

Learning Stability During COVID-19 Pandemic Of Undergraduate, Case Of State Aid Measures

Supit Boonlab¹, Sanitdech Jintana² and Chaimongkhon Supromin³

^{1,2,3}Department of Social Science, Faculty of Liberal Arts, Rajamangala University of
Technology Thanyaburi, Thailand ORCID: 0000-0002-0462-115x

Abstract

COVID-19 pandemic has ruined society and economic all over the world since 2019. Educational stability in term of learning also was a part. Research aim was to analyze relationship between state aid measures and learning stability. The finding displayed that health statement revealed most of student was fine in all cases. There was no problem of learning stability in term of family part and the aid measure from university identified significance to economic problem. Besides, the pandemic has made impact to society part at much level particular in uncollected group of state aid measure. In the conclusion, students and their family either have collected or uncollected from state aid measures, they still have learning stability with a little bit impact. Moreover, they have realized disciplinary for preventive measures from virus infection. We can look into different dimension, i.e., the aid measures have worked well cover the impact or student can adjust good to situation.

Keyword: COVID-19, higher education institution, learning stability, undergraduate, state aid measure

Introduction

Coronavirus (COVID-19) pandemic or emerging disease created fear and panic to people all over the world. Creating losses in every dimension of society and economy of all countries particular, human society (Corlett et al. 2020) so the stability of all groups of people is shaken. The system in society was disrupted, i.e., society, family, kinship, friends, work organization, country and world society (Corlett et al. 2020). Transport and trading system both domestic and international were affected. Therefore, all countries affected by this large outbreak have adopted the same measures: social distancing, lockdown, shutdown, and curfew. Thailand also has an emergency decree as a statutory measure from government to control pandemic. Otherwise, Corlett et al. (2020) suggested that the apparent issue of this emerging infection safety was reduction of social activity.

Higher education institutions have reached big impact, i.e., disturbing original teaching plans (Chen 2020) because they were the crowded places consequence in the classroom that was very hard to keep social distancing. Students also came from everywhere over the country that was risk infection the virus. Therefore, online learning instrument was used in education class. Moreover, according to social distancing that was result achievement to reduce infection of virus. There are many things have to be stopped completely, i.e., transportation, employees laid off, trade canceled, goods and services job etc.

The stability of university students was also severely affected. Economic, social, family problems, including whether to have a job or not in the future after graduated. When people use patterns of work change from the original namely "New normal life". Government and higher education institutions have announced a way to help relieve tuition fees for all students in the academic year and other measures when those students are affected, i.e., finding work to generate income, etc., but are these measures appropriate in line with students' troubles?. They were the questions to find out. Otherwise, some cases in Thailand previously, we have had classic problem in online learning barriers, for instances, student experienced significantly challenges in e-learning, e.g., instructors had little experience in online learning methods (Siritongthaworn et al. 2006), also, instructors and their students failed to acknowledge benefits and lacked interested enforcing e-learning (Saekow and Samson 2011). In addition, student life, i.e., financial and co-curricular activities, student welfare including food, transportation (Abdullah et al. 2020), lack of necessary hardware and software for connecting if he/she are in the remote area (Willis and Ratcliff, 2020), was framework that is practiced in the case from other countries.

According to above, the statement which is important to study how impact university student been due to learning stability and state aid measures to their education life along COVID-19 pandemic. The result would be useful and valuable to higher education institutions in term of effective and risk in education. The search aims were to investigate statement aid measures and learning stability of student, and to analyze the relationship between them.

Review literatures

1. Higher educational institution in uncertain times

Willis and Ratcliff (2020) found five factors strategies (i.e., communicate clearly and regularly, consider the barriers, champion access and accessibility for students, reconnect community through empathy and compassion) for academic leaders during uncertain time pandemic. Al-Baadani and Abbas (2020) mentioned that wealthy countries are more willing to move on online learning, but middle and poor countries will face tough time to cope with changing. According to uncertain times when COVID-19 pandemic spread out over the world, education is one of the determinants of economic development and huge implication on higher educational institutions (Al-Baadani and Abbas 2020) as unclear how long COVID-19 will last and how Ross and Lau (2021) refer that universities are expected postponement semester or adjust new technique in class as online learning. Besides, the different of technology, the characteristics of teachers, students

and courses would influence to students' satisfaction (Lin and Wang 2012), and using free cloud-based collaboration tools was easier and satisfaction more than a traditional paper recording system (Botelho 2015). Hrastinski (2009) pointed out that if we want to enhance online learning, we needed to increase online learner participation.

Due to uncertain times, universities' leader pay attention to make satisfaction to students and keep effective learning as good as possible. It is a challenge to face the tough situation of pandemic pushing education entirely online, universities have to acknowledge and try new chances to progress with virtual learning (Abdullah et al. 2020). Those leading decisions such as communication clearly and regularly, consider barriers, champion for accessibility, prepare for post-crisis operations, and reconnect community should be taken into consideration (Abdullah et al. 2020), also, flipped learning (Smalley 2020).

2. State aid measures

The move to online learning for teaching has raised concerns about the quality of remote teaching. Previous studies have warned that student performance especially students who already have academic difficulties and suffer greatly on online courses. Otherwise, 20% of students have difficulty access powerful technologies including working laptops and reliable high-speed internet (Smalley 2020; Hasani 2020; Aparicio et al. 2016; Willis and Ratcliff 2020). Tashkandi and Al-Jabri (2015) supported that limited internet bandwidth, expensive package of internet, and means of communication were the barriers. Some universities have announced plans to aid students who may lose internet connections, i.e., opening limited university libraries and distributing mobile hotspots to students. Besides, many schools switch to pass / fail grading systems rather than standard letter grades. Moreover, student financial aid and affordability in USA, several states have released revised recommendations regarding scholarship eligibility and requirements that may have to be changed due to the outbreaks, i.e., providing advice and increased resiliency from state agencies, approved laws that allow modifications and waivers for state financial aid programs (Smalley 2020). More instances, campus housing, most schools do not offer tuition refunds, but some reduce tuition fees about typically between 10-20%. On other hand, temporary relief for student loan borrowers, payments are deferred and interest is waived, steps to provide additional assistance to borrowers who may not be eligible for federal relief measures, and agreement to private loan providers to mitigate loans, approval legislation to tackle student borrowing or debt dunning (Smalley 2020).

Thailand also have taken aid measures from state and universities but it was depends on individual. Some of aid measures had active that divided two statements, i.e., government policy aid (e.g., Lending money at low interest rates and long term from financial institutions, household utilities, state subsidy 166USD monthly allowance and so on), university aid (e.g., accessing electronics database via a VPN system, COVID-19 insurance service from the university, reduce the rent dorm on campus, no fines if extend payment tuition fees and so on).

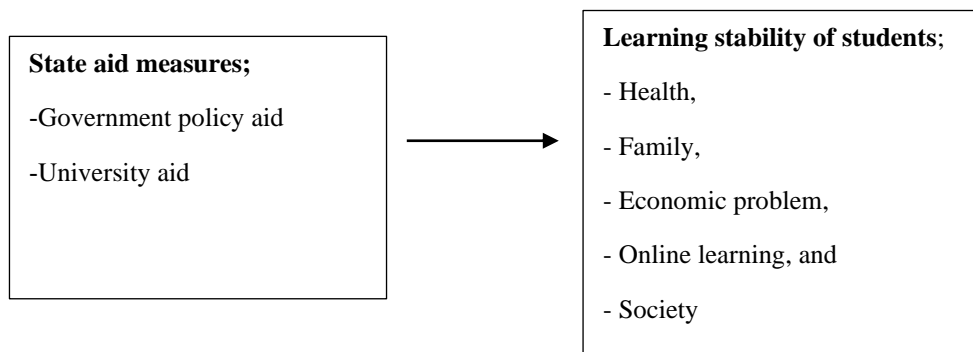
3. Learning stability of university students

For those scientific reasons, the most effective self surveillance avoidance of COVID-19 infection is to reduce activity outside home (Corlett et al. 2020), keep at least 2 meters among people, avoidance crowded place, etc. Litman (2020) stated that the greatest risk of infection was long-term travel along with others, workplaces, shopping malls and social gatherings therefore, when you realize that you are in an infected area, you need quarantine for 14 days.

Educational institutions are also banned from regular teaching, changing work style to work from home, online teaching and learning that rely on the Internet and equipment. It can be seen that this issue tends to create problems in student learning stability and influence incomplete learning performance as previous. In addition, family economic problems are affected by the pandemic, for instance, during school holidays, weekend or evening time, some students will work part time to earn extra income, in this situation, they can not work. In addition, a lifestyle called a new normal occurred. It may result in the future career of the student who is graduate very likely. Universities should hasten to study the impact and adaptation patterns of students that reflect the student's academic stability in depth so that they can see the change in problems and prepare to handle, preventive and promote measures in a timely manner.

Besides, on-site learning was changed into online learning. It was problem in every university particular the remote area without facility as tools. Barriers for online learning tool were the past experience on using online tools and lack of technology experience (Muflih 2020; Talidong and Toquero 2020). On the other hand, there were five factors that play significant role on student readiness into online learning, i.e., students' self-competence, comfort with e-learning, uncertainty avoidance, financial ability, and technology availability (Hasani et al. 2020). The students with more experience and more competence in using computers are more ready to adopt online learning as well as effective study. Also, Muilenberg and Berge (2005) supported that cost and internet access were two influential issues that affected students' adoption of e-learning (Willis and Ratcliff 2020). Moreover, students' ability to access computers and other devices as facility condition via internet connection and being stable connected was a barrier (Aparicio et al. 2016). Some recommendations, i.e., introducing online learning technologies to students as early as possible, providing online learning applications with excellent usability and effective instructional create, arranging clear instructions for both students and instructors, and lastly supporting financial to enable them participation in online class sessions (Hasani 2020; Al-Baadani and Abbas 2020; Crawford et al. 2020). In the same way, online learning could reduce educational efficiency, program launch costs and difficulties, and less the communication between students and instructors (Palvia et al. 2018)

Conceptual framework



Methods

Data were collected through a questionnaire, which created, to four parts, i.e., demography, state aid measures, learning stability of student, and needs / expectation. Sample group was 420 undergraduate students in academic year 2020 of Rajamangala university of technology Thanyaburi, Pathum Thani province, Thailand with cluster sampling. Measurement reliability of questionnaire and data analysis were analyzed via IBM SPSS version 24.0. The ranking was designed such as state aid measures (i.e., collected, uncollected, and unknown), learning stability of students was categorized to two modes, first, No, second, i.e., little, moderate, much. Measurement reliability exhibited 0.623 - 0.752. Descriptive statistics were frequency, percentage, and mean to describe demographic. Statistical analysis used to examine correlation of state aid measures (15 statements) and learning stability (22 statements) was Chi-square.

Results

Demographic data of sample group was male, 55%, 19-21 years old, 77.60%, studying in the 2nd years, 45.90%, being regular course, 99.50%, parents in marriage, 57.50%, 1-2 family members were laid off / unemployed, 58.70%, 1-2 family members studying, 82.80%, central region of domicile, 69.80%, accommodation currently, rental room, 66.90%, mother responsible cost of studying, 33.70% followed by father, 32.30%, and both, 19.00%, students expenses monthly on average 33-166USD, 45.30%, and 1-2 family members lacking income during outbreak, 57.80% followed by none, 23.80%.

The results of study for learning stability in all 5 aspects, i.e., health, family, economic problem, online learning and society revealed that students were not risk of infection in health issue was the highest (80.20%), while the number of students who were mostly concerned health was low. There were only panic, anxiety and fear that concerns in moderate to high with highest (22.60%).

Family side, it was found that the students (80%) had no risks and concerns to the outbreak while the living with elderly / children at low level with highest value (26.40%).

In terms of economy, it was found that students were paid less (31.60%) and students lack additional income from part-time work (32.80%). On the other hand, family of students laid off / trading stopped issue revealed unaffected (42.00%).

Online learning, it was found moderately prepared for learning (41.50%), enough disciplined in materials and considered themselves with middle level (43.20%). Moreover, students had online learning materials along computer Internet signal and learned online learning while online learning was not a method of learning that would cost them, i.e., traveling, renting a dormitory, etc.

Society, students were not afraid and suspicious around (38.20%), acting appropriately avoidance along guideline of coronavirus risk at the high level (54.20%), changing behaviors, i.e., social distancing, masking, not going to crowded places, etc., at a high level (49.50%), and avoiding meeting people in unnecessary or introvert at the medium to high level (75.70%)

Otherwise, under covid-19 pandemic, Thai government has done support some group of people who received big impact particular low incomes group, namely, state aid measure. The results displayed aid household utilities (i.e., insurance refunds, electricity meters, water meters, electricity bills and water bills), online teaching software and training to use which more than 50% rating. While student's family had been healed as state subsidy 166USD monthly allowance for 6 months and social security compensation (44.60%) and reduced private dormitories rental costs 10-50% a few month (30.20%).

Due to those tables displayed below, they have been analyzed correlation between state aid measure and learning stability (i.e., health, family, economy, online learning, and society).

Table 1. Result of correlation between state aid measure and health

State aid measures	No	Little	Moderate	Much	Total	Pearson Chi-square	Sig.
Package internet							
Collected	32 7.6%	17 4.0%	10 2.4%	2 0.5%	61 14.5%	12.66	0.04*
uncollected	147 35.0%	99 23.6%	49 11.7%	0	295 70.2%		
unknown	30 7.1%	23 5.5%	11 2.6%	0	64 15.2%		
Total	209 49.8%	139 33.1%	70 16.7%	2 0.5%	420 100%		
Accessing electronics database via a VPN system							
Collected	26 6.2%	21 5.0%	8 1.9%	2 0.5%	57 13.6%	20.52	0.00**
uncollected	126 30.0%	66 15.7%	45 10.7%	0	237 56.4%		

unknown	57	52	17	0	126		
	13.6%	12.4%	4.0%		30.0%		
Total	209	139	70	2	420		
	49.8%	33.1%	16.7%	0.5%	100%		
COVID-19 insurance service from the university							
Collected	24	13	12	1	50	12.87	0.04*
	5.7%	3.1%	2.9%	0.2%	11.9%		
uncollected	120	63	34	1	218		
	28.6%	15.0%	8.1%	0.2%	51.9%		
unknown	65	63	24	0	152		
	15.5%	15.0%	5.7%		36.2%		
Total	209	139	70	2	420		
	49.8%	33.1%	16.7%	0.5%	100%		

There were three statements which had relation to health (more often sick) as 1) package internet 2) accessing electronics database via a VPN system, and 3) COVID-19 insurance service from the university with significance at 0.05 and 0.01. State aid measure (package internet service) was rated uncollected highest at no and little level in health variable (35.0% and 23.6% respectively). Accessing electronics database via a VPN system and COVID-19 insurance service from the university were highest rated on uncollected related to “NO” on health variable (30.0% and 28.6% respectively) while overall student felt nothing getting sick (49.8%). Moreover, overall in health statement revealed that most of student was fine in all cases of state aid measure.

Table 2. Result of correlation between state aid measure and family problem

State aid measures	No	Little	Moderate	much	Total	Pearson Chi-square	Sig.
Reduce the rent dorm on campus VS family member infected							
Collected	39	6	0	0	45	23.12	0.00**
	9.3%	1.4%			10.7%		
uncollected	268	5	6	0	279		
	63.7%	1.2%	1.4%		66.3%		
unknown	96	1	0	0	97		
	22.8%	0.2%			23.0%		
Total	403	12	6	0	421		
	95.7%	2.9%	1.4%		100%		
COVID-19 insurance service from the university VS paranoid among each other							
Collected	39	4	7	0	50	15.50	0.02*
	9.2%	0.9%	1.7%		11.8%		

uncollected	187	26	5	2	220
	44.3%	6.2%	1.2%	0.5%	52.1%
unknown	129	17	5	1	152
	30.6%	4.0%	1.2%	0.2%	36.0%
Total	355	47	17	3	422
	84.1%	11.1%	4.0%	0.7%	100%

There were two statements on health (i.e., family member infected and paranoid among each other) which had relationship to state aid measure with significance at 0.05 and 0.01. Both statements on state aid measure was highest rated on uncollected related to “NO” (63.7% and 44.3%) on family member infected and paranoid among each other respectively. Therefore, overall it obvious displayed that there was not problem of learning stability in term of family part.

Table 3. Result of correlation between state aid measure and economic problem

State aid measures	No	Little	Moderate	Much	Total	Pearson Chi-square	Sig.
No fines if extend payment tuition fees VS family was laid off/ no job							
Collected	21	22	8	8	59	15.69	0.01*
	5.0%	5.2%	1.9%	1.9%	14.0%		
uncollected	95	32	40	49	216		
	22.5%	7.6%	9.5%	11.6%	51.2%		
unknown	62	27	28	30	147		
	14.7%	6.4%	6.6%	7.1%	34.8%		
Total	178	81	76	87	422		
	42.2%	19.2%	18.0%	20.6%	100%		

It identified relationship of No fines if extend payment tuition fees and family was laid off/ no job significant at 0.05. Uncollected of state aid measure was highest rate at “NO” level of economic problem (family was laid off / no job) (22.5%). Overall students on “NO” rated was highest score.

Table 4. Result of correlation between state aid measure and online learning

State aid measures	No	Little	Moderate	Much	Total	Pearson Chi-square	Sig.
Lending money at low interest rates and long term from financial institutions							
Collected	6	25	11	0	42	15.46	0.01*
	1.4%	5.9%	2.6%		9.9%		

uncollected	47	85	113	18	263		
	11.1%	20.0%	26.7%	4.2%	62.0%		
unknown	18	39	50	12	119		
	4.2%	9.2%	11.8%	2.8%	28.1%		
Total	71	149	174	30	424		
	16.7%	35.1%	41.0%	7.1%	100%		
No fines if extend payment tuition fees							
Collected	9	24	23	4	60	15.64	0.01*
	2.1%	5.7%	5.4%	0.9%	14.2%		
uncollected	46	67	95	9	217		
	10.8%	15.8%	22.4%	2.1%	51.2%		
unknown	16	58	56	17	147		
	3.8%	13.7%	13.2%	4.0%	34.7%		
Total	71	149	174	30	424		
	16.7%	35.1%	41.0%	7.1%	100%		

They were two relationships significant at 0.05, i.e., lending money at low interest rates and long term from financial institutions and No fines if extend payment tuition fees to online learning (be able to learn effective). It was identified that students had uncollected ., lending money at low interest rates and long term from financial institutions highest in the moderate level rate of online learning (26.7%). On the other hand, students have not received no fines if extend payment tuition fees statement had highest score at the moderate level rate to online learning (22.4%).

Table 5. Result of correlation between state aid measure and society

State aid measures	No	Little	Moderate	Much	Total	Pearson Chi-square	Sig.
Supporting part time VS behave properly to avoid any risk of infection							
Collected	5	8	22	21	56	13.70	0.03*
	51.2%	1.9%	15.2%	5.0%	13.3%		
uncollected	24	22	71	135	252		
	5.7%	5.2%	16.8%	32.0%	59.7%		
unknown	9	5	26	74	114		
	2.1%	1.2%	6.2%	17.5%	27.0%		
Total	38	35	119	230	422		
	9.0%	8.3%	28.2%	54.5%	100%		
COVID 19 insurance service from the university VS fearful and suspicious of people around							
Collected	15	19	14	1	49	13.53	0.03*

	3.6%	4.5%	3.3%	0.2%	11.6%
uncollected	101	70	39	11	221
	23.9%	16.6%	9.2%	2.6%	52.4%
unknown	46	55	43	8	152
	10.9%	13.0%	10.2%	1.9%	36.0%
Total	162	144	96	20	422
	38.4%	34.1%	22.7%	4.7%	100%

They were two relationships significant at 0.05, i.e., Supporting part time VS behave properly to avoid any risk of infection and COVID 19 insurance service from the university VS fearful and suspicious of people around. It identified that students had uncollected highest in the many level rate of behave properly to avoid risk of infection (32.0%). In addition, COVID-19 insurance service from the university that students uncollected had highest score at none level rate to fearful and suspicious of people around (23.9%).

Discussion and conclusion

To study learning stability of Thai university student along COVID-19 pandemic, current students displayed in five perspectives follow:

Health, students were not in risk infected situation highest number while other statements are concerned in the least mostly. Particularly, there were only panic, anxiety and fear that concerned with moderate to high at highest level. This finding could explain that the stability of health was stable. This may be due to government measures to control the pandemic (Vuuren et al. 2020). Besides, the monitoring of outbreak news such as reporting progress of the situation both domestically and internationally through real-time online communication channels which would result to students being cautious, more reduce anxiety feeling that they were not at risk. Therefore, these findings were a good sign of a crisis that the students' mental health was not abnormal risk at all. According to Litman (2020) in line found that impact of COVID-19 pandemic was more risk to people living in urban areas than rural areas therefore it could be possible cause students to worry about their health at a very low level, also because the location of the university this case in the suburbs and not crowded.

Family, it was found that excess of 80% of students had no risks and concerned the pandemic while the students lived with elderly / children at a low level was the highest value at 26.40%. The finding can explain that students had family stability in much level accordance to Ung-chusad and Cunsuthiwat (2020) that it was possible to accept the pandemic and adapt to a normal life carefully according to the new normal way in order to be able to continue living. On the other, to control the spread to a low transmission level with least fatalities, it can also be explained further this point by Litman (2020) offered that due to family of student located in outside of city and students did not live with their families.

In term of economy, it was found that students were paid for study less (31.60%), and 32.80% lacked extra income from part-time work. The issue of parents being laid off / trading with

42.00% of students unaffected. These findings can be explained in line with Drake et al. (2012) and Nabarro and Wannous (2016) that one outbreak event will threaten economics and society in the short term but this was contrary to Qiu et al. (2016-2017) who indicated that an outbreak has a direct impact to people spending within the long term and indirect costs. On the other hand, unemployment / dismissal of the student's family was affected with 58.00%, according to statistics of Thai unemployed on Thairath (2020). It also affected the lack of extra income from part-time working which was large 32.80%. It could be possible due to businesses having to shut down along country's lockdown measure but 67.20% of students were not affected. It could be said that a part time job for those students group was an ideal type of work in line the outbreak as Deeod (2020) found that occupations in the food delivery service were affected at a moderate level. They were able to operate a large number of businesses because of the adjustment.

The form of online learning, it found that 41.50% of students were moderately prepared for online learning and 43.20% thought that they had sufficient discipline to study online. Besides, students had online learning materials with computer, internet signal, and learned online learning while they thought that online learning was not a cost-sharing method of study, i.e., travel, dorm rental, etc. These findings of student learning stability reflect how adaptable students were, learn moderate to new ways of learning, ready enthusiastically to learn. It was a good sign that problems of students' online learning as a whole were unlikely to be a major issue that will negative impact educational stability. Thongkaew (2020) and Wayo et al. (2020) supported those findings that the mechanism supporting the teaching and learning adaptation education was the use of technology, known as "blended learning" in higher education. It can help reduce stress and anxiety that the pandemic will come back around. Otherwise, it can be said that students are able to stabilize the studies in order to acquire knowledge their own due to restrictions on access to learning resources. In addition, it will be like a blueprint in the future that if a new disease outbreak occurs, educational management can be replaced by a new model effectively at an acceptable level.

Last, social aspect, it was found that students were not afraid of the xylophone of those around them, 38.20% , acting appropriately of coronavirus infection avoidance, 54.20%, adaptation change behaviors (i.e., social distancing, masking, not going to crowded places, etc.) at high 49.50%, and avoiding meeting other people if unnecessary, introvert at moderate to very high level, 75.70%. They were in line with Viner et al. (2020), Corlett et al. (2020), and Litman (2020) that social distancing practice as case of a closed school system was a better method than using a temperature measurement tool to screen people at risk. This was the result of the pandemic of SARS and MERS viral diseases in mainland China, Hongkong, and Singapore but those results identified that social stability of students create confidence for society and universities in adaptation and follow the measures to avoid infection risk as a whole while 62.80% of fear paranoia was relatively high which may affect mental health.

In conclusion, learning stability of students in the COVID-19 pandemic situation was not affected much. It was sufficient to prevent students from studying normally because they were able to comply with the anti-epidemic measures quite well. There was a new way of learning to prepare online learning but paranoia and anxiety statements while maintaining social distancing,

masking, and avoiding entering slums including the students did not feel that they were at risk of infection from COVID-19 pandemic.

According to research aim, analysis the relationship between statement aid measures and learning stability, first, health statement revealed that most of student was fine in all cases. Second, there was no problem of learning stability in term of family part. Third, the aid measure from university (no fines if extend payment tuition fees) displayed significance to economic problem (family was laid off / no job) that meant most of student have not had problem in economic. Forth, online learning had problem at moderate level consequence in uncollected group. Lastly, the pandemic has made impact to society part at much level particular in uncollected group of state aid measure.

Acknowledgement

I thanks institute of research and development, Rajamangala University of Technology Thanyaburi for its financial support of the research on which this article is based Grant no. **COVID63D0912**

Compliance with Ethical Standards

This study was officially approved by the Institutional Review Board (IRB) in COA No.08, RMUTT_REC No. Exp 08/63

References

Abdullah M, Husin NA, Haider A (2020) Development of post-pandemic COVID-19 higher education resilience framework in Malaysia. *Archives of Business Research* 8(5): 201-210.

Al-Baadani AA, Abbas M (2020) The impact of coronavirus (COVID19) pandemic on higher education institutions (HEIs) in Yemen: challenges and recommendations for the future. *European Journal of Education Studies* 7(7): 68-82.

Aparicio M, Bacao F, Oliveira T (2016) An e-learning theoretical framework. *Educational Technology and Society* 19(1): 292-307.

Botelho J, Machado V, Proenca L et al. (2019) Cloud-based collaboration and productivity tools to enhance self-perception and self-evaluation in senior dental students: a pilot study. *European Journal Dental Education* 23(1): e53-e58.

Chen T, Peng L, Yin X et al (2020) Analysis of User Satisfaction with Online Education Platforms in China during the COVID-19 Pandemic. *Healthcare* 8(3): 200.

Corlett RT et al (2020) Impact of the coronavirus pandemic on biodiversity conservation. *Biological Conservation* 246: 108571.

Crawford J, Butler-Hederson K, Rudolph J (2020) COVID-19: 20 countries' higher education intra-period digital pedagogy responses. *Journal of Applied Teaching and Learning* 3(1): 4-13.

Drake TL, Chalabi Z, Coker R (2012) Cost-effectiveness analysis of pandemic influenza preparedness: what's missing? *Bull World Health Organization* 90(12): 940-941.

Deeod P (2020) The impact spread of the coronavirus 2019 (COVID-19) on occupation of a food delivery service. *Journal of MCU Nakhondhat* 7(6): 131-144.

Hasani LM, Adnan HR, Sensuse DI (2020) Factors affecting student's perceived readiness on abrupt distance learning adoption: Indonesian higher-education perspectives. In: 3rd International Conference on Computer and Informatics Engineering (IC2IE), Yogyakarta, pp. 286-292.

Hrastinski S (2009) A theory of online learning as online participation. *Computers & Education* 5(1): 78-82.

Lin WS, Wang CH (2012) Antecedence to continued intentions of adopting e-learning system in blended learning instruction: a contingency framework based on models of information system success and task-technology fit *Computers & Education* 58(1): 88-99.

Litman T (2020) Pandemic-resilient community planning, practical ways to help communities prepare for, respond to, and recover from pandemics and other economic, social and environmental shocks Victoria Transport Policy Institute, 23 April 2020, pp.1-29.

Muflih S, Abuhammad S, Karasneh R et al (2020) Online education for undergraduate health professional education during the COVID-19 pandemic: attitudes, barriers, and ethical issues. *Research Square* pp.1-17.

Muilenberg LY and Berge ZL (2005) Student barriers to online learning: a factor analytic study. *Distance Education* 26(1): 29-48.

Nabarro D, Wannous C (2016) The links between public and ecosystem health in light of the recent ebola outbreaks and pandemic emergence. *Eco Health* 13(2): 227-229.

Palvia S, Aeron P, Gupta P (2018) Online education: worldwide status, challenges, trends, and implications. *Journal of Global Information Technology Management* 21(4): 233-241.

Qiu W, Rutherford S, Mao A (2016-2017) The pandemic and its impacts. *Health, Culture and Society* 9-10:1-11.

Ross J and Lau J (2021) Universities brace for lasting impact of coronavirus outbreak. Available at: www.timeshighereducation.com/news/universities-brace-lasting-impact-coronavirusoutbreak (accessed 2 February 2021)

Siritongthaworn S, Krairit D, Dimmitt NJ (2006) The study of e-learning technology implementation: a preliminary investigation of universities in Thailand. *Education International Technology* 11(2): 137-160.

Saekow A, Samson D (2011) E-learning readiness of Thailand's universities comparing to the USA's cases. *International Journal of e-Education e-Business e-Management and e-learning* 1(2): 126-131.

Sahin M, Kurban CF, Mazur E (2019) *The new university model: scaling flipped learning in higher education*. FL Global Publishing.

Smalley A (2020) Higher education responses to coronavirus (COVID-19). National conference of state legislatures. Available at: www.ncsl.org/research/education/higher-education-responses-to-coronavirus-covid-19.aspx (accessed 10 March 2021).

Talidong KJB, Toquero, CMD (2020) Philippine teachers' practices to deal with anxiety amid COVID-19. *Journal of Loss and Trauma* 25(6-7): 573-579.

Tashkandi A, Al-Jabri I (2015) Cloud Computing Adoption by Higher Education Institution in Saudi Arabia: Analysis Based on TOE. 2015 International Conference on Cloud Computing ICC, July, pp.1-8. *Computer Science*.

Thairath (2020) Available at: www.thairath.co.th/news/politic/1815023 (accessed 8 April 2020)

Thongkaew T (2020) New normal based design in education: impact of COVID-19. *Journal of Teacher professional Development* 1(2): 1-10.

Ung-chusad K and Cunsuthiwat S (2020) COVID-19 Thailand: transition from "semi-lockdown" to stability. *Journal of Health Science* 29(2): 376-380.

Viner RM et al. (2020) School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. *The Lancet Child & Adolescent Health* 4(5): 397-404.

Kumar, S. (2022). Strategic management of carbon footprint using carbon collectible non-fungible tokens (NFTS) on blockchain. *Academy of Strategic Management Journal*, 21(S3), 1-10

Kumar, S. (2021). Review of geothermal energy as an alternate energy source for Bitcoin mining. *Journal of Economics and Economic Education Research*, 23(1), 1-12

Roy, V., Shukla, P. K., Gupta, A. K., Goel, V., Shukla, P. K., & Shukla, S. (2021). Taxonomy on EEG Artifacts Removal Methods, Issues, and Healthcare Applications. *Journal of Organizational and End User Computing (JOEUC)*, 33(1), 19-46. <http://doi.org/10.4018/JOEUC.2021010102>

Shukla Prashant Kumar, Sandhu Jasminder Kaur, Ahirwar Anamika, Ghai Deepika, Maheshwary Priti, Shukla Piyush Kumar (2021). Multi objective Genetic Algorithm and Convolutional Neural Network Based COVID-19 Identification in Chest X-Ray Images, *Mathematical Problems in Engineering*, vol. 2021, Article ID 7804540, 9 pages. <https://doi.org/10.1155/2021/7804540>

Vuuren DP et al. (2020) Energy, land-use and greenhouse gas emissions trajectories under a green growth paradigm. *Global Environmental Change* 42: 237-250.

Wayo W, Charoennukul A, Kankaynat C (2020) Online learning under the COVID-19 epidemic: concepts and applications of teaching and learning management. *Regional Health Promotion Center 9 Journal* 14(34): 285-298.

Willis K, Ratcliff A (2020) Promoting student success in uncertain times: five practical strategies for academic leaders during the pandemic. *Education Doctorate Faculty Work* 8.