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ICECoT 2021

International Conference on Emerging Computational Technologies

"Future Trends of Emerging Computational Technologies in the 21st Century"
"Strategizing IR4.0 in Conquering Covid-19 and Beyond"

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Preface

This e-book describes the research papers presented at the International Conference on Emerging Computational Technologies (ICECoT 2021), organised by Faculty of Computer and Mathematical Sciences (FSKM), UiTM Cawangan Melaka. The main discussions of the conference is on the technological advances that help shape the skills that are required to cope with the Fourth Industrial Revolution (IR 4.0). Considering that this is our first attempt at organising a conference, we are therefore greatly honoured that the Universitas Negeri Semarang (UNNES), Indonesia, Mahasarakham University (MSU), Thailand and University of Hail (UoH), Saudi Arabia have all agreed to become our partners by contributing several reseach papers as well as providing reviewers to assess the quality of the papers.

Out of the numerous research works that had been submitted and reviewed, the Editorial Board have selected 22 papers to be published in the e-book. The discussions of these papers pertain to the use of technologies within the broad spectrum of Computer Science, Computer Networking, Multimedia, Information Systems Engineering, Mathematical Sciences and Educational Technology. It is hoped that the research findings that are shared in this e-book can benefit those who are interested in the various areas of computational technologies; such as graduate students, researchers, academicians and the industrial players, to name a few.

As the Project Manager, I would like to thank all of the committee members from the bottom of my heart for their tireless efforts in ensuring the success of ICECoT 2021. Without their continual support and excellent teamwork, this conference would not have come to fruition. In fact, holding this major event has been a good learning experience for us all, and I sincerely believe that our future conferences will become more outstanding if the same spirit is maintained.

Dr. Noor Aishikin Adam
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Enhanced Virtual Learning using Google Education & Padlet As A Tool for Inquiry-Based Learning For The Speciation Topic

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Abstract—**Active teaching and learning implementation as well as full involvement by students is particularly challenging on learning during the Covid-19 Pandemic. Therefore, the study conducted aims to examine the effectiveness of applying inquiry-based learning for topic of Speciation in Biology with the integration of technology via virtual learning. In this study, the 5E model of Inquiry- based was adapted by integrating Google education technology and Padlet while teaching and learning was conducted virtually. A total of 42 Biology SB025 (matriculation) students were involved in the implementation of this learning. Data collection is carried by students answering a questionnaire method with Likert scale. Two forms of constructs are provided, namely Virtual Learning Effectiveness with the help of Google & Padlet and Learning Effectiveness and comprehension by inquiry with the help of Google & Padlet. The findings from both constructs showed overall mean result is 4.716 and 4.86 which the level of application for this construct is high. This demonstrates the ability to master an active involvement of students in learning virtually and helps students to be more engaged and student centered. This shows a good level of understanding of students with inquiry-based learning with the help of google education and Padlet as a medium of sharing and collaboration between researchers with students and students among themselves. In conclusion, inquiry-based learning with the application of technology can make teaching and learning more effective and maximize student involvement in virtual learning.**

Keywords—google education, inquiry learning, padlet, speciation, virtual learning

I. INTRODUCTION

The Malaysia Education development plan 2013-2025 is the main essence of a comprehensive education transformation towards better quality education. The content of PPPM emphasizes the strengthening of the quality of STEM education that can develop human capital such as knowledgeable, highly skilled, highly prudent, creative, innovative, and competitive [1].

At the same time, the transformation of teaching and learning towards digitization is fast forwarding the impact of the Covid-19 pandemic where it has opened opportunities and challenges for the national education system to face the changes in the digital era of Industrial Revolution 4.0. This is done between students and lecturers with the help of the latest technological equipment.

Inquiry learning exposes students to the concepts of 5E (engage, explore, explain, elaborate, and evaluate). Each of these phases exposes students to relevance to past learning topic and real situations (engage). Students build an understanding of concepts based on exploration. Students can also make explanations and build further ideas through the findings obtained (explain). Upon understanding the concept, students able to elaborate and finally measures the level of understanding (evaluate).

Learning with the use of technology is important in line with the development of the modern world today. The integration usage of ICT media makes the learning process more interesting and productive [2].

Following the covid-19 pandemic that hit the country, teaching, and learning sessions are still vigorously implemented with full technology applications. The existence of the DELIMA KPM portal has become a platform for educators to explore and master the existing applications to attract students to remain actively involved in virtual teaching and learning sessions. Many free applications are available in open space and opportunities for educators to undertake more creative and innovative student-centered teaching and learning by adhering to 21st century virtual learning. While the introduction of *G-Suite education* from Google education is another new leaf in the advancement of technology in the world of education; where various applications from google are provided free of charge including training to educators on how to operate it.

Based on past problems, topic 4: Speciation (Matriculation Biology Syllabus SB025) is a broad topic and quite difficult to understand and master by students because it involves the evolutionary process in the production or change of animal or plant species in the ecosystem. According to Britannica online, difficulties in understanding evolution occur because students find it difficult to take a mental picture of the processes that take place. High-level comprehension through reading and concepts by analogy can help students understand and master this topic.

The objective of this study is to look at the effectiveness of inquiry-based teaching and learning in the Topic of Speciation with the integration of technology for virtual learning. This study also aims to find effectiveness in virtual learning with the help of Google & Padlet as student-centered teaching platform. This study can also indirectly assess the level of students' mastery of technology in virtual learning.

II. LITERATURE REVIEW

STEM integration has a positive impact on student achievement [3]. Reference [4] students who receive more exposure to STEM activities successfully show high achievement in STEM fields. Active learning methods, the use of technology can also help teachers to develop ideas and creativity in the teaching & learning process [5].

Inquiry is defined as a method of student-centered teaching and learning that involves inquiry and curiosity include students in planning, implementation, and assessments, involving the learners in these decisions will place work on them [6]. Student-centered learning has proven to be successful in raising the achievement levels of students in reading, math, and science. Higher achievement levels are reached by engaging students with technology and group projects that encourage them to surpass their comfort zone and accomplish the task they have chosen to pursue [7].

Inquiry-based learning requires a high level of active mental involvement compared to physical involvement where it can improve students' understanding [8]. Inquiry-based learning could not only improve students' understanding of concepts, but also strengthen reasoning skills and cultivate students' positive attitudes toward science [9].

The virtual learning method is a method of teaching and learning using technology to facilitate teaching & learning when the Covid-19 pandemic hit the country. According to the study, learning effectiveness with the use of computer technology facilities found that the use of ICT is less effective in physical learning, but amazingly effective in virtual classroom learning and can be used as a learning application in this pandemic [10].

In general, the use of technology in the field of education today has grown so rapidly that without human technological tools, we are not able to advance the country in a better direction. The advancement of ICT has also contributed to positive developments in the education model of the new millennium. The use of modern technological tools has helped the teaching & learning process to become increasingly attractive to students [11]. Students can make studies and presentations virtually using video, photos or any digital display showing students' success in mastering digital platforms [12].

In general, the use of technology in the field of education today has grown so rapidly that without human technological tools, we are not able to advance the country in a better direction. Padlet is one of the tools in virtual learning. Reference [13] Padlet is one new technologies tool work like a cork board facilitating students to post and share notes and ideas in the form of link, videos, and documents. Padlet is being chosen as the best tools for this study based on its features. Reference [14] Padlet helps brainstorm ideas, live question bank, gather students work, become online students' portfolio and there are about more than 30 creative ways in use Padlet in virtual classroom.

III. METHODOLOGY

A. Study Design

The information-based collection research method used is with students answering a questionnaire in the form of a Google form at the end of the assignment. A total of 42 Biology SB025 semester 2 (matriculation) students were involved in this study. Reference [15] questionnaires help in measuring the level of awareness as well as readiness in accepting new things. Questionnaire method with Likert scale as shown in Table I is used to measure the data where respondents fill in the opinions towards the social phenomena studied [16]. Two forms of constructs are provided, namely Virtual Learning Effectiveness with the help of Google education & Padlet and Learning and the second construct is Effectiveness and comprehension by inquiry with the help of Google education & Padlet.

TABLE I. : LIKERT SCALE INSTRUMENT [17]

Evaluation	Score
Strongly Agree	5
Agree	4
Less Agreeable	3
Disagree	2
Totally Disagree	1

For the analysis purpose of the level for both constructs, the researcher categorized back the Likert scale classification of five points to three levels to classify each item against mean score as in Table II.
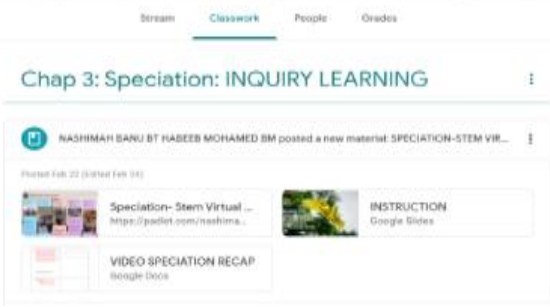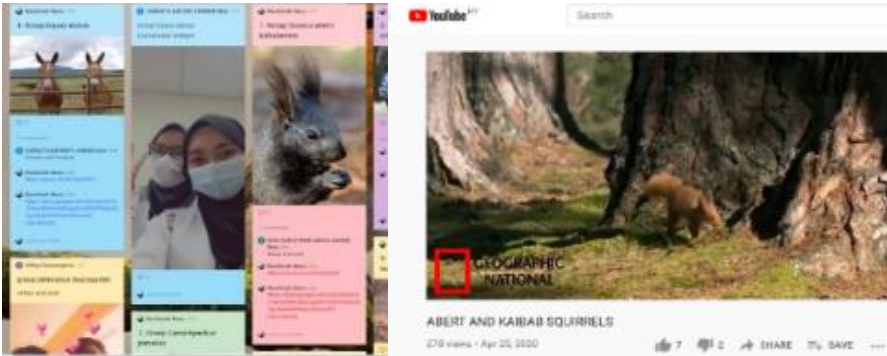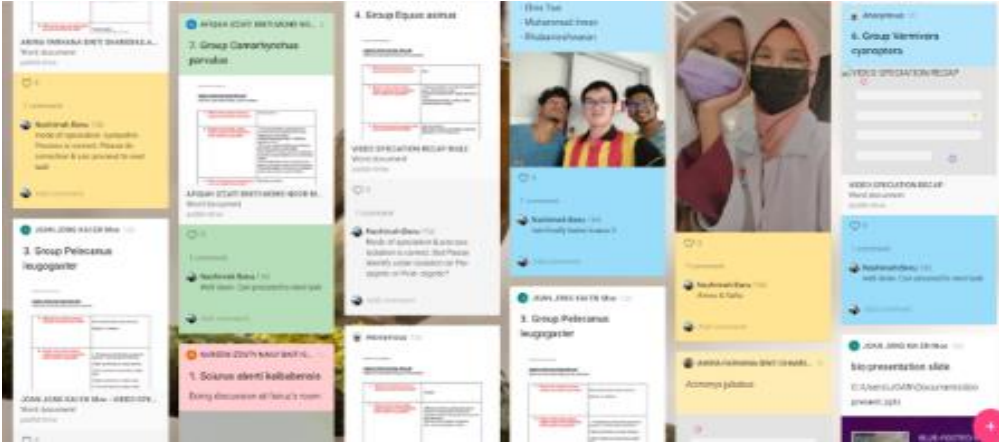
TABLE II. : THE THREE LEVELS CLASSIFICATIONS OF MEAN SCORE[18]

Stages of Application	Interpretation	
	Frequency	Score Means
Low	Not Frequent	1.0 - 2.33
Medium	Less Frequent	2.34 - 3.66
High	Frequent	3.67 - 5.00

B. Design of Teaching And Learning Activities

The design of teaching & learning activities in this study has adapted the teaching continuity of the 5E inquiry learning model. This 5E model consists of five phases, which is engagement, explore, explain, elaborate, and evaluate. Table III describes in more detail the teaching and learning activities that have been carried out based on the inquiry learning model.

TABLE III. : THE DESIGN OF TEACHING & LEARNING ACTIVITIES

| Phase	Activity
Before teaching & learning begins	1. Researchers share assignment instructions: Speciation Stem learning through students Google classroom as in Fig. 1. 2. Through the classwork, 3 materials are shared: Google slides: Instructions for assignments (with hyperdoc which is a link for each information such as to the class Padlet, YouTube video link and link to Google doc (worksheet). Fig. 1. Google classroom display
1.Engage	1. Seven groups (of two students) are formed by placing pictures and species name only. 2. Students will make a group reservation by placing a photo of the member (via the Padlet). 3. Each group will be accompanied by a YouTube video link related to the species as in the picture as in Fig. 2. Fig. 2. YouTube video link related to each species assigned
2. Explore	1. Students need to identify information from videos related to speciation as in Fig. 3. 2. All the recorded information by students shared through the Padlet. Fig. 3. All recorded information by students as per in the Padlet
3. Explain	1. Students are asked inquiry-based questions to arouse curiosity, hence make them focused on explorations. 2. Students need to do research by searching through Google Search to answer the questions. 3. All information, website links, journals or any online student reference materials must be attached to the Padlet (facilitates access for lecturers or other students for reference) as in Fig. 4.
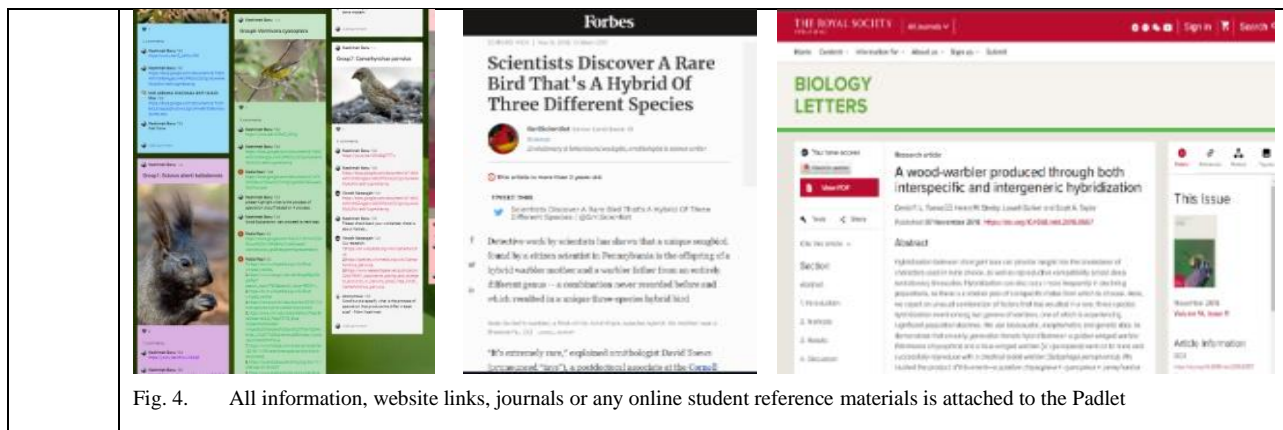
Fig. 4.　　All information, website links, journals or any online student reference materials is attached to the Padlet

| 4. Elaborate | 1. Students will make a presentation via PowerPoint / Canva / Google Slide via Google meet. |
| | 2. All presentation materials are shared as in Fig. 5 on the padlet to facilitate the presentation process. This will help if there is any line interruption. |

Fig. 5.　　Shared material on the Padlet

| 5. Evaluate | Questionnaire in Google Form as in Fig. 6 are analyzed. |

Fig. 6.　　Questionnaire in Google form

IV. FINDINGS

Once the data is collected, it is analyzed according to the two constructs questioned which is Learning Effectiveness in virtual with the help of Google education & Padlet and Effectiveness and comprehension of Learning by inquiry with the help of Google education & Padlet. Using a Likert scale in Table I, the mean score findings for each construct is calculated analyzed based in Table II. Table IV shows the result for Effectiveness with the help of Google education & Padlet and Learning.

From the results of the questionnaire for the virtual Learning Effectiveness construct with the help of Google & Padlet, the overall mean result is 4.716, which is according to the Table II of mean score interpretation, the level of application for this construct is high. This shows that respondents agree that the use of Google & Padlet is more

effective in the implementation of virtual learning and helps students to be more engaged and student centered. Students' mastery of the use of technology & applications is also high. According to [13] Padlet can be an important tool in the classroom because it can combine group research, bring creativity, activate participation & always follow latest updates.

Table V shows the results of the construct questionnaire on the effectiveness and comprehension of learning by inquiry with the help of Google education & Padlet, the average mean result obtained is 4.86, which is a high level of application. This shows that respondents think and agree that inquiry-based teaching with the help of Google education & Padlet is more effective and easier to understand the topic of teaching.

TABLE IV. : EFFECTIVENESS OF VIRTUAL LEARNING WITH HELP OF GOOGLE EDUCATION & PADLET

Point	5	4	3	2	1	
Likert Scale	Strongly Agree	Agree	Less Agreeable	Disagree	Totally Disagree	Mean
1. Padlet facilitates information search / sharing in one common platform	30 71.43%	7 16.67%	5 11.90%	0	0	4.60
2. I am more committed and like to use the Google & Padlet in virtual learning style	37 88.10%	5 9%	0	0	0	4.88
3. I can share all the information with home group researcher & other classmates easily through Padlet	42 100%	0	0	0	0	5
4. The use of Padlet encourage me to be more creative in presenting the material on the wall	18 42.86%	20 47.62%	3 7.14%	1 2.38%	0	4.30
5. Padlet always helps me track current & upcoming post by other teams and lecturer	35 83.33%	6 14.29%	1 2.38%	0	0	4.8
Overall, Min 4.716						

TABLE V. EFFECTIVENESS AND COMPREHENSION LEARNING BY INQUIRY WITH THE HELP OF GOOGLE EDUCATION & PADLET

Point	5	4	3	2	1	
Likert Scale	Strongly Agree	Agree	Less Agreeable	Disagree	Totally Disagree	Mean
1. Providing complete instructions via Google & Padlet facilitates task comprehension	32 76.19%	5 11.90%	5 11.90%	0	0	4.64
2. Assignment questions (5E) are easily solved step by step with the help of technology	38 90.48%	4 9.53%	0	0	0	4.90
3. I understand better and master the content of the lesson with inquiry method with the help of technology	36 85.71%	5 11.90%	1 2.38%	0	0	4.83
4. It is more fun and interesting in learning virtually with a combination of inquiry methods & technology	38 90.40%	1 2.38%	3 7.14%	1 2.38%	0	4.98
5. This method helps me to explore, do a lot of reading on assignments and it also saves time	39 92.86%	3 7.14%	0	0	0	4.93
Overall, Min 4.86						

Simpler inquiry strategies such as O-T-Q (observe-Think-Questions) can be integrated to enrich inquiry in teaching [19]. This is so in the study of Biology in particular. The inquiry approach associated with technology is helpful for the students in the making exploration especially on topics which needed deeper understanding.

The ability of students in accessing and using Google education and Padlet applications is clear because students are always actively sharing material on the Padlet which is used as the main medium for sharing information from the exploration. This also shows students understand the instructions issued virtually via Google slides shared via Google classroom. More so, the students shared the Padlet link via class WhatsApp with the simple reason of reading and sharing information via smartphone as well as always being aware of new posts made by other group members and lecturers.

The advantages obtained using these applications, can help the collaboration between students and lecturers. This was observed by the researcher through the comment section in Padlet where students make it a chat room if they face any problems in finding information or in sharing information. This shows that students are very committed in showing interest in learning through Google education and Padlet. Students also looked proud when their names appeared in the comment post column in Padlet and indirectly they were eager to multiply the post.

V. CONCLUSION

In conclusion, this study provides exposure to technology, especially Google education & Padlet as an alternative in the implementation of virtual learning that is more effective in engaging students in a student-centered manner, especially for inquiry-based learning. From this study, Padlet's abilities are well exploited, especially easier to use by students and become a virtual learning platform because of the features of this application that is more user friendly, easily adapted, understandable and inspire classroom ideas. Idea in different layout help in exposing students' creativity in explaining their idea & findings.

Inquiry-based learning with the help of Google education & Padlet is not only able to give freedom in the search for information but also helps students to make a lot of reading & latest findings. 5E task ordering helps students master each concept with the help of information for each task in the same platform to ensure students are always on the right track. This study shows the readiness of students and their ability to conduct inquiry-based teaching and learning with the integration of Google education & Padlet for more effective virtual learning.

the teaching and learning sessions during the presentation session via Google meet with the students and supported this study. I also would like to express our gratitude to all individuals who were directly or indirectly involved in this study.

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