



The Effectiveness of Project-Based Learning (PBL) Assisted by TikTok Media on Creative Thinking Skills (KBsK) among Form Six Geography Students

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Abstract

The Project-Based Learning (PBL) approach incorporating TikTok media has shown remarkable potential in improving Creative Thinking Skills (KBsK) among Form Six Geography students. This technique, which uses TikTok media as a teaching tool, has opened up opportunities for students to engage in exploration and learning based on direct experience and thus makes the learning process more delightful, relevant and realistic. This research operated the quasi-experimental method with Post-test Only Control Group Design for the data analysis. This data was obtained from two groups, namely the experimental group (6UKM) and the control group (6UiTM), to compare the effectiveness of the PBL approach

assisted by TikTok. The study results confirmed that students who followed PBL learning with TikTok media revealed a significant increase in KBsK compared to students who did not use the approach, based on a significant value of $0.000 < 0.005$. Through the use of PBL with the assistance of social media such as TikTok, students not only have the opportunity to boost their KBsK but also can recall Geography facts better. Therefore, TikTok is a famous and readily available platform, and it can also help students construct a more in-depth understanding and continuously strengthen their knowledge, which can be used as a pertinent and valuable teaching strategy in modern education.

Keywords: Project-Based Learning, TikTok media, Creative Thinking Skills

Introduction

The era of technology use in Geography PdPc is an approach that mandates transformations in Geography education in the 21st century. Improvements in the quality of education can result in students who are literate and skilled in geography subjects and can also produce students who maintain creative thinking skills (KBsK). This study explored the effectiveness of project-based learning assisted by TikTok media as a geography Learning and Facilitation (PdPc) tool in secondary schools to improve creative thinking skills. The researchers measured the effectiveness of project-based learning among students in Geography subjects through an experimental study that decided the effectiveness of TikTok media interventions through pre-tests and post-tests. Generally, this analysis aimed to evaluate the effectiveness of PBL among Geography students. This research sought to identify the level of interest assisted by TikTok media in the ability to remember Geography subjects among Form Six students. Two research hypotheses were formed for the objectives of this study, namely H_{01} ; There is no significant difference between the pre-test and post-test on the variable (remembering facts about Geography subjects) for the control group and the experimental group and H_{02} ; There was no significant difference in the variable of remembering facts in Geography between the control group and the experimental group in the post-test. By mastering these competencies, students can help themselves to be more innovative and competitive in the 21st century and can remember Geography facts quickly and consistently.

Creative thinking skills (KBsK) can be measured based on TikTok projects produced by Form Six Geography students. The TikTok content created by these students was based on Physical Geography and Human Geography in the second semester. The assessment of the TikTok content produced was based on the student's creative and innovative competencies in addition to the creative content skills in the TikTok content produced. The production of this content was designed to test the student's ability to create new ideas related to Geography learning content. These indicators proved that the students have good thinking skills and can think flexibly, creatively and innovatively. The TikTok project-based learning design can help students explore and overcome problems remembering more complex Geography facts (Daryanto & Raharjo, 2012). The project-based learning model has been designed to help students expose themselves to a more active and innovative learning approach during Teaching and Learning (T&L) sessions in the Classroom (Ngalimun, 2013). The project-based learning model is also properly arranged to address a problem in PdPc. Apart from being able to complete a project or task, PBL exposure among students can also train students to plan, manage, address and solve problems in learning.

Nevertheless, the project-based learning model also comes with its advantages and disadvantages. The advantages are exposing students to solving complex problems or current issues, developing creative or critical thinking skills, fostering student cooperation to work in groups, and training students to be responsible and learn from past experiences (Sutirman, 2013). Meanwhile, the disadvantage of PBL is that it takes a long time to complete a project without financial resources. However, the gravity of PBL in PcPc for the 21st century is significant to uncover the 4K values among students: communication, collaboration, the ability to think critically, creatively and innovatively, and the ability to solve problems (problem-solving skills). Generally, the educational process is seen through transmitting knowledge from teachers to students and involves other critical matters, such as shaping students' thinking. Hence, education in Malaysia must transform to produce critical thinkers and innovations among students. Thus, the capacity to think creatively among these students must be explored and improved through PcPc geography since learning geography at the Malaysian Higher School Certificate (STPM) level is demanding and requires the proper strategy among teachers. Executing efficacious models and media is one of the new strategies based on project-based learning assisted by TikTok media.

The project-based teaching model can increase students' creativity in learning geography (Rina et al., 2015; Lailya et al., 2017; Hayuhana, 2020). Although studies are performed on the same variables through the project-based learning model to influence creative thinking skills among students, there are several differences with this deconstruction. Among the differences are the location of the study, the time of the study, the subject of the study, and the use of media in the study, which is TikTok. Hence, this study was conducted to support Form Six UiTM class Geography students to train their skills to improve their creative thinking skills. In addition, this study aspired to identify the impact of the TikTok media project on creativity and memory among Form Six Geography students.

Study Objectives

This study intended to evaluate the effectiveness of project-based learning (PBL), assisted by TikTok media, in stimulating Form Six Geography students to develop creative thinking skills (KBsK). The specific objectives of this study are:

1. To identify the level of creative thinking skills (CTS) among Form Six Geography students
2. To test the effectiveness of PBL and TikTok media on the level of creative thinking skills (KBsK) and the ability to remember Geography facts among Form Six students.

Research Hypothesis

H₀₁: There was no significant difference between the pre-test and post-test on the variable creative thinking skills (KBsK) among Geography students for the control and experimental groups.

H₀₂: There was no significant difference in the variable creative thinking skills (KBsK) among Geography students for the control and experimental groups for the post-test.

Literature Review

TikTok is a social media platform that allows users to share videos for between 15 and 60 seconds. Since its introduction in 2016, TikTok has garnered global engagement, especially among young people who are more attracted to creative and entertaining content. According to Jiang et al. (2022), TikTok has become a medium for educational content, permitting educators to share knowledge through an easily accessible short video format. The emergence of this platform in education reflects a fresh trend in digital learning that also sees the impact of technology on the teaching and learning process (Hsieh, 2021).

TikTok provides quick and easy access to content relevant to learning, from science to life skills (Zhao & Zhang, 2023). TikTok users, especially students, can obtain information through short, simple, easy-to-understand videos. This delivery method is suitable for quick learning concepts or as an initial exposure to a topic that stimulates students to actively and creatively engage in the learning process. According to an analysis by Wu et al. (2020), short videos produced by students motivate them to understand concepts more deeply through "learning by teaching." Video editing tools on TikTok also increase creativity and allow students to apply their knowledge visually while growing their level of acquaintance (Tang, 2023). Besides, TikTok functions as a global learning community that brings together diverse backgrounds of students and teachers to exchange and share knowledge. Through the use of hashtags such as #LearnOnTikTok, users can access educational content that is relevant to their interests (Lee & Cho, 2022), consequently providing students with the opportunity to delve deeper into specific topics and pinpoint pristine perspectives that are not available in formal learning sources.

Although TikTok delivers various educational content, it also includes irrelevant and unsuitable content for students. Xie et al. (2023) stated that teachers and parents face difficulties in monitoring the content accessed by students. This requires parents and teachers to monitor the students' activity closely so that they only access relevant and safe content. TikTok is an open platform that allows anyone to share information without significant control, which can ultimately lead to any problem of spreading false or wrong information that can confuse students (Yuan & Liu, 2022). Thus, with adequate digital literacy skills, students will select the information required to grow their knowledge.

One of the main drawbacks of TikTok is the potential for addiction to the application, which is designed to attract users' attention (Chang, 2021). Uncontrolled use of TikTok can affect students' concentration and reduce the time that should be allocated for learning. Several suggestions can be highlighted to ensure that TikTok is used effectively as an educational tool. Teachers and parents can monitor the content that students access and instruct them to use specific educational hashtags, such as #LearnOnTikTok. This step will help reduce exposure to inappropriate content (Wu et al., 2020). Teachers can utilize TikTok to produce relevant and engaging educational content, such as simple science experiments or explanations of mathematical concepts (Tang, 2023). This can ensure that students receive authentic and easy-to-understand information and encourage them to have strong digital literacy skills to help them evaluate the content's validity (Lee & Cho, 2022).

Overall, TikTok has tremendous potential as an educational tool to make learning more interactive and accessible. Nonetheless, some challenges need to be addressed, especially in

terms of content monitoring and the risk of addiction. TikTok can be an innovative and effective medium for 21st-century learning if used well.

The entire teaching system must continue exploring changes to remain relevant in the 21st-century. Among the current changes in the teaching world is the emergence of a consensus on using Information and Communication Technology (ICT) in the classroom. Bilbao-Osorio and Dutta, cited in Tarisayi and Manhibi (2018), remarked that "advancements in the field of Information and Communication Technology (ICT) have drastically modified the teaching and learning system due to its capacity to carry out various tasks that could not be easily carried out by educators before. Manhibi (2019) also believed that integrating ICT in schools is a golden opportunity due to the variety of student benefits. Mokgadi (2015) also commented that the effective and sustainable use of ICT has been recognized and has become imperative in meeting the demands of 21st-century education for teaching and learning. In short, the global digital trend has elevated ICT as the primary medium in the classroom in the 21st century.

The proof is that the implementation of Geographic Information Systems (GIS) in the geography curriculum has successfully brought about a significant change in the learning system in the classroom. Due to the latest developments in the world of technology, changes in the geography curriculum have become a prerequisite for students to remain relevant and significant in the world of education. Thus, this situation has proven the description brought by Dewey (1916): "If we teach students today using the methods we applied yesterday, they will face problems in the future". Therefore, to prevent students from facing problems in the future, Geography classrooms need to be equipped with creative and up-to-date ICT tools. Accordingly, integrating the role of ICT in the geography classroom is a critical and urgent approach to increasing students' creativity and understanding. Yong et al. (2016) mentioned that "today's students are not the same as in the past; they have been born into the digital era that has made technology part of their lives". Geography teachers today need to appreciate the centrality of ICT in the classroom. Chisango and Marongwe (2021) agreed that "digital literacy, such as ICT, information, and media literacy, has been established as a pillar of skills for the 21st century". Therefore, a strong consensus has been built on the need to innovate and enhance classroom practices through ICT integration.

A report issued by the United States Office of Educational Technology states that recent years have witnessed the adoption of robust digital and networked technologies in the classroom, such as the widespread use of interactive whiteboards, virtual learning environments, educational computer games, and an increased reliance on internet applications including email and e-learning for both classrooms and independent study (Livingstone, 2012). Nevertheless, this report by the United States Office of Educational Technology only focused on ICT integration in the US and did not involve other locations, such as the different situations in Africa, which still need to catch up in ICT infrastructure. This substantial gap between developed and developing countries in applying ICT in the classroom has raised a critical polemic in global education. Many studies outline various aspects of geography teaching in the school curriculum in South Africa. A survey of geography teaching in South Africa has investigated different aspects of geography, such as teaching and evaluating GIS (Manik, 2022; Zondi & Tarisayi, 2020; Tarisayi, 2018), the effectiveness of Geographic Information Systems (GIS) in fostering students' interest in Geography subjects

in secondary schools (Mayalagu et al., 2019); stating that continuity and progress in geography education (Beets & Grange, 2005; 2008); and student performance in geography (Ahiaku & Mncube, 2018).

Although it has been proven that there has been much progress in the geography classroom in recent years, various studies have also declared that there are still many challenges and room for improvement that need to be done in the education system. The challenges are workforce and resource constraints (Mayalagu et al., 2019). Mayalagu et al. (2018) also approved that some difficulties in executing GIS are related to school workforce constraints. Although studies on ICT integration in schools are growing, more studies must focus on ICT integration in geography classrooms. Information communication technology, such as search engines, Microsoft Office, Google Classroom, and various social media applications, can be used in schools. Milosavljevic (2019) explained that the 21st-century is a visual communication society primarily created in virtual space. Accordingly, today's classrooms must utilize visual communication in the virtual world to acknowledge the need for ICT for a student-centered education system.

In addition, current classrooms should address the needs of students in the 21st-century, especially in the integration of ICT in the school. Prensky (2001) defined 21st-century children as 'digital natives'. Digital natives are children who have grown up in a technological and digital environment such as using computers, video games, digital music players, video cameras, mobile phones, and all other modern technological devices and tools" (Prensky, 2001). These students have been exposed to social media such as WhatsApp, Instagram, Twitter, Facebook, YouTube, and TikTok. Prensky (2001) also claimed that there are 'native speakers' of the digital language of computers, video games, and the internet. In addition, Jukes et al. (2010), through a study by Kivunja (2014), described "digital natives" as the "digital generation". The recognition of today's students as digital natives or digital generations requires a teaching approach in the geography classroom to accommodate the needs of this new generation of students. Therefore, the next section will present the theoretical framework that guides this study.

Research Methods

This study is a quasi-experimental analysis using the Post-test Only Control Group Design method consisting of experimental and control groups. The experimental class used the project-based learning model assisted by TikTok media, while the control class did not use the project-based learning model. The sampling technique used was random sampling, which ultimately involved the Form Six UKM class as the control class and the Form Six UiTM class as the experimental class. The study instrument was based on an instrument developed by Ganesan (2019), consisting of four questionnaire items. This study used four questionnaire items because of the suitability of the creative thinking skills indicator (KBsK). The researcher distributed questionnaires to students to answer according to their understanding and skills to get an accurate picture of their abilities. This questionnaire was streamlined by paying attention to the creative thinking indicators: fluency, breadth of knowledge, originality and recall ability. The data analysis technique used pre-tests and hypothesis tests. Prerequisite tests involved tests such as the Normality Test and the Kolmogorov Smirnov SPSS 16.0 Test with a reliability level of 95%. The homogeneity test used Levene's Test SPSS 16.0, which had

a reliability level of 95%. A hypothesis test was carried out using the t-test and independent sample t-test criteria.

The criteria for taking the t-test decision with a significant level of 5% (I-tailed) is that if the sig. value (2-tailed) $< \alpha$ (0.05) and the average value of the experimental class is greater than the control class, then H_0 will be rejected, which means that there is an influence of the project-based learning model assisted by TikTok media on students' creative thinking skills. If the sig. value (2-tailed) $> \alpha$ (0.05) and the average value of the experimental class is less than the control class, then H_1 is accepted, which means that there is no influence of the project-based learning model assisted by TikTok media on creative thinking skills.

The implementation method of PBL using TikTok in Geography learning involves several main steps. Among them is that the teacher gives students the freedom to choose a relevant Geography topic, such as climate change, population density, natural resource use, or sustainable development. Each group of students must produce a short TikTok video (maximum three minutes) explaining their topic creatively. This learning process involves several principal stages: research, video planning, and content delivery.

In the research stage, students must find critical information about the chosen topic, collect data, and organize essential facts to be included in the video. During video planning, students would discuss the script, filming locations, and compelling visuals to convey each relevant fact. Students were also encouraged to use TikTok features such as on-screen text, sound effects, and animations to increase the appeal of the produced video. Finally, teachers and fellow students would evaluate the video that was produced. This evaluation would cover essential aspects of learning, such as conceptual understanding, creativity, and presentation effectiveness. Students were also allowed to reflect and assess their strengths and weaknesses, thus helping them improve their projects in the future.

Study Findings

Table 1 summarizes a descriptive analysis of 62 students who answered the creative thinking skills (KBsK) questionnaire. Thirty-four students represented the Experimental Group (EG), while 28 represented the control group (CG). KBsK's achievement level was assessed based on the scale presented by Cohon et al. (2013), Ishak et al. (2018), and Ahmad. (2002,) which stated that the values 1-2.33 (Low), 2.34-3.66 (Medium), and 3.67-5.00 (High).

Table 1

Level of Creative Thinking Skills (KBsK) variables among Form Six students

Level	Number	Percentage (%)
Low	56	90.32
Medium	6	9.67
High	-	-
Total	62	100

N=62 (EG 31 dan CG 31)

Source: Research Study 2023

The study findings show that the level of KBsK among Form Six students is low (56, 90.32%), followed by medium (6, 9.67%) and high (0, 0%). This finding is the overall level of KBsK among Form Six Geography students before sample selection was implemented for the actual experimental study. Overall, the findings show that the level of KBsK among Geography students is low (56, 90.32%). Table 2 shows a summary of the level of KBsK among Geography students involved in the actual study (Pre-Test of 62 people), representing 31 students from the EG group and 31 from the CG group.

Table 2

Number and percentage of KBsK levels for EG and CG groups (Pre and Post)

Level	Pre		Post	
	Number	Percentage (%)	Number	Percentage (%)
Low	56	90.32	31	50.0
Medium	6	9.67	7	11.3
High	-	-	24	38.7
Total	62	100	62	100

N=62 (EG 31 dan CG 31)

Source: Research Study 2023

The pre-study findings show that the level of KBsK among EG and CG students was as follows: low level (56, 90.32%) followed by medium level (6, 9.67%), and high level (0.0%). At the same time, the post-study results for both groups are as follows: low (31, 50%), followed by medium level (7, 11.3%), and high level (24, 3.7%).

Table 3

Number and Percentage of Pre and Post KBsK Level Achievements between EG and CG Groups

Level	EXPERIMENTAL GROUP (EG)				Control Group (CG)			
	Pre		Post		Pre		Post	
	No.	%	No.	%	No.	%	No.	%
Low	26	83.8	3	10	28	90.3	25	80.6
Medium	5	16.1	5	16	3	9.67	5	16.1
High	-	-	23	74	-	-	1	3.2
Total	31	100	31	100	31	100	31	100

Source: Research Study 2023

The results of the study show that the level of KBsK for the experimental group for the post-test is as follows: low level (3, 10%) followed by medium level (5, 16%) and high level (23, 74%). The study findings for the control group are as follows: low level (25, 0.6%) followed by medium level (5, 16.1%) and high level (1, 3.2%). Thus, overall, the study findings confirmed that the study subjects had an increase in KBsK level scores for the experimental group compared to the control group, which was still at a low level.

Data Analysis

Several metrics were used in this study's data analysis process. Among them are the Normality Test, Homogeneity Test and Hypothesis. The Normality Test determines whether

the data distribution obtained is normally distributed. The Normality Test in this study also uses the Kolmogorov-Smirnov Test because the distribution results are stronger and do not cause perception. The Kolmogorov Smirnov Test has a significant level of 5%. The Normality Test results can be seen in Table 4.

Table 4

Normality Test

Class	Sig.	Description
Experiment	0,200	Normal
Control	0,133	Normal

Based on the table above, the level of understanding for the experimental group is 0.200, while the level of understanding for the control group is 0.133. The value obtained from the second class is more than 0.05. Therefore, the distribution of data received from the experimental and control groups is normal.

Table 5

Homogeneity Test

Class	Sig.	Description
Experiment and control	0,701	Homogenous

Based on Table 5 above, the significant level of the Homogeneity Index is 0.701. This value indicated that the experimental group and control group data are homogeneous. After the data distribution findings for the Normality and Homogeneity Tests showed a normal and homogeneous distribution, the Hypothesis Test was carried out using the t-test (independent sample t-test). The following are the hypotheses involved in this study:

H_0 : TikTok-assisted PBL does not significantly impact creative thinking skills.

H_1 : TikTok-assisted PBL has a significant impact on creative thinking skills.

Suppose the significant value is 0.05, and the variance value for the experimental group exceeds the significant level of the control group. In that case, H_0 is rejected, proving that project-based learning has advantages related to creative thinking skills. Meanwhile, suppose the significant value is ≥ 0.05 , and the values obtained in the experimental class are lower than the significant level of the control class. In that case, H_0 is accepted, proving that the project-based learning approach assisted by TikTok media significantly influences Form Six students. The results of the Independent Sample T-Test are shown in Table 6.

Table 6

T-test

Class	N	Mean	Sig.
Experiment	31	82	0,000
Control	31	70	0,000

Hypothesis testing is through independent sample t-test analysis. Based on the t-test, it proved that the significant value is 0.000, smaller than 0.05, and the class that uses Project Based Learning with the help of TikTok media (experimental group) 82 is greater than the class that does not use PBL (control group) 70. This finding makes H_0 rejected and H_1

accepted, which means that project-based learning, with the help of TikTok media, influences geography subjects' creative thinking skills among Form Six Geography students.

The study's findings show increased creative thinking skills among students in the UiTM class as an experimental class. This increase in KBSK is due to the implementing of the project-based learning model assisted by TikTok. This model has increased the ability to think creatively among Form Six Geography students and provided a new learning atmosphere in the classroom. The students learned how to produce TikTok videos according to the geography topic.

TikTok-project-based learning is the basic beginning of a physical or human geography topic. Participants are given topics related to physical environmental issues and their impact on human activities in Malaysia by producing videos and pictures about the problem. The videos produced must use techniques and criteria set by the evaluation panel. Among the criteria are the titles and themes chosen, which must be based on rubrics relevant to physical Geography or human geography, video creativity, originality of the work and support from external users on social media (likes). Project-based learning has successfully uncovered new ideas to overcome an issue and increase student creativity (Bjorner, Kofoed, & Pederson, 2012).

The next step is to complete the project design. (Design a Plan for the Project). The project participants were divided into six groups. Project planning is an essential step in PBL because the knowledge about implementing the actions carried out by the participants will be clarified and refined before the video production. PBL participants were also asked to determine the theme they choose and organize and plan before implementing the PBL project.

Students would prepare an initial plan with a "storyboard" that matches the given title. The creative skills that can be developed in video production are to describe the level of student thinking in detail. While producing this video, the students could make a PBL draft to streamline each step and strategy guided by the teacher to achieve the validity and reliability set. The review carried out by the teacher was appropriate and consistent with the rubric formed by the geography teacher involved.



Picture 1: TikTok video produced by STPM Geography students

Figure 1 shows a group of short videos produced by Form Six students in a Geography learning project using the TikTok app. These videos were produced as part of a project-based learning (PBL) approach, which involves students exploring and presenting geography topics through popular social media. The following is an analysis of this approach, including its effectiveness, challenges, and benefits.

Using TikTok in Geography learning has grown students' engagement and interest in Geography. This platform empowers them to convey ideas more creatively by producing short videos, thus making learning more interactive and exciting. Based on the pictures shared, the students seem comfortable with this activity through the production of various types of videos that they have produced. Using visual and audio media also helps attract the attention of other students to watch the videos. Through the process of making this video, students need to understand the chosen topic in more depth before being able to present it more clearly. This situation shows that this PBL method has helped students better understand Geography topics such as local winds, convective rain, and climate phenomena. Students can also develop critical thinking skills by processing and presenting information through active and practical exploration of topics.

Using TikTok inspires students to intensify their communication skills verbally (through oral delivery) and visually (through the arrangement of visual elements in videos). Each student conveys their ideas in various delivery styles.

This project also entitles students to master technology skills such as filming and editing videos. Using TikTok will enable students to learn techniques and methods of using the tools and special effects provided in the application to add appeal to their videos. This ability is an essential skill in the digital age. Students can express their understanding of a topic more uniquely and creatively. With various styles and formats of presentation in their videos, students are also trained to choose the most appropriate approach to present geographical topics in an exciting and easy-to-understand way. PBL and TikTok also encourage students to practice learning concepts through practical experience and application. In addition, through their exploration of geographical topics in the form of projects, students are more likely to remember the concepts learned because of their direct experience from producing the video.

Discussion

Project-based learning (PBL) using social media platforms such as TikTok offers an innovative approach to improving the learning of Form Six geography students. In the increasingly advanced digital era, students today are seen to be more inclined towards a student-centered and interactive learning approach, and TikTok provides an ideal medium to achieve this goal. Implementing PBL through TikTok has taken advantage of the features of short and easily accessible videos that allow students to process and present geography facts creatively and excitingly.

Using TikTok in geography learning helps improve the memory of geographical facts through the simultaneous use of visual and audio elements. TikTok allows students to create short videos with graphics, animations, text, and voiceovers that illustrate important geographical facts such as map concepts, geomorphological processes, climate, and other geographical phenomena. By combining text and visuals interactively, students find it easier

to understand and remember all the knowledge than if they only used plain text or notes. For example, students can produce a video about types of land formations using map illustrations and voice recordings explaining every kind of formation, which will reinforce their understanding and help their memory.

The content creation process on TikTok also encourages students to research and gain an in-depth understanding of the given topic before producing a video. In the context of PBL, students are accountable for finding, analyzing, and processing information to create informative and easy-to-understand videos. Through this step, students memorize geographical facts and understand the related concepts, as they need to convey this knowledge in a clear and attractive form for the user to view. PBL using TikTok involves active learning that has made students become explorers and practitioners to increase their understanding.

Collaboration in PBL is also enhanced through TikTok, as it integrates students to work together to produce group videos or provide comments and suggestions on classmates' videos. This collaborative approach allows students to exchange ideas, discuss facts, and help each other understand concepts in the problematic subject of Geography. TikTok will also enable students to provide immediate feedback through comments or likes, encouraging them to communicate and collaborate with their peers. This collaboration builds social and critical thinking skills essential to 21st-century learning.

In addition, learning using TikTok allows students to practice their digital media literacy skills. In an increasingly technology-driven world, students not only need to master academic content but also need to know how to use technology wisely and ethically. By employing TikTok, students will go through experiences such as editing videos, finding authentic sources of information, and organizing content to make it more exciting and relevant. Through this process, students can strengthen their digital literacy skills, including communication and creativity skills, which are crucial in facing the world of work in the future.

Finally, using TikTok in PBL provides more enjoyment and meaningful learning. This method is very suitable for Form Six students already exposed to digital technology and social media, making them more enthusiastic about participating in learning activities. Using TikTok as a learning tool, geography teaching becomes more dynamic and relevant to students' daily lives, increasing their motivation and interest in the subject. This also makes learning more student-centered, giving them the autonomy and flexibility to explore and express their ideas more creatively.

Overall, this TikTok-based PBL approach can augment memory, conceptual understanding, collaboration skills, media literacy, and learning motivation among Form Six geography students. Integrating aspects such as visual, audio, and social interaction, TikTok has successfully aided students in relating geography facts more deeply, making learning more relevant and fun. This approach is an essential step in making geography classrooms more in line with the needs and interests of students in the 21st-century.

Participants in this study also emphasized that geography classroom achievement can be improved by using TikTok. Ordonez et al. (2021) revealed that TikTok is a new video-sharing

social networking service rapidly gaining popularity. Participant J explained, "depending on the school's location, some students have TikTok accounts. What we need to do as teachers in the 21st-century is to leverage this access to TikTok and make it important in the classroom". Some participants acknowledged the advantages of TikTok, namely that 21st-century students are necessarily exposed to social media. Participant E also agreed, "If students are always using TikTok, why don't we use TikTok in the classroom? I remember when I was in school, teachers would use music in class. I felt like learning at that time". Teachers must ensure students' access to social media in their geography lessons.

In addition, other participants believed that "using TikTok will motivate students while eliminating negative attitudes towards the subject". Students exposed to TikTok are more likely to be stimulated by teachers' use of social media. Therefore, using TikTok in the geography classroom aligns with Mayer (2009), who believes that "Students can learn better through the application of graphics and tone as well as printed text". Students can also easily relate learning through TikTok videos, especially for those who already have a TikTok account, as confirmed by the participants in this study. The findings of this study agree with the conclusion of Jacobs et al. (2022) from a controlled experiment that "TikTok has a positive effect on student performance".

Some topics in the geography curriculum, such as discovering artefacts, have become stimulating content when the TikTok video combines music and text and can be a creative approach to teaching geography. The article titled, 'Exercising #ClimateAction' with the global TikTok community at COP26, TikTok (2021) states that the TikTok community, including the generation that is increasingly interested in using TikTok, has been involved in the preservation of the geographical environment and as a truly global platform, TikTok is committed to representing the generation most affected by climate change and producing inspiring, accessible and engaging content.

Therefore, a geography teacher can leverage this global platform for content that can enhance geography teaching. Nonetheless, several participants also commented that teachers cannot assume all students use TikTok. Therefore, even though 21st-century students have access to these digital devices, not all students, especially in the Malaysian context, necessarily have access to TikTok. Participants also explained, "Students in some schools in Malaysia, for example, do not have access to smartphones. The assumption by teachers that all students know about TikTok is completely wrong". Thus, this study establishes a creative approach to teaching geography, such as using TikTok, that relies on students having smartphones and existing knowledge about TikTok. Reflections by Nkula and Krauss (2014) and Padayachee (2016) also prove that the need for ICT devices is a barrier to ICT integration in schools. This experimental study shows that the creative use of ICT tools depends on students' existing knowledge.

Additionally, Participants stated, "The use of TikTok in the classroom requires adequate supervision of students. Some students may be distracted and only focus on the entertainment content". The statement revealed that using TikTok requires constant monitoring of the students themselves. Students should remain focused and not be distracted by the music accompanying the TikTok video. Despite some of the challenges

discussed, the study verified that TikTok has the potential to be used to motivate students in geography classrooms to a greater extent.

Considerations when integrating ICT tools in geography. This study introduced several suggestions for creatively teaching geography through integrating ICT tools. Participants explained that "creativity should not exclude some students from the class. Teaching methods may be innovative, but it must involve all students". Creativity should facilitate learning for all students in the classroom. This creativity should accommodate different abilities at the school, such as the creativity of teachers who should consider the language used in TikTok. According to the Department of Education (2007), inclusive education in the Malaysian context is defined as "a learning environment that promotes the full personal, academic and professional development of all students regardless of race, class, gender, disability, religion, culture, sexual preference, learning style and language". Teaching geography creatively should adhere to the policy of inclusive education. More importantly, integrating ICT tools in the classroom should not lead to the exclusion of a few students.

The use of ICT should encourage engagement and refrain from practicing exclusionary policies, especially in this challenging education system. The study results also showed that a teacher should consider the location and environment of the school. Participants revealed that "The school environment greatly influences creativity in the geography classroom. Creativity needs to be supported by the availability of resources". Some of the ICT-related strategies for teaching geography creatively discussed in this paper depend on the availability of resources. For example, one participant in this study revealed that in some schools, students have TikTok accounts and use TikTok in the geography classroom along with internet access at home. This approach makes integrating ICT into PdPc easier in these schools.

In addition, the participants also unanimously agreed that creativity should ensure adequate and effective teaching of geography content. The PBL identified in this study meets the requirements and criteria for adequate geography content. "Teachers should ensure adequate curriculum teaching in each lesson, and TikTok should not distract students from learning the content". The participants also provided several strategies for teaching students geography content effectively and meaningfully. In general, creativity should not lead to poor teaching of geography content. However, creativity should be pursued to uplift students as long as it does not diminish the significance and exactness of geography content. Geography content cannot be compromised to integrate TikTok in the classroom creatively.

Conclusion

Ergo, this research confirmed that using TikTok as a PBL medium in Form Six Geography learning could make learning more interactive and relevant to student's interests. Although there were challenges in its implementation, the effectiveness of this approach can be enhanced with appropriate guidance and monitoring by teachers. With a combination of creativity, technological skills, and deeper conceptual understanding, the PBL approach through TikTok can be an effectual medium in helping students master the subject of Geography in a more meaningful and enjoyable way.

The project-based learning (PBL) approach through social media, such as TikTok, also provides opportunities for students to produce creative content related to geographical facts.

This activity allows students to understand and memorize information better, making learning more fun and relevant to their digital lifestyle. Therefore, studies show that this approach can improve students' memory and understanding of geographical facts. Using short video media involving visual and audio elements makes learning more enjoyable, thus helping them better relate to the concepts learned (Zamri, 2020). In addition, applications like TikTok allow students to collaborate and share knowledge with peers, streamlining their understanding through the teaching and information-sharing process.

In conclusion, this study was conducted based on the need to motivate 21st-century students in the geography classroom, aligning with the digital age's challenges. The literature review shows that this generation of students grew up in a technology-rich environment, thus demanding creative and innovative teaching approaches such as Project-Based Learning (PBL) using TikTok. 21st-century students are generally familiar with accessing and using digital technology, making the integration of Information and Communication Technology (ICT) in learning a vital step to improve teaching effectiveness, especially in Geography.

Implementing multimedia learning theory and continuity theory emphasizes leveraging students' existing knowledge. Therefore, this study underscores the essence of bringing teaching closer to digital contexts relevant to students' daily lives. The study results uncovered that using TikTok can enrich the learning experience and improve teaching performance in the 21st-century classroom.

Through the PBL approach, Form Six students are exposed to researching, analyzing, and presenting Geography topics through short, informative, and creative videos on TikTok. This method strengthens students' understanding of Geography concepts and develops 21st-century skills such as communication, collaboration, critical thinking, and creativity. Using TikTok as a learning platform makes learning more interactive, engaging, and relevant to today's digital world.

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