

# Creation of Digital Learning Kingdom to Support Online Learning during the COVID-19 Outbreak

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**Abstract:** The objectives of this research were to develop, test, and assess the quality of the development of various Digital Learning Kingdoms. These Digital Learning Kingdoms were used to support online learning in the epidemic situation of COVID-19. In this study, a sample of 3,000 students was drawn from sixth to ninth grades. Two main statistical methods are used in this study: the average score  $\bar{x}$  and the Standard Deviation (SD). The independent t-test was used to test the difference of the average learning scores in setting experiments of the Digital Learning Kingdom management and normal learning management between the experimental and the control groups. The paired samples t-test was used to compare the pre-post average scores in the study.

The results of the experiment have shown that the development of an online learning media database by creating the Digital Learning Kingdom for 21<sup>st</sup> century workforce development, which consisted of 5 systems, offered the highest levels of efficiency. The students' learning achievement with the Digital Learning Kingdom learning management was higher than the normal learning management and also had higher post-study scores with statistical significance at the level of .01. The overall students' satisfaction with the Digital Learning Kingdom management was at the highest level.

**Key words:** COVID-19, digital learning kingdom, learning management, online learning.

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## 1. Introduction

In the current situation, there is a high possibility that the COVID-19 epidemic will last a long time. Globalization will be destroyed by this epidemic disease. The world that used to be wide would be narrowed down. The education that originally aimed to develop various students' skills in order to compete with others and be a part of the world citizenry, would be narrowed down to students and their families having happy lives. During this time, students are struggling with the lack of their education continuity. They are forced to stop learning and developing. Therefore, online learning fills the gaps during COVID-19 when schools are forced to temporally closed. Other media students expose to are mostly one-way communication which makes them feel isolated even more. Therefore, A Construct of the Digital Learning Kingdom for Development of a 21st Century Skilled Workforce is one of the methods that would help solve the mentioned problem to support online learning during the COVID-19 outbreak. Students will not only participate in the media but also have a free will to study whichever Kingdom they are interested in. Online learning technology not only helps to manage social-distancing but also taking care of students' mental health.

Therefore, the goals, philosophies and frameworks, policies, and processes would also change. In particular, all educational mechanisms will need the characteristics of distance education in digital platforms. Currently, there is widespread awareness in the use of tools and applications to develop lessons and forms to transfer teachers' knowledge to students online which is considered a good sign. Nevertheless, the awareness mentioned above or the dimensions of learning management for "student-centered instruction" on the online platform or active learning in a virtual classroom has not been mentioned much, but still focuses on tools and technology that are not at the heart of education [1], [2]. In order to manage an online education program using an active learning form to have a high functioning classroom (a classroom that is highly effective in both the process and the learning outcomes of the students), one must consider the nature of students, teachers, and various contexts including the environment, geo-society in which the student grew up, and the current world situation. Then, one should design a content structure that is practical. The learning framework should be consistent with the students' and their families' backgrounds whether they are life projects, problem-solving, or the development of facilities that will improve student lives [2], [8].

Therefore, A Construct of Digital Learning Kingdom for Development of a 21<sup>st</sup> Century Skilled Workforce is one of the methods that would help solve the mentioned problem to support online learning during the COVID-19 outbreak. This online learning will result in those who lack opportunities or do not have the opportunity to study in the regular school system working in careers they do not like or want to pursue.

However, due to the specific education or knowledge and the school system, that may not promote or develop their labor skills sufficiently for them to get better job opportunities. For Thailand to have a comprehensive learning source, a variety of educational media, various types, any time, any place, and any user of those media must be employed [6]. It may be a way that is closer to the students to increase their educational opportunities and to be able to expedite their personal development. Although this media is not available in the normal school system, this Digital Learning Kingdom for workforce development is not intentionally created for only those who lack opportunities [3]. Students who study in the school system are able to study and find knowledge for self-improvement and self-learning as well. Furthermore, the ability to learn by yourself or Self-Directed Learning is also a necessary and most important skill in the 21<sup>st</sup> century workforce development so that the Digital Learning Kingdom can enable learners to develop skills in various fields e.g. knowledge skills, vocational skills, and students' lifelong skills. These skills are key factors that further the country's education systems' sustainable development [4], [5].

## **2. Objectives**

- 1) To develop various Digital Learning Kingdoms and a central system for managing the learning subsystems database for 21<sup>st</sup> century labor development.
- 2) To test the system and evaluate the quality of the development of various Digital Learning Kingdoms and the central system for managing the learning subsystems database for 21<sup>st</sup> century workforce development.

## **3. Conceptual Framework**

I conducted the research, did the literature review, and learnt the concepts and theories related to the development of the Digital Learning Kingdom in Thailand and abroad using the following steps:

## **4. Research Methods**

I classified this research into 2 phases as follows:

1st Phase: The process of the development of various Digital Learning Kingdoms and the central system for managing the learning subsystems database for 21<sup>st</sup> century workforce development which consists of 5

systems as follows:

- 1) Online learning media database
- 2) E-book media database
- 3) 3D virtual museum on traditional learning database
- 4) Online Children's and youth literature database
- 5) Online vocational learning community system to develop 21<sup>st</sup> century workforce with details as below.

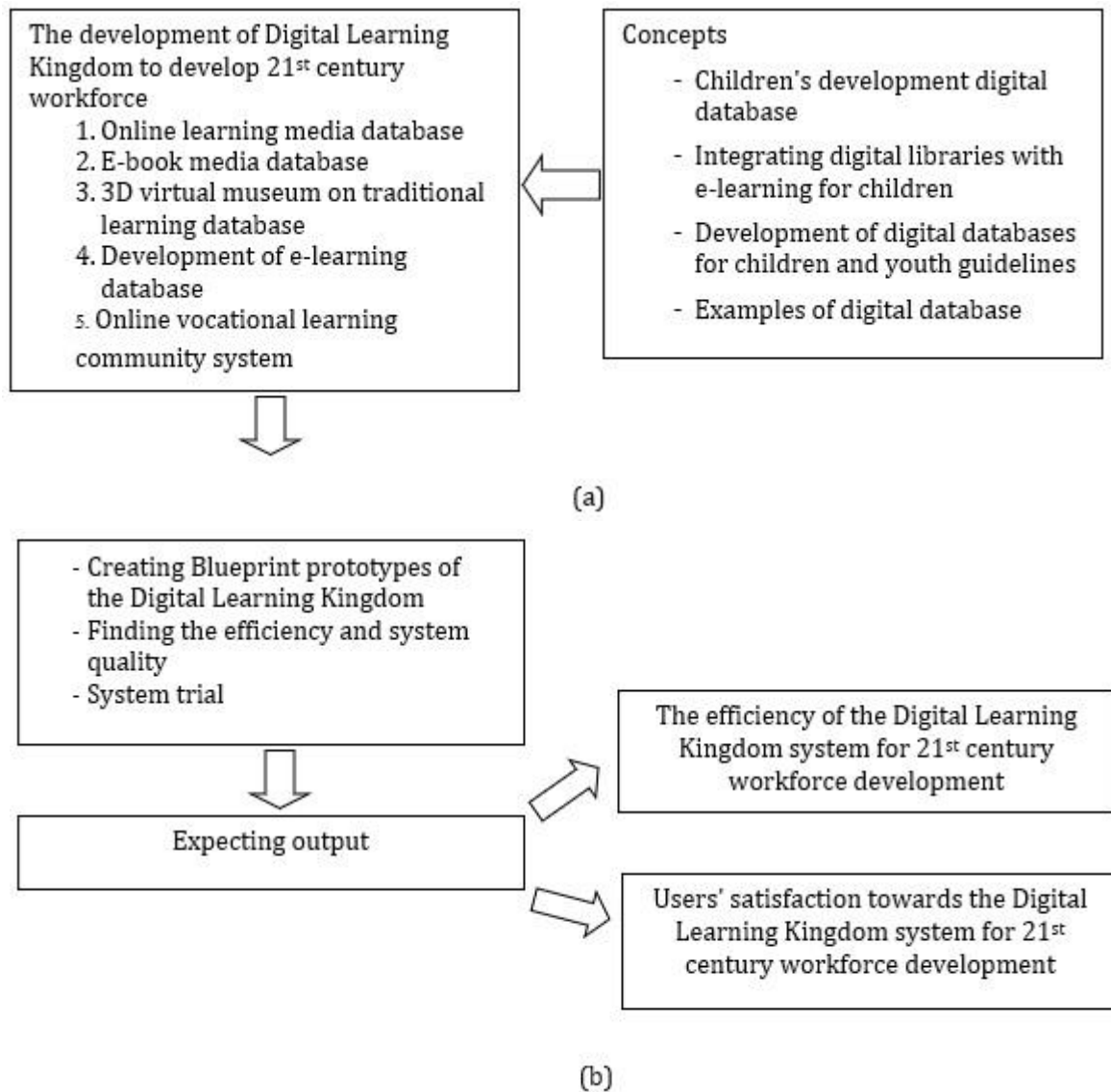


Fig. 1. Research conceptual framework.

The first phase of implementation of the project to build a Digital Learning Kingdom for 21<sup>st</sup> century workforce development, I studied and analyzed the concepts and theories related to the research. The research also studied the needs of the development of the Digital Learning Kingdom by brainstorming and had a group discussion with experts in information and communication technology [7]. The results were used as concepts to design and develop a system for digital learning. The concepts were also used to develop the central system for managing the database of learning subsystems for 21<sup>st</sup> century workforce development which consist of 5 systems: 1) Online learning media database, 2) E-book media database, 3) Three-dimensional virtual museum on traditional learning database, 4) Development of e-learning database, and 5)

Online vocational learning community system. The results from the 5 Digital Learning Kingdom systems based on the opinions of experts. The experts gave 5 areas on 1. System suitability, 2. System operation accuracy, 3. System operation convenience and ease, 4. System operation speed, and 5. System security.

In the second phase, the system testing and evaluating the quality of the development of various Digital Learning Kingdoms (subsystems) and developing the central system to manage the subsystems learning database for 21<sup>st</sup> century workforce development. In the second phase of the digital literacy for the 21<sup>st</sup> century workforce development, I conducted system experiments and evaluated the quality of the development of the Digital Learning Kingdom and developing the central system to manage the subsystems learning database for 21<sup>st</sup> century workforce development. The system trial used the developed system from the first phase together with a manual of how to apply the system in the educational institutions especially in the study scope. The implementing process covered 75 locations from 10 Provinces., The North region consisted of Chiang Rai, Chiang Mai, Nan, Lampang, Western, Kanchanaburi, and Phetchaburi. The East consisted of Chon Buri. The Northeast consisted of Surin. The Central consisted of Ayutthaya and the South consisted of Surat Thani. A total number of 3,000 students. I provided training for educational institution administrators, professional level teachers, teachers and lecturers from the institutions that used the system before conducting the experiment. During the experiment, I followed up, observed the problems and obstacles whereas users using the program, corrected some errors throughout the experiment of 1 semester. The research then summarized the experiment and the observation results using the tool to measure the satisfaction of students, in grade six to nine in educational institutions, towards the system.

#### Population

- 1) School administrators, professional level teachers, teachers and lecturers from educational institutions.
- 2) Students from sixth to ninth grades.
- 3) An Educational expert, an Information and Communication Technology expert, an Educational Institution administrator, a professional level teacher, teacher and lecturer, totaling 5 people.
- 4) Students covering 10 provinces which are Northern region, Chiang Rai, Chiang Mai, Nan, Lampang, Western region, Kanchanaburi, Phetchaburi, Eastern Chon Buri, Northeast region, Surin, Central region, Ayutthaya, Southern region, Surat Thani, total of 3,000 students. I determined the sample size from the large population from independent variables studied, i.e., gender and educational level then conducted a randomized stratified random sampling by selecting random samples from the population in 10 provinces in the study area with provinces as strata and sampling units with the following details:

In the second phase, the study had a sample group of students from sixth to ninth grades totaling 3,000 students. I divided the students into 2 groups, 1,500 students in the experimental group and another 1,500 students in the control group. These students represented students who are studying in under 75 institutions, each with different grades in each school. In the manner of pre-post study from both the control and the experimental groups to prove whether the elevation of 21<sup>st</sup> century skills was statistically significant. I examined the distribution of score data and test score data.

The research conducted covered 20 provinces, i.e., Northern region, Chiang Rai, Chiang Mai, Lamphun, Lampang, West region, Tak, Phetchaburi, Prachuap Khirikhan, Eastern region, Rayong, Chonburi, Northeast region, Udon Thani, Ubon Ratchathani, Roi Et, Central region, Bangkok, Phichit, Phitsanulok, Southern region, Phuket, Krabi, Pattani, Yala, and Narathiwat.

## 5. Hypothesis

- 1) The created Digital Learning Kingdom System will be the most effective.
- 2) The learning achievement of students using the Digital Learning Kingdom system will be higher than

the normal learning management.

- 3) The students' post-study scores learning by using the Digital Learning Kingdom system will be higher than pre-study.
- 4) The students' satisfaction with the learning management using the Digital Learning Kingdom system will be at the highest level.

## 6. Research Format

In this research, I conducted the first semester of the academic year 2018, was research and development using the random control group pretest-posttest designs. The first group was the experimental group where the Digital Learning Kingdom system learning management was used. The second group was the control group where the normal learning management was used. At the end of the semester, both groups then had the lesson test and used t-test independent Luan Saiyot and Angkhana Saiyot (1995, p. 249) to compare the results.

## 7. Research Instruments

- 1) Digital Learning Kingdom system
- 2) Assessment form to find effectiveness of the Digital Learning Kingdom system
- 3) The achievement test
- 4) Satisfaction assessment form for the Digital Learning Kingdom System

## 8. Statistics Used for Data Analysis

Statistics describing the characteristics of scores from the quality assessment form by experts and satisfaction assessment forms from students sixth to ninth grades and vocational certificate levels. Those students who learned by using the Digital Learning Kingdom system, Saiyot and Angkhana Saiyot (2000, p.73). The statistical methods are used in this study: the average score and the Standard Deviation (SD). The independent t-test was used to test the difference of the average learning scores in setting experiments of the Digital Learning Kingdom management and normal learning management between the experimental and the control groups. The paired samples t-test was used to compare the pre-post average scores in the study scores with statistical significance at the level of 0.01.

Table 1. Evaluation of Database Performance from Experts ( $n = 5$  persons)

Topics	$\bar{x}$	S.D.	Meanings
Sequence of system components	4.59	0.53	Strongly agree
Picture beauty	4.87	0.38	Agree
Sound consistency	4.61	0.53	Strongly agree
Interaction techniques	4.84	0.49	Strongly agree
<b>Total average</b>	<b>4.73</b>	<b>0.48</b>	<b>Strongly agree</b>

As shown in Table 1, the experts' opinion on the Digital Learning Kingdom average for all items are at the highest level in general. Considering in each aspect, the table shows that the experts have the opinion on the visual aesthetics at the highest level followed by the opinion on interaction techniques at the highest level, the opinion on the highest level of sound consistency, and the opinion on the system overview at the highest level.

## 9. Results

The results show that systems for various Digital Learning Kingdoms (subsystems) and developing the



central system for managing the learning database of subsystems for 21<sup>st</sup> century workforce development consist of 5 systems as shown in the picture showing the results of the Digital Learning Kingdom.

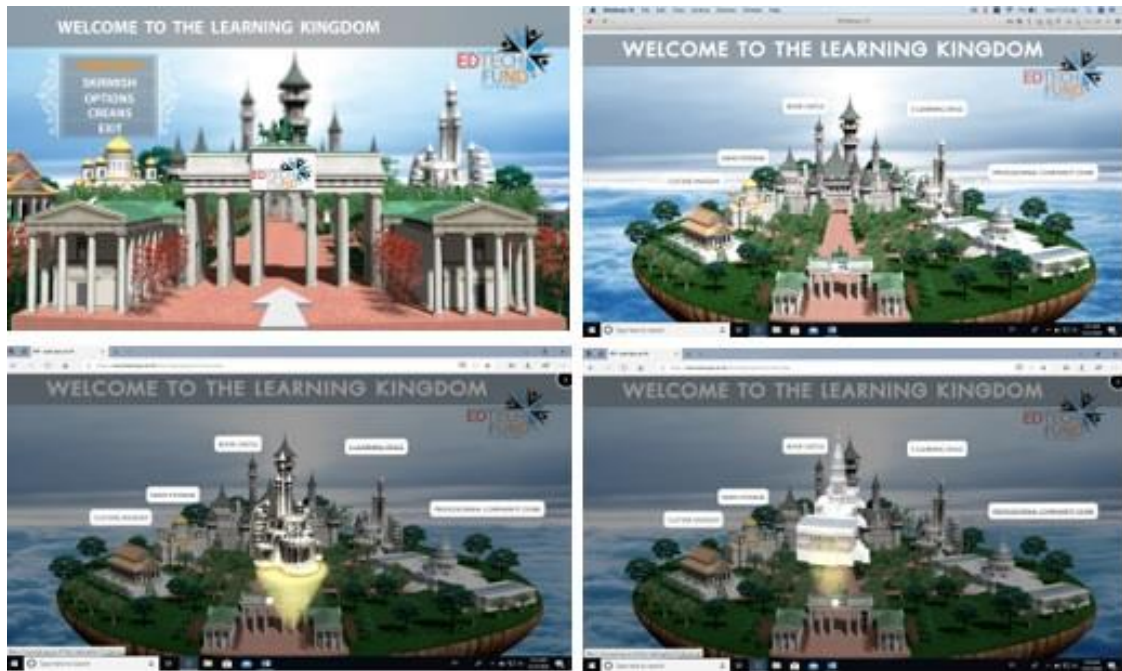


Fig. 2. Displaying the home page of the system to bring students into the digital learning kingdom.



Fig. 3. Displaying the home page of the book castle system learning E-book media development.



Fig. 4. Displaying the main page that leads to virtual media learning.  
The three-dimensional virtual media system on Thai musical instruments.



Fig. 5. Displaying how to learn with the three-dimensional virtual media systems.  
Virtual museum usage in tradition Chonburi province.



Fig. 6. Displaying how to learn with the three-dimensional virtual media systems.  
Virtual museum usage in tradition Chonburi Province.





Fig. 7. Displaying the screen bringing students to learn to use the e-learning space system.



Fig. 8. Displaying a community learning and a vocational online learning e-PLC.



Fig. 9. Displaying students' online learning in the dormitories during the government curfew period.





Fig. 10. Transferring the learning process from the digital learning kingdom to the administrators, teachers, academics, and those involved in teaching and learning in schools.

Target group in 6 regions.

The results of the implementation data analysis of the Digital Learning Kingdom system are as follows:

Table 2. Results of the Students' Satisfaction Study with the Digital Learning Kingdom

Topics	Rate Opinions		Meanings
	$\bar{x}$	S.D.	
Lessons are inspirational and interesting for learning	4.56	0.51	Strongly agree
Screen layout design	4.78	0.50	Agree
Text design	4.50	0.51	Agree
Graphic meanings	4.53	0.51	Strongly agree
Sound and rhythm suitability	4.32	0.50	Agree
Presentation duration	4.45	0.57	Agree
Giving students the opportunity to review lessons they have learnt	4.70	0.59	Strongly agree
Giving students the opportunity to control direction and speed slow - fast to match their pace	4.42	0.67	Agree
Having lesson introduction by linking the previous and new knowledge	4.59	0.57	Strongly agree
Giving students the opportunity to participate throughout their study	4.55	0.56	Strongly agree
Diversity and suitability of interaction patterns	4.57	0.50	Strongly agree
Stimulating students to participate in the lesson	4.65	0.51	Strongly agree
Stimulating students to be knowledgeable	4.23	0.67	Agree
<b>Total average</b>	<b>4.52</b>	<b>0.54</b>	<b>Strongly agree</b>

From Table 2, the evaluation of efficiency and satisfaction above found that the Digital Learning Kingdom system has the quality to support teaching and learning. The media can support learning management where students are the center of learning in both small and large groups. It simultaneously benefits society. The operators have integrated the media production techniques that are appropriate for the era, resulting in appropriate learning conditions of students' levels.

The results of the quality assessment of the development of the Digital Learning Kingdom system for 21<sup>st</sup> century workforce development show that the users have the highest level of overall satisfaction. The order of satisfaction can be ranked as follows: three-dimensional virtual media systems, three-dimensional virtual media system on Thai musical instruments, and the virtual museum system on tradition. The users are

satisfied at the highest level in general e.g. the three-dimensional virtual media system Architecture of Wat Yanasangwararam Woramahawihan and the online vocational learning community system. The evaluation of the efficiency of the Digital Learning Kingdom for 21<sup>st</sup> century workforce development shows that users evaluated the efficiency of the virtual museum system on tradition at the highest level in general. The users evaluated the efficiency of communication at a high level in general.

## 10. Discussions

Discussions found that in conducting research on A Construct of Digital Learning Kingdom for Development of a 21<sup>st</sup> Century Skilled Workforce, it was a learning management system consistent with the National Scheme of Education. The development of the Digital Learning Kingdom in educational institutions is therefore an important factor for students' development in a learning society in the digital era. Therefore, students are able to learn throughout their lives, learn continuously, and obtain the ability to access technology. Students had opportunities to develop life and vocational skills through digital media and promote lifelong learning. These opportunities would promote the development of a better quality of life, equality and sustainability. This research results from experimenting with the system and evaluating the quality of the Digital Learning Kingdom system for 21<sup>st</sup> century workforce development and found that most learners are satisfied with the system in general at high and highest levels in general. It can be discussed that in the experimentation with this Digital Learning Kingdom system, students are able to learn to their full potential which can be stated that the learning media is an important medium for bringing knowledge to students and also allowing them to learn according to well-defined objectives.

In addition, all 5 database systems that I have created, developed, and got it verified by experts, show that all systems have the highest level of suitability. It can be stated that the learning media is an important tool in learning management by teachers and students to enhance good learning for students to achieve higher academic achievement.

## 11. Suggestions

- a) The research matter on creating school networks using the Digital Learning Kingdom should be done.
- b) The research matter on creating a learning management plan using the Digital Learning Kingdom interdisciplinary plan should be done.

## Conflict of Interest

The author declares no conflict of interest.

## Acknowledgment

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He was born in Bangkok on 20th September 1977.

His educational background:

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- PhD, doctor of philosophy program in science and technology, King Mongkut's University of Technology, Thonburi, Thailand, 2011 (received the University's outstanding academic category scholarship)

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Associate Professor Dr. Thanyawich Vicheanpant receives an Outstanding Personnel in terms of National Education Supporting from the Association of Private Higher Education Institutions of Thailand under the Patronage of Her Royal Highness Maha Chakri Sirindhorn. He also receives an award for being an Educational Contributor from Nakhon Nayok Education Service Area.