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Research Paper Open Accsess

Using of Game-Based Learning via Facebook Live to Enhance Distance Learning in the Time of COVID-19 Pandemic

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Abstract

The use of current and emerging platforms in education is becoming an intriguing topic among educators and educational institutions. Using live-stream media like Facebook lives can provide a more intimate level of engagement with audiences. Besides, the use of games in education plays a vital role in engaging students by encouraging a hands-on approach. This study aimed to investigate implementing a game-like via Facebook live feature as a supportive science learning tool. This study examined how Thai secondary school teachers and students performed and interacted with five live-streaming activities. In each live-stream activity, the participants needed to answer ten questions in the scheduled time. The resource used for posing questions is secondary school science materials related to the Thai Basic Education Core Curriculum's learning standard. The participants were required to join the live-stream video as well as answer ten questions in real-time. All participants were provided materials uploaded on the Facebook wall two days before the live-streaming day. The result of this study showed that the number of participants who scored more than the given criteria had steadily increased, suggesting that the Facebook live feature is a useful tool for learner engagement. It indicates that the Facebook live feature increases students' motivation and attention since it can enhance visual skills, improve students' interaction and collaboration abilities with their peers.

Introduction

The outbreak of the coronavirus disease-2019 (COVID-19) has made significant disruptions to the Thai education system. This pandemic caused school closures in Thailand. A new normal education system is expected after the COVID-19 is under control [1]. So providing education during the coronavirus disease (COVID-19) outbreak is a challenge[2]. Most Thai students and teachers have adapted to the new normal following the COVID-19 pandemic. Thailand has been arranging a distance learning approach via satellite or DLTV (Distance Learning Television) since the reign of His Majesty King Bhumibol (King Rama IX), who had an excellent vision in bridging the knowledge gap for learners in rural areas. On this crisis, Thailand has an opportunity to adopt this approach for underprivileged children and youth for all learners nationwide. The online learning platform is also an alternative solution [3,4]. Students can always access learning materials such as module contents, assignments, and recorded sessions anytime and anywhere with an online learning platform. Besides, online courses transfer classroom learning in the virtual environment with no physical interactions. Parents could support education leaders and teachers to assess different ways to continue educating students during the COVID-19 Pandemic [5,6]. However, when students participate in a lecture for an hour online, it goes beyond passive into insensible. Finding ways to bring active learning into the online environment is necessary. Active learning refers to the idea that students are actively engaged in the learning process rather than passively

absorbing content[7]. There are many examples of active learning strategies adapted for online learning, such as assessment - tests and quizzes that provide immediate feedback, discussions (virtual chat, bulletin board), games and simulations, and community building.

Gaming is a type of play where participants follow defined rules. Many different types of games are being applied and used in educational institutions [8]. The correlation between the game cycle and learning outcome is shown in Figure 1. The game-based learning model provides a link between simulation-based activities and the real world and associates events in the Game with real-world events. The game-based learning model has successfully carried out informal education, such as military, medicine, and physical training [7]. Michel (2016) remarked that games with encouraging curriculum content or other educational materials are educational games [8]. Also, games can be used as a support tool to complement traditional teaching methods to improve the learners' learning experience while also teaching other skills such as following rules, adaptation, problem-solving, interaction, critical thinking skills, and creativity [9]. Many platforms can support online learning, such as Facebook, Zoom, and line application.

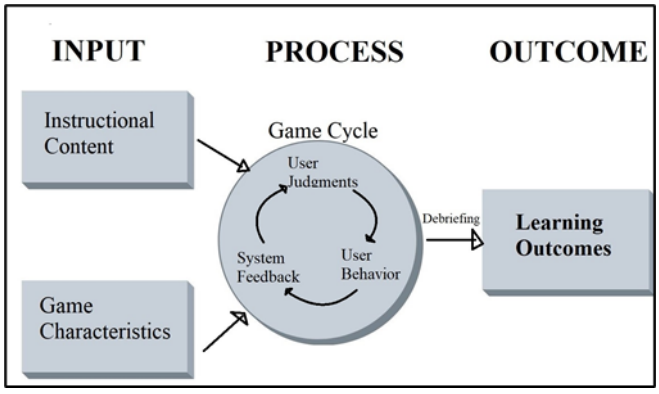


Figure 1. Game-Based learning model[9] .

In Thailand, both social media and technology have become an indispensable part of Thai society. Every individual aged above 13 years old will have their account on popular social media networks such as TikTok, Instagram, Snapchat, and Facebook [10–12]. Social media allows active participation in activities and services by sharing content and opinions and supporting online groups' creation according to the participants' specific needs[10,13,14]. Social media advantage in education is an engagement tool that encourages new teaching methods and effective communication between students and teachers worldwide. Teachers can upload teaching or educational videos on social media such as YouTube, Facebook, Twitter, and Instagram to educate students worldwide. Moreover, social media could enhance students' performance, help the student become more active and engage in learning [5].

Facebook is one of the biggest social media networks globally. According to the Q3 2019 report, 74% of Facebook users visit the platform daily. Hence, it can be a useful tool for the instructor to share learning resources, fire up discussions, promote collaboration, improve relationships between students, and incorporate various learning tools—such as videos, images, boards, chatting, and private messaging.

Facebook Live is a Facebook feature that allows users to stream live videos to a Facebook Page or Group. Besides, applying Game-Based learning with Facebook Live can bring active learning into the online environment [15]. Therefore, Game-Based

learning with Facebook Live could be used as a support tool to Enhance Distance Learning Engagement in the Time of COVID-19 Pandemic.

In this paper, Facebook appears to be used primarily as a supportive tool in game-based learning for science subjects. The study's goal was to determine if the implementation of Game via live-stream feature would encourage students' and teachers' online learning during the COVID-19 pandemic.

Methods

2.1 Materials

The tools for live streaming composted of a desktop computer, stable internet connection, and a mobile phone. Besides, Facebook and OBS-Studio Application are the platforms that are used to support an online educational game.

2.2 Participants

This study's participant was random of teachers and students from primary school to high school who register in the google form.

2.3 Research Design

This qualitative research introduced game-based learning (GBL) in science education via Facebook Live to enhance distance learning in the COVID-19 pandemic. This study aims to bring active learning into the online environment and maximize learners' voluntariness to study and answer real-time questions. The data in this study were collected using online surveys. The process for managing game-based learning through Facebook Live consists of seven stages, namely (1) Learning resources preparation, (2) Scheduling and activity promotion, (3) Registration, (4) Updating learning resources, (5) Live-stream broadcasting, and (7) rewarding:

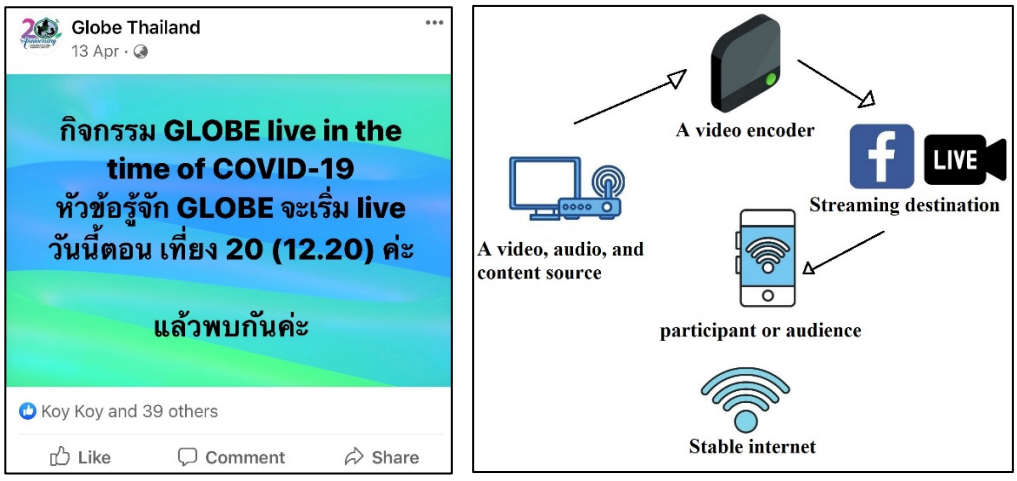
Firstly, learning resources for question designing were collected from books, social media, and the Globe Thailand website. The selected sources are relevant to the secondary school science level. Each topic is related to the Thai Basic Education core curriculum's learning standard, as can be seen in Table 1[16]. Each topic was considered in the developed ten questions—secondly, Scheduling and activity promotion. Set up scheduling is an essential part of planning online activities. In this study, each day's activity time was set at 12:20 pm because this is the time that participants hang out online most often. Hence, the scheduled date and time criteria, application form's link, and directions during the broadcast activity were posted on the Facebook wall, allowing the audience to decide ahead of time.

Table 1. Topics, Resources' Contents, and Standard Indicators**.**

Topic	Resources' Contents with the provided links	Standard Indicators and Grade Level
Knows GLOBE	- GLOBE 20 anniversary, https://www.youtube.com/watch?v=CsoVO54I3AM - Save the world (PM2.5) https://www.youtube.com/watch?v=jFeACJKpQhY	General knowledge Grade: All
Promotion of Soil Measurement	Soil fertility and pH, Soil Texture, - Soil observer cartoon http://globethailand.ipst.ac.th/media.php?p=3 - Soil Temperature https://www.youtube.com/watch?v=pIANGIkOSV8	Standard Sc1.2, Sc3.2 Grade 4, 7, and 8

Topic	Resources' Contents with the provided links	Standard Indicators and Grade Level
Climate Change	Storm, Flood, The effect of climate change and Preparing for changes, - Landslide https://www.youtube.com/watch?v=OaJfYAp7gVA - Climate Change https://www.youtube.com/watch?v=z1ybJRoUEqc	Standard Sc3.2 Grade 3, 5, 7, and 8
Promotion of Water and Atmosphere Measurement	Dissolved oxygen, Water temperature, Relative humidity, - Clouds covered https://www.youtube.com/watch?v=ca9yetBlip4 - Mosquitos https://www.youtube.com/watch?v=tQD_3qnamMI - Water transparency https://www.youtube.com/watch?v=ePU6OJyr4_I	Standard Sc1.1, Sc2.3 Grade 3, 5, 7, and 8
Promotion of Biosphere/Land Cover Measurement and the Earth System Science	Land cover, Trees circumference measurement, - Tree is sleeping https://www.youtube.com/watch?v=x8A33NWJvMU - Where the animal is https://www.youtube.com/watch?v=UivCv0U5ib8 - Tree height https://www.youtube.com/watch?v=_v0mJIlRd5Y	Standard Sc1.1, Sc.2.1 Grade 5, 7, 9

Thirdly, for the registration, the participants were asked to register through an online registration form. The online registration lets participants sign up for activity events anytime and anywhere before the activity date. Fourthly, Updating learning resources. In this section, online learning links video lectures, tutorials, online courses, and e-books which are informal online learning resources posted on the Facebook wall. Participants were assigned to study on the provided resources before joining the activity. The learning resources were posted on the Facebook wall every two days before the activities started. Then, participants could access the learning resources and study the topic that related to the questions.



(a) **(b)**

Figure 2. A compelling description: "GLOBE live in the time of COVID-19 in the topic of Know GLOBE will start at 12:20 pm" (a); The basic setup and flow of a live stream (b).

Fifthly, Live-stream broadcasting. Live-streaming broadcasting is a significant phase that would begin by writing a compelling description before starting the live-streaming video, as seen from Figure 2(a). The participants tend to engage with the activity more increase view duration. Then, check the video and audio sources such as cameras, computer screens, and other image sources, microphones, and other sounds to be played in the stream. After that, install a video encoder that packages real-time video and sends it to the internet. Next, start a live-stream broadcast on Facebook. A stable internet connection is essential, so streaming does not freeze, buffer, or drop off entirely. The basic setup and flow of the live stream were shown in Figure 2 (b). After the broadcast, the participants would receive a notification that a Facebook they follow was live. Finally, participants needed to enter to join live-streaming videos and answer questions in real-time at the scheduled time. The activity started with the host reading each question, and participants would have a response time of 20 seconds, reading three choices and typing the answers. Live streaming was ended after ten questions were asked. Figure 3 shows a sample of live-streaming activity.

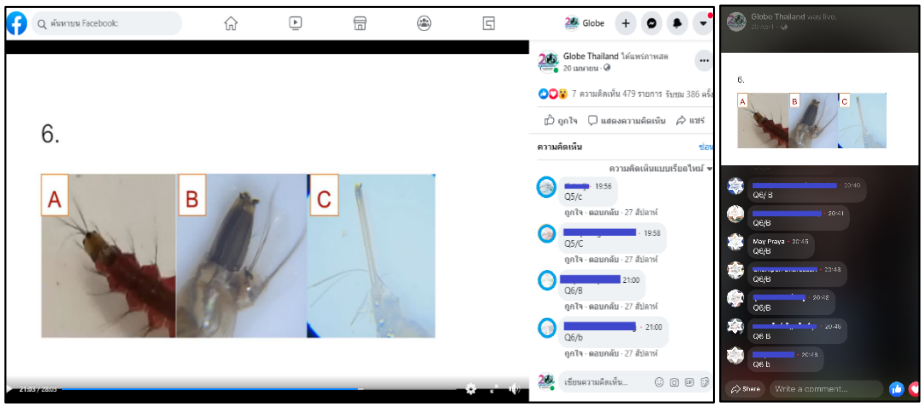


Figure 3. Live-stream activity on April 20, 2020.

Sixthly, rewarding. There are two criteria for rewarding participants, which are the ones who have corrected at least seven from ten questions and the ones who joined five times activities with the highest cumulative total points known as the winner of the Facebook Live. To encourage and motivate participants to participate in the next activity, the names of participants who scored more than the given criteria were posted on the Facebook wall on the following day (Figure 4 (a)). Also, participants could learn more about the questions from the answers revealed and posted on Facebook wall.

Seventh, the survey was divided into two parts: a five-point Likert-scale six questions section, and three open-ended questions sections. The students were asked to fill the survey with a five-point Likert-scale seven questions section, while teachers need to fill both sections. To assess the level of the experience and knowledge of the participants on game based-learning, the responses were scaled by Likert values from 1 to 5: Not Satisfied at all, Not Satisfied, Neutral, Satisfied, Strongly Satisfied. The google form of the survey was delivered at the ending of the activities via a link (Figure 4 (b)).

(a) **(b)**

Figure 4. The names of participants who scored more than the given criteria and the answers were posted on a Facebook wall (a); The QR code for evaluating live-streaming activity (b).

2.4 Data collection and Analysis.

In this study, a survey was developed to evaluate the participants' experience and knowledge of game-based learning via the Facebook live platform. A five-point Likert-scale six questions are (1) Do you gain knowledge from participating in the activity? (2) Does the content of the activity modern and can be applied in life?, (3) Does the timing of the event appropriate?, (4) Does the activity provides fun and enthusiasm while participating? (5) Dose the plate form (Facebook life) appropriate?, and (6) Does the content appropriate?. Whereas Three open-ended questions are (1) Do you think this activity can be applied to the school? (2) Do you think that using Facebook Live can enhance Distance Learning Engagement, and (3) Do you have any other comments, questions, or concerns?

2.5 Data analysis technique

The data of this research was hand analysed because the number of data is a small group. The stages of data analysis were carried out (1) preparing and organizing data for analysis, (2) exploring and coding data, (3) creating codes to compile descriptions, (4) representing and reporting findings, (5) interpreting findings, and (6) validate the accuracy of the findings [17].

Result and Discussion

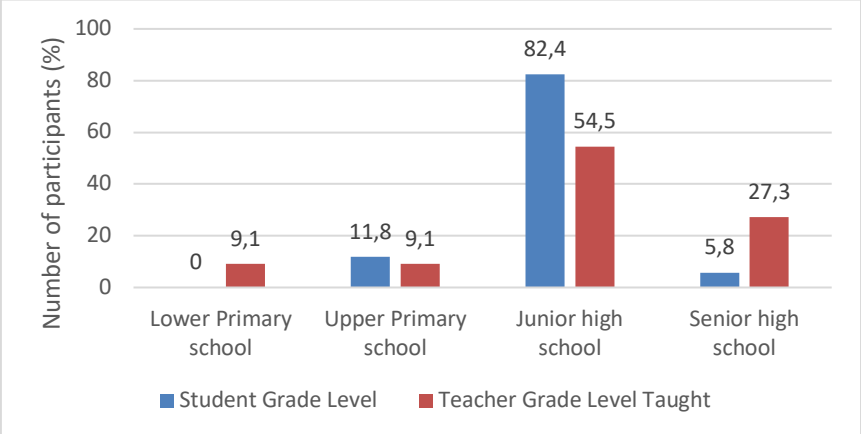
The results in this research were obtained from real-time responded participants and an online survey. Table 2 shows total likes, total shared, number of viewers, and participants' scores for real-time responded participants. After conducting the activities five times, it showed that the number of viewers who log onto Facebook on live-streaming events varies between 303 and 453 viewers. Indeed, there are two criteria for rewarding participants, which are the ones who have corrected at least seven from ten questions and the ones who joined five times activities with the highest cumulative total points known as the winner of the activity. At the first-time activity, 50% of participants scored more than seven. Then, it was noticed that the

percentage of participants who got at least a score of seven had been increased steadily from 50% to 90% from the first-time activity to ending live-stream event. According to the result, the number of participants who get score more than the criteria have increased. Thus, this can be implied that participants improved their self-study with online resources. Also, answering more and more questions will allow more participants to correct more questions [18]. On the pandemic crisis, self-study on an online resource is an excellent method that enables learners to continue their studies effectively and efficiently[19].

Table 2. Total likes, total announcements shared, viewers, and the number of participants' scores**.**

No.	Total Viewers (person)	Total Announcements Shared	Number of Real-Time Participants (person)	Score ≥ 7 (person)
1	446	11	33	15
2	453	12	35	28
3	303	5	34	29
4	374	8	39	36
5	449	9	31	29

Figure 5 represents the level of student grade, and teacher grade taught, who participated in the live-stream activity. There are three student grade levels joined the activity since Facebook does not allow children under age 13 to create their own Facebook accounts. However, the results reveal that children under 13 may be on Facebook by using false information to sign up. According to the results, what is consistent is that the highest percentage was junior high school students (82.4%), followed by the upper primary school (11.8%) and senior high school (5.8%). The junior high school teacher was the most significant participant (54.5%), followed by senior high school teachers (27.3%). The third was upper primary school teachers (9.1%) and lower primary school teachers (9.1%). Thus, this two-way communication approach is for most junior high school students and teachers.



n for student grade level =54; n for teacher grade level taught = 48

Figure 5. Percentage of student grade level and teacher grade level taught participated in the live stream activity

It can be said from figure 5 that this online approach is innovative because it modelled the traditional two-way communication in face-to-face classrooms to online. This approach developed authentic relationships between teachers and students. Therefore, the

key to success in online teaching is building a repertoire of tools that allow the teacher to have authentic communication with online students.

Questionnaires	Mean	
	Teachers	Students
The knowledge gained in each activity	4.4	4.3
The content of the activity is modern that can be applied in life	4.5	4.1
The timing of the event is appropriate	4.1	4.0
Have fun and enthusiasm while participating in activities	4.4	4.2
Appropriateness of platform (Facebook Live)	4.3	4.0
The appropriateness of content	4.3	4.1

Table 3. Mean of the activity rating using a five point Likert scale**.**

After the live streaming ended, the participants were asked to fill the survey for evaluating the activity through an online form**.** For the first section, both teachers and students were asked six questions to indicate the activity's rating shown in Table 3**.** The six questions, among them, are (1) Do you gain knowledge from participating in the activity? (2) Does the content of the activity modern and can be applied in life?, (3) Does the timing of the event appropriate?, (4) Does the activity provides fun and enthusiasm while participating? (5) Dose the plate form (Facebook life) appropriate?, and (6) Does the content appropriate? This assessment question uses guidelines from Likert values from 1 to 5 **(**not satisfied at all, not satisfied, neural, satisfied, strongly satisfied**).** Based on Table 3, a mean of 4**.**5 indicated that teacher-rated their satisfaction with the activity's content is modern that can be applied in life**.** A mean of 4**.**4 indicated that teacher-rated their satisfaction with the knowledge gained in each activity and have fun and enthusiasm while participating in activities**.** A mean of 4**.**3 indicated that teacher-rated their satisfaction with the platform's appropriateness **(**Facebook Live**)** and the content's appropriateness**.** The timing of the event is appropriate was rated at a mean of 4**.**1**.** For students, the highest mean is 4**.**3, with the knowledge gained in each activity followed by, have fun and enthusiasm while participating in activities with 4**.**1 of the mean**.** It can assume that students were engaged in this activity as they are more likely to follow the activity's rules and excited to participate**.** The lowest mean of the student is the same as the teacher**.** The evaluation results revealed a significant finding that teachers and students are satisfied with this approach as the mean was in the range of 4 to 5**.** From three open-ended questions as follow**:**

- Do you think this activity can be applied to the school?
- Do you think that using Facebook Live can enhance Distance Learning Engagement?
- Do you have any other comments, questions, or concerns?

Teachers who participated in this activity recognize the potential of using Game-based learning with Facebook live; that is an excellent pedagogy in this COVID 19 pandemic**.** This approach could engage students in online self-learning**.** Student engagement is crucial because it's linked to increased student achievement**[20].** Using this Game-based learning approach, students tend to read assigned online resources more thoroughly as can be seen as the results in increasing the number of participants who passed the criteria **(**table 2**).** Most teachers noted that students could learn more effectively at their place because students can access many resources related to the assigned topic**.** Also, teachers agreed that using Facebook live is one of the platforms that support distance learning**.** There is a concern of using this approach**:** equity and accessibility to technology **[21**,**22].** Moreover, participating in this activity can help students focus on memory because of this activity in real-time**.** It could mean that game-based learning via Facebook is an

excellent pedagogy approach in the COVID-19 pandemic.

Conclusion

Continue quality learning for Thai students during the COVID-19 pandemic is a challenge for Thailand. Ministry of Education has been preparing to bring about online learning platform solutions to help tackle this problem. This research introduced Game-based learning with science learning via Facebook live as an optional way to promote distance learning engagement. This approach could engage students in online self-learning with motivation. From an open-ended questions survey, teachers agreed that using Game-based learning with Facebook live is one platform that could support distance learning. Besides, Game-based learning helps to bridge the online class closer to reality. The limitation of this approach is the equity and accessibility to technology. Future work is to create e-learning groups on Facebook, share specific or additional content, and discuss online forums.

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