficiency that could support online learning for every student.

The appropriate components of online teaching model to which most students gave first priority was the communication and interaction (S9), followed by content management (S8); measurement and evaluation (S10); online learning management system (S7); necessary IT skills of students (S11); anticipated online-learning environment (S13); and lastly, online-learning aptitude (S12), respectively. The point that most students placed importance on was that the communication channels should be various where students could simply interact with lecturers, or students with students; lecturers could give feedback that displayed quickly connected to social networks.

- Lecturers

When Confirmatory Factor Analysis (CFA) was conducted, the survey results from the sample group extracted the confirmatory factors from the variables. The findings showed that there were 3 factors of online teaching and learning at present context and 18 variables.

TABLE II. THE RESULTS OF CONFIRMATORY FACTOR ANALYSIS (CFA) IN ONLINE TEACHING AND LEARNING MODEL. THE LECTURER SAMPLE GROUP.

indicators	Factor weight		R^2
	β	*SE*	
The condition of online teaching and learning at present context (K1)			
S1	0.75**	0.13	0.57
S2	0.89**	0.09	0.79
S3	0.61**	0.08	0.37
The need in online teaching and learning (K2)			
S4	0.78**	0.06	0.61
S5	0.82**	0.07	0.97
S6	0.59**	0.05	0.35
Appropriate components of online teaching model (K3)			
S7	0.64**	0.05	0.42
S8	0.90**	0.06	0.83
S9	0.79**	0.06	0.65
S10	0.73**	0.05	0.55
S11	0.79**	0.05	0.61
S12	0.87**	0.05	0.73
S13	0.96**	0.06	0.80

b. * p < 0.05, ** p < 0.01

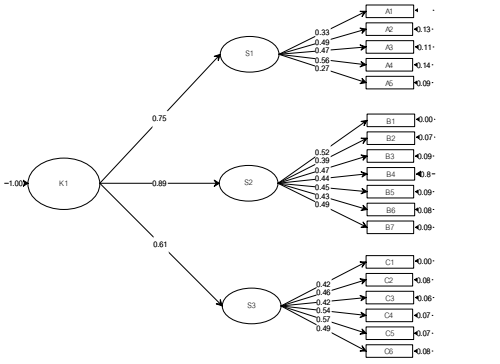
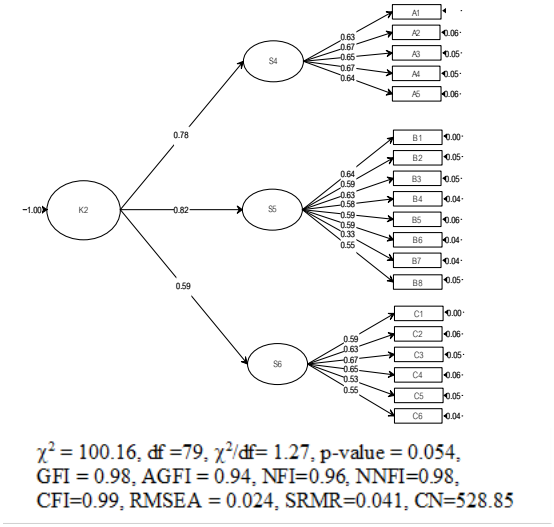
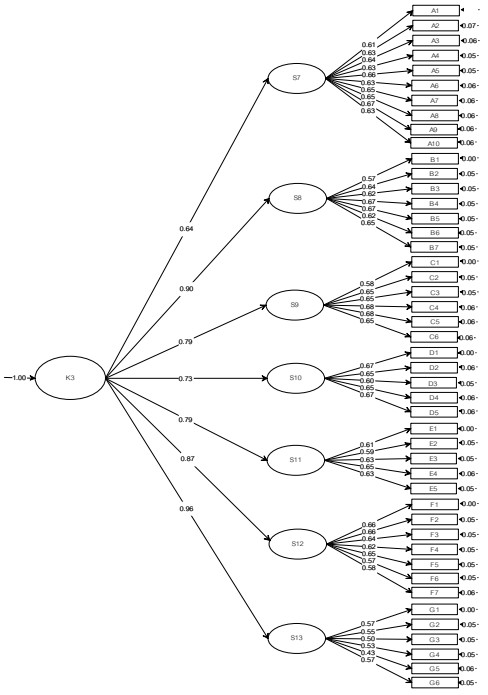


Figure 4. Model of condition factors in online teaching and learning at present.



χ^2 = 100.16, df =79, χ^2/df= 1.27, p-value = 0.054,
GFI = 0.98, AGFI = 0.94, NFI=0.96, NNFI=0.98,
CFI=0.99, RMSEA = 0.024, SRMR=0.041, CN=528.85

Figure 5. The factor of the demand in online teaching and learning model.



χ^2 = 1,278.39, df =930, χ^2/df= 137, p-value = 0.0835,
GFI = 0.93, AGFI = 0.92, NFI=0.98, NNFI=1.00,
CFI=1.00, RMSEA = 0.022, SRMR=0.047, CN=747.68

Figure 6. The factors of appropriate components of online teaching model.

Based on table 2 and figure 4-6, about the condition factor of online teaching and learning at present context, it was found that the lecturers give first priority to software and technology used in online teaching (S2), followed by the overall condition of lecturers (S1); and lastly, the overall condition of strategies and policy that supported online teaching and learning. The point that most lecturers placed importance on was a software for online teaching which was not effective in some modules.

The factor of demand in online teaching and learning that was given first priority by the lecturers was the demand in software and technology for teaching (S5), followed by the demand in improving the lecturers' quality (S4); and lastly, the demand in strategies and policy that supported online teaching and learning (S6). The point placed most importance was the demand in the software for teaching and learning that was effective and suitable with the university's context.

The factors of suitable components of online teaching model that lecturers gave first priority was the anticipated online learning environment (S13); followed by content management (S8); online teaching (S12); communication and interaction (S9); necessary IT skills of lecturers (S11); measurement and evaluation (S10); and lastly, online teaching and learning management system (S7), respectively. The point on which was most placed importance was that lecturers and students should have a positive attitude toward online teaching. And the developed teaching online system must improve both lecturers and students' behaviors during the class. Also, the executives could catch up the teaching process.

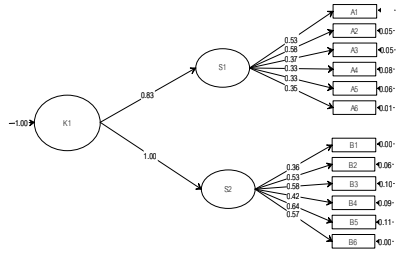
- Executives

When Confirmatory Factor Analysis (CFA) was conducted, the survey results from the sample group extracted the confirmatory factors from the variables. The findings showed that there were 2 factors of online teaching and learning at present context and 12 variables.

TABLE III. THE RESULTS OF CONFIRMATORY FACTOR ANALYSIS (CFA) IN ONLINE TEACHING AND LEARNING MODEL. THE EXECUTIVE SAMPLE GROUP.

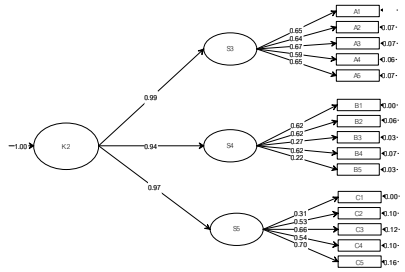
indicators	Factor weight		R^2
	β	*SE*	
The condition of online teaching and learning at present context (K1)			
S1	0.83**	0.08	0.69
S2	1.00**	0.12	1.00
The need in online teaching and learning (K2)			
S3	0.99**	0.06	1.00
S4	0.94**	0.06	0.88
S5	0.97**	0.13	0.95
Appropriate components of online teaching model (K3)			
S6	0.88**	0.11	0.77
S7	0.96**	0.06	0.91
S8	0.84**	0.06	0.70
S9	0.94**	0.05	0.88
S10	0.23*	0.10	0.05

c. * p < 0.05, ** p < 0.01



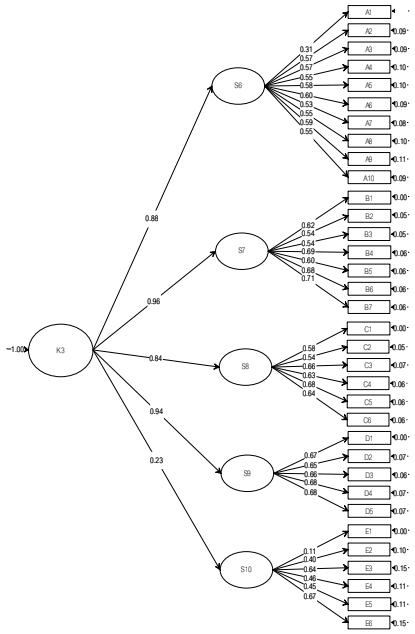
$\chi^2 = 36.54$, df =33, $\chi^2/2 = 1.11$, p-value = 0.308,
GFI = 0.99, AGFI = 0.98, NFI=0.98, NNFI=1.00,
CFI=1.00, RMSEA = 0.012, SRMR=0.022, CN=1,100.40

Figure 7. The factors of current condition of online teaching model.



$\chi^2 = 66.10$, df =54, $\chi^2/df = 1.22$, p-value = 0.1249,
GFI = 0.99, AGFI = 0.97, NFI=0.99, NNFI=1.00,
CFI=1.00, RMSEA = 0.017, SRMR=0.021, CN=892.00

Figure 8. The factor of the demand in online teaching and learning model.



$\chi^2 = 897.00$, df =476, $\chi^2/df = 1.88$, p-value = 0.062,
GFI = 0.93, AGFI = 0.92, NFI=0.97, NNFI=0.99,
CFI=0.99, RMSEA = 0.034, SRMR=0.050, CN=473.04

Figure 9. The factor of appropriate components of online teaching model.

According to table 3 and figure 7-9, it was found that, in terms of the present condition of online teaching, the executives gave first priority to strategies and policy that support the process (S2), followed by the present condition of software and technology to support this (S1). The point most highlighted was that the university should provide knowledge and enhance skills in online teaching and learning for all lecturers and students1

About the factors of demand for online teaching, the executives placed first importance on the development of lecturers and students in their faculties (S3), followed by the strategies and policy components that support online teaching (S5); and lastly, the software and technology assisting the teaching (S4). The post firstly given priority was the support and enhancement of online lessons and media creation.

When the appropriate components of online teaching were examined, the executives emphasized mostly on the content management (S7), followed by measurement and evaluation (S9); Online teaching administration system (S6); communication and interaction (S8); and lastly, the anticipated teaching online environment (S10), respectively. The point emphasized especially among the executive was the summarized content that was easy to understand and convenient for self-study.

B. The Development of Online Teaching and Learning RUS Model that Serves New Normal Way of Life

The present research aims to develop the Online Teaching and Learning RUS Model which is effective and suitable with Rajamangala University of Technology Suvarnabhumi's context as well as serves the new normal way of life. The research findings indicated that the appropriate online teaching and learning model was composed of 2 processes, leading to the expected academic outcome in every dimension of knowledge, skills and application. The first process was preparation, an input factor, consisting of three modules: preparation of lecturers, preparation of students, and infrastructure as well as supporting agencies. The second was the process of providing online teaching and learning, which was composed of 6 modules: lecturer's module; learner's module; information technology module; content module; evaluation and feedback modules.

Figure 10. Online Teaching and Learning RUS Model.

The finding also indicated that the preparation process was crucial. As Rajamangala University of Technology Suvarnabhumi is a regional university that focuses on producing practical graduates. Therefore, it requires the supporting agencies to impose an urgent policy and dynamic mechanism to prepare the infrastructures including hardware, software and personnel. Moreover, lecturers and students were obliged to be prepared with their necessary knowledge and skills for online teaching and learning. But, for effective management, they were screened for readiness before being developed. All these three stages of preparation enhanced the efficiency and success of the academic outcomes in every subject and course.

In an online teaching and learning process, the contents module and assessment module are firstly prioritized since both directly affect the learners' academic results. However, the two modules cannot be successful without the performance of lecturers since they have the duties to provide online teaching content, learning media, activities, supplementary sources, assignments, tests, advice, assistance, as well as stimulation and learners' behavior monitoring. Lecturers should design their online lessons based on the principle of ADDIE model, an acceptably developed teaching process containing 5 phases. They are analysis phase; design phase; development phase; implementation phase; and evaluation phase [2,35].

But managing contents in theoretical and practical courses might be different. That is to say, in theoretical courses, the teaching is conducted 100% online. The resources are provided for online learning via Google Classroom and Line Application. Meanwhile, the real-time teaching is also conducted online through Google Meet and Zoom. However, the process of providing online teaching and learning should follow the learning theory of Gagne consisting of 9 steps. The first one is to motivate the learners; step two is to inform learners about learning objectives; step 3 is to recall previous knowledge related to the lessons; step 4 is to present the materials; step 5 is to provide a guidance for learning; step 6 is to activate the involvement from learners; step 7 is to provide feedback to them; step 8 is to test what they've learned and lastly, step 9 is to provide enrichment or remediation [10]. In the case of practical subjects, the teaching process can be 100% conducted online by preparing the videos, simulation, and demonstration for learners to study by themselves. Also, real-time teaching should be conducted like theoretical subjects, too. Lecturers who conduct online teaching in practical subjects, in addition, should adopt 6Ts techniques to develop learners' skills and enhance their learning efficiency. The techniques can be divided into 6 components as follows: T1) Time – refers to the time lecturers allocate for teaching; T2) Text – is different models adopted in teaching; T3) Teach – refers to techniques, presentation, media, and interesting activities; T4) Talk – is how lecturers break the ice, inspire and motivate learners; T5) Task – refers to activities that encourage practice, or assignments that encourage skills and experience; and T6) Test – is to evaluate the academic achievement, all of which are focusing on practice or assignments [5]. However, if some subjects are considered unable to practically teach online but must be taught in a lab, factory or outdoors, the action can be conducted as necessary with social distancing. In terms of assessment modules, to assess learners' efficiency in theoretical and practical areas requires different tools and methods. Theoretical subjects emphasize achievement, while practical subjects emphasize performance. Thus, both formative and summative assessments should be conducted to test the learners' knowledge, understandings and skills. To reflect the learner's learning ability, lecturers need to design the effective assessment tools suitable with each subject's way of learning, promote principle in the assessment, as well as provide the academic outcome back to individual or groups of students. Feedback module is another way for lecturers and learners to give and receive feedback. This stimulates the lecturers and makes them prepare the content and assessment, while the learners learn their strengths and weaknesses. This is a part that creates the quality in online teaching and learning. Also, the feedback should be provided to the executives, so online teaching management in undergraduate level will be successful. The communication can be both one way and two ways, and it can be connected with social networks through communication technology modules.

Apparently, both lecturers and learners must possess IT skills necessary for the online teaching and learning process. To achieve a successful online teaching, these factors must be completed: online teaching and learning management system; online content management; online measurement and evaluation; online communication and interaction as well as the anticipated online learning environment. Therefore, the researchers have wrapped up the results from the research findings and experts' suggestions to present to the executives of Rajamangala University of Technology Suvarnabhumi, as the information could be used in consideration of creating effective online teaching and learning. Three pressing strategies, with other six strategies and 23 models have been presented as follows: the first pressing strategy is to support the development among lecturers and learners. The second is to provide software and technology and the last one is to implement the policy and supporting agencies. These three pressing strategies would be the important mechanism in the movement. Thus, using the Online Teaching and Learning RUS Model that we developed for online teaching and learning would make the process more effective, suitable with the new normal way of life both lecturers and learners are encountering in the future.

C. The approval assessment of effective Online Teaching and Learning RUS Model, suitable with Rajamangala University of Technology Suvarnabhumi's context and supports new normal way of life

The effective Online Teaching and Learning RUS Model, suitable with Rajamangala University of Technology Suvarnabhumi's context and supports a new normal way of life, has been assessed for its efficiency by

a panel of 5 qualified judges. The result showed that the model was effective and suitable with the university's context at the highest rank, with overall average value of 4.51, and able to be a model of online teaching and learning for the university.

TABLE IV. THE ASSESSMENT OF ONLINE TEACHING AND LEARNING RUS MODEL BY THE PANEL OF QUALIFIED JUDGES.

Items	Means	*S.D.*	Meanings
1 . Appropriate component suitability	4.52	0.89	highest
2. Learning steps suitability	4.47	0.93	high
3 . Communication channel suitability	4.53	0.91	highest
4. Readiness preparation suitability	4.60	0.90	highest
5. Feedback process suitability	4.46	0.92	high
6. Model assessment suitability	4.48	0.91	high
Total average	4.51	0.91	highest

VI. DISCUSSION, LIMITATION AND RECOMMENDATION

A. Discussion of the Study

The research found that most problems and demand from lecturers and learners as well as executives are the lack of software and technology prepared for online teaching and learning. It was the main point in discussions. The possible reason for this comment was that while the discussions were taking place, it was an early stage of the spread. As it was a sudden change, the university had not prepared the plans to support such change. That's why the model supporting equipment and tools for online teaching and learning could enhance the effective learning process. And it also helped solve the facing problems during teaching. The focused main point was the consideration of equipment and tools, as well as technology, specifically the strong internet signal that supported lecturers to access the data easily without the limitation of time and location [17]. This would facilitate teaching management. Moreover, learners would be able to conduct learning activities, search and exchange knowledge that was useful for them or for them and lecturers, reducing the gap of self-adjustment while dwelling under the current situation. Additionally, lecturers, learners and parents could maintain interactions among each other because of convenient communication as technology was a channel for exchanging opinions. And opinions were used to improve teaching [3].

Apart from preparing equipment, the university should place importance on providing knowledge and skills for online teaching and learning to both lecturers and learners. Some lecturers were deficient in technological device usage knowledge, and learners were not equal in terms of readiness due to their family's financial status. What the university could do was to establish the agency responsible for assisting, facilitating and developing their skills [17]. Another important point that the university should focus on and implement strategies and policy was the development of lecturers and learners' skills in utilizing the software, producing media and online content, using computers and other technology. There were both groups of lecturers able to use and unable to use technology since at an early period, most lecturers could not prepare themselves for online teaching in time, so they used their experience in learning the technology by themselves [23, 34]. However, 30.3% of lecturers were unable to adjust themselves to technology, especially the old generation. That's why the university should create the guideline of changing the teaching method and help them adjust to the demand, able to acquire new technology and keep the technology in the digital era [37].

In terms of online teaching and learning process, it should be a process combined between knowledge and learning innovation and technology, with different teaching patterns; for example, direct teaching, self-learning; flip learning – a new method that overthrows the conventional method [39]. The approach can be various such as online courses, online live broadcast teaching, student self-learning, television air classroom [20]. Furthermore, [33] stated about online teaching models and service platform types that they should be composed of TV teaching videos, live classrooms, resource class communication and Online Q and A.

For the supreme efficiency, the online teaching and learning process; thus, must consist of important components of online teaching and learning. It is important that such components are designed to suit the real context. The first component is an instructor who passes on content and knowledge to the learners, making them understand and experience [4]. Student is a knowledge receiver who needs to be prepared for using technology and information [1,42]. Technology is the main equipment that facilitate online teaching and make learning become successful [23,40,42]. Communication systems also takes part in making a successful learning, where lecturers and learners have interactions, communication, Q and A and understanding checks during the class [15]. Content is the main part of achieving the teaching goal. The subject should have a guideline to connect different contents. The content itself should be clear, brief, easy to understand and modified to keep up the trends, facilitating the learners when they study by themselves [29]. Measurement and Evaluation is also one of the important processes of providing feedback to develop teaching and learning. There are two types: formative and summative assessments. The assessments can be various to evaluate learners based on a real context [29,42]. All the previously mentioned components were included in "Online Teaching and Learning RUS Model " developed and approved by the experts and certified as it was an effective model suitable with Rajamangala University of Technology Suvarnabhumi's context. It can be used as a prototype model for online teaching and learning that supports new normal way of life [6,12,16,18,36].

B. Limitation of the Study

The research team wants to show appreciation for the budget support from the Research and Development Institution of Rajamangala University of Technology

Suvarnabhumi that helped us conduct and accomplish this research project. Moreover, the findings from the investigation can be applied and useful for other departments of the university, or even other universities who wish to apply the model with their future works.

C. Recommendation of the Study

- *FUTURE WORKS*

The occurrence of Covid-19 Virus has created several questions in different aspects of education systems. For example, how can we design effective learning in this era? To what extent is the technology involved in learning? New abnormal has affected education. And educational institutes who want to survive must adjust themselves since Covid 19 crisis is the test to see how education management adjusts their ideas to comply with the new abnormal. Therefore, the development of an effective and suitable online teaching and learning model that serves the new normal in this present study is considered the first step for lecturers and learners in the university. However, IT technology and information science keep changing, especially in the near future, present online teaching and learning tools may be deficient for the university considered as the university that produces practical graduates. Thus, considering the idea of using Artificial Intelligence to be a part of online teaching and learning management is another plan we want to accomplish in the future. This is to create a modern teaching and learning management within the learning environment adjusted to the changes of social and technological context. Artificial Intelligence will help manage the content, develop learner's capability, and facilitate lecturers in both theoretical and practical subjects. The notions and theories adopted are involved three components: Artificial Intelligence (AI); Online Teaching and Learning RUS Model); and New Normal Education Management as shown in figure 11

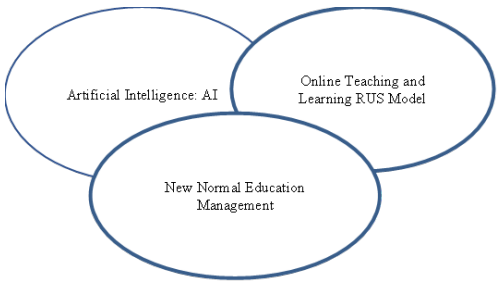


Figure 11. Intelligent Online Teaching and Leaning Management Model for New Normal Higher Education.

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