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Sains Humanika

Development of Teaching Aids Using TikTok as a Learning Medium for the Topic of Technical Drawing in the Form 4 Invention Subject

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Article history: Received: 18 September 2024 Received in revised form: 30 May 2025 Accepted: 31 May 2025 Published online: 20 September 2025

Abstract

The digital era is a time when the development of digital technology has had a widespread impact on various aspects of human life. With the onset of the Industrial Revolution 4.0, the dynamics of learning can no longer be managed conventionally, especially in the selection of learning methods. This study aims to develop teaching aids using the social media platform TikTok as a learning medium for the topic of technical drawing in the Form 4 Invention subject. The study was conducted using a mixed method which is a combination of qualitative and quantitative. This research method uses the ADDIE model, which consists of five phases (analysis, design, development, implement, evaluate). The research instruments used in this study included a semi-structured interview form (qualitative) and both pre-test and post-test assessments (quantitative). The study began with a qualitative approach, in which five informants were interviewed during the analysis phase using semi-structured interviews. Based on the data collected, the researcher developed a teaching aid focused on the use of the TikTok application. Once the application was developed, the researcher conducted pre- and post-tests involving 45 students from Form 4 who were taking the Invention subject at three schools in Perak area. The pre-test was conducted before the use of the application, while the post-test was administered after using the TikTok application. The findings indicate that this teaching aid helps both students and teachers in the learning process and attracts students' interest in learning technical drawing, particularly isometric drawing, thus making them more competent in the Design and Technology subject. With this teaching aid, creative and innovative learning can be fostered, which can increase student motivation.

Keywords: TikTok, Form 4 Invention Subject, Teaching Aids, Technical Drawings and Isometric Drawings, Technology Education

Abstrak

Era digital merupakan waktu di mana perkembangan teknologi digital telah mempengaruhi pelbagai aspek kehidupan manusia. Seiring dengan revolusi industri 4.0, dinamik pembelajaran tidak boleh lagi dikendalikan dengan cara konvensional, terutama dalam pemilihan kaedah pembelajaran. Kajian ini bertujuan untuk membangunkan bahan bantu mengajar (BBM) dengan menggunakan media sosial TikTok sebagai medium pembelajaran bagi topik lukisan kerja matapelajaran Reka Cipta tingkatan 4. Kajian telah dijalankan dengan menggunakan kaedah reka bentuk *mixed method* iaitu gabungan kualitatif dan kuantitatif dengan menggunakan model ADDIE yang mempunyai lima fasa (analysis, design, development, implemention, and evaluation). Instrumen kajian yang digunakan dalam kajian adalah borang temu bual separa berstruktur (kualitatif) dan ujian pra dan ujian pasca (kuantitatif). Kajian ini berawal dengan kaedah kualitatif dengan menemu bual 5 orang informan sewaktu fasa analisis (temu bual separa berstruktur). Seterusnya, melalui data yang diperoleh, pengkaji membangunkan alat bantu mengajar berfokus kepada aplikasi TikTok. Setelah aplikasi tersebut siap dibangunkan, pengkaji menjalankan ujian pra dan pasca terhadap 45 orang murid tingkatan 4 yang mengambil subjek Reka Cipta di tiga buah sekolah sekitar Perak. Ujian pra dijalankan sebelum menggunakan aplikasi, dan ujian pasca pula dijalankan selepas menggunakan aplikasi TikTok. Dapatan kajian menunjukkan bahawa BBM ini berperanan untuk membantu guru dalam proses pengajaran serta menarik minat murid dalam memmuridi lukisan kerja khususnya bagi topik lukisan isometri, seterusnya menjadikan murid lebih kompeten dalam subjek Reka Cipta. Melalui pembangunan BBM ini juga, pengkaji dapat membantu murid untuk menjadi lebih kreatif dan inovatif sekaligus meningkatkan motivasi murid dalam pembelajaran. Dalam pada itu, cadangan juga disertakan bersama untuk rujukan pengkaji di masa yang akan datang dalam membangunkan aplikasi yang berfokus kepada media sosial TikTok.

Kata kunci: TikTok, Reka Cipta Tingakatan 4, Bahan Bantu Mengajar, Lukisan Kerja Dan Lukisan Isometri, Pendidikan Teknologi

1.0 INTRODUCTION

The pedagogical approach known as *Pengajaran dan Pemudahcaraan* (PdPc) frequently emphasizes theory-based learning, relying primarily on textbooks as the primary source of information. This approach can result in a loss of student concentration during the PdPc process, resulting in ennui and a diminished inclination towards learning. As a result, students may struggle to comprehend and lose interest in the

subjects being taught. Taib and Mustapha (2017) contend that the learning environment plays a pivotal role in the process of PdPc by shaping students' attitudes towards learning. This environment consists of a suitable classroom, teaching aids, learning materials, reference materials, workshops or laboratories, and workshop equipment (Taib & Mustapha, 2017). Teaching aids are indispensable for captivating students' attention. Effectively utilizing teaching aids can facilitate a seamless learning process, ensuring that students maintain concentration and avoid monotony during the teacher's instruction. Azman (2014) contends that teacher-centered learning, also known as one-way learning, creates a passive classroom environment in which students become passive learners who simply listen to the teacher's explanations.

Conventional instructional approaches that lack student engagement and require minimal participation can impede students' comprehension of lesson content and restrict their cognitive growth. Law and Zamri (2021) assert that conventional approaches are ineffective in engaging students, resulting in diminished concentration during PdPc. Since the Covid-19 outbreak spread across the globe, the use of applications has grown rapidly (Mastor et al., 2021). Abd Gani et al. (2024) and Mastor et al. (2021) also stated that extended classroom sessions result in students losing focus – which is strongly related to the current learning styles of students (requiring relevant, engaging content and diversity in the learning process).

Mantihal and Maat (2020) concede that teachers in Malaysia continue to underutilize 21st-century pedagogical approaches. This limitation arises from the absence of technology integration in PdPc, leading to the disregard of the five essential standards of 21st-century learning know as 4C (creativity, communication, collaboration, and critical thinking) (Mantihal & Maat, 2020; Fitriani et. al., 2022; Muhali, 2019; Tajudin & Abdullah, 2018). Scherer and Brito (2020) highlight that these constraints arise from two main factors: (i) access to digital technology infrastructure; and (ii) continuous training provided to teachers to integrate digital technology into the current curriculum. Thornhill-Miller et al. (2023), in their study, discuss and summarize the challenges that can emerge in the integration of technology in 21st-century education. These challenges are capable of altering the context, resources, and implementation of the 4Cs themselves, as they require skills/soft skills, problem-solving, competency, efficient communication, and adequate resources. Referring to this study as well, it can be concluded that the success of integrating technology in education does not solely depend on the equipment, but also on the support from teachers and the training that transforms learning towards a more informative approach.

Mohd Rusdin and Ali (2019) in their study stated that the role of a teacher is crucial in creating space and opportunities for students to explore technology through education. It should also be noted that today, social media has become a primary space for the younger generation to socialize. Therefore, educators must be wise in utilizing social media as a learning medium, such as through the use of virtual reality (VR), augmented reality (AR), and mixed reality (MR), which have become key technologies of the present (Firdaus Jusoh et al., 2021). These technologies can even be integrated into applications like TikTok, as shown in the study by Farha Shaafi et al. (2022), which highlights the effectiveness of TikTok as a teaching aid compared to conventional learning methods.

Information and communication technology is developing quickly, according to the results of the technological advancements being investigated, making it possible to use it in a variety of industries, including education (Fauziyah et al., 2022). Kirin and Warman (2023) note the increasing prevalence of social media usage, particularly among the younger demographic. Firdaus et al. (2024) and Madhani et al. (2021) share the same opinion, arguing that the paradigm shift in communication and information sources has made them easily accessible, enabling the classification of these platforms into two types of usage (positive and negative). The presence of educational, advantageous, and verifiable content distinguishes the positive utilization of social media, while the negative utilization deviates from these positive attributes. The Malaysian Ministry of Education's Wave 3 (2021-2025) aims to use social media as a targeted platform to improve students' creativity, critical thinking, and innovation in learning.

Taib and Mustapha (2017) explain that Malaysian daily secondary school students in Form 4 and Form 5 exclusively received the topic of Invention (Reka Cipta) as an optional subject in 1996, with a strong focus on technical subjects. The objective of the Invention subject is to cultivate original, groundbreaking, and resourceful thinking in students, equipping them for the professional environment. E'zzati (2014) asserts that schools develop students' competencies and skills by applying creative and critical thinking skills for effective learning and understanding. However, a study by Ikhsan and Norila (2005) found that the use of teaching and learning strategies for the subtopic of work sketches fails to enhance students' creative and innovative knowledge. Taib and Mustapha (2017) argue that the current teaching aids have limitations, especially in subtopics related to engineering drawings. In addition, Taib and Mustapha (2017) propose the use of a wide range of teaching aids to offer students different learning strategies.

This study aims to enhance students' convenience and comprehension of the subtopic of work drawings studied in Form 4, based on the given problem statements. The primary objective of this study is to foster greater enthusiasm among Form 4 students for the subject of Invention, particularly in relation to technical subtopics. This will be achieved by utilizing teaching aids to enhance students' performance. The objectives of this study, as outlined in the provided explanation, are as follows:

- To analyses the element requirement to develop TikTok application based on topic of technical drawings.
- To develop teaching aids based on TikTok application for Form 4 Invention.
- To evaluate the usability of the TikTok application based on topic of technical drawings.

2.0 LITERATURE REVIEW

Cognitive theory encompasses the study of how the human mind comprehends and manipulates information, encompassing processes such as interpretation, storage, processing, and utilization for the purpose of generating comprehension and guiding behavior. Cognitive theory encompasses the study of how the human mind handles information, including processes such as interpretation, storage, processing, and utilization for comprehension and action (Hanafi & Sumitro, 2019). Hanafi and Sumitro (2019) propose that cognitive theory involves distinct channels, such as audio and visual, for processing information. They also suggest that active learning processes occur when information reaches working memory and integrates with existing knowledge. Prior research has demonstrated that the utilization of multimedia resources, such as graphics, audio integration, and visualization, promotes the cognitive advancement of students. This includes developing skills in analyzing, evaluating, and creating as a direct outcome of the learning process.

Collaborative learning is a method that utilizes instructional tools designed to enhance students' enthusiasm for learning the topic of technical drawing, particularly isometric drawings. Through the utilization of these instructional tools, students can enhance their

comprehension of mastering this subject matter and enhance the efficiency and effectiveness of the learning process. Furthermore, students will have the opportunity to contribute their viewpoints and ideas to enhance the learning process and achieve the learning objectives with exceptional proficiency. Collaborative learning techniques enable students to effectively promote the social benefits aspect by fostering an engaged learning environment (Yunos and Atan, 2014). A positive impact can be observed in students' cognitive learning processes, social and emotional functions, as well as psychological development, which contribute to forming a more positive attitude towards learning, thereby encouraging the development of critical thinking in the students (Warsah et al., 2021). Indirectly, this can contribute to learning achievements even after graduating from educational institutions—particularly in the industrial sector, by enhancing students' employability.

Muhali (2019) asserts that the proliferation of social media has expanded the possibilities for students and educators to delve into information and knowledge. In their study, Firdaus et al. (2023) discuss how the internet has the potential to revolutionize communication and social interaction in the current technological era. They highlight the role of social media as a convenient tool for facilitating communication. Moreover, the progress of information technology has led to the widespread use of social media in PdPc, both in schools and higher education institutions. The present technological advancement can effectively engage educators and students in the PdPc through the use of technological tools and social media platforms. Developing these teaching aids necessitates expertise and understanding in the realm of graphics, as well as a combination of creativity, enthusiasm, motivation, diligence, and vivid imagination. These qualities are essential for producing software that can serve as effective teaching and learning materials (Aji, 2018).

ByteDance, a Chinese company, owns TikTok, a short video production application (Rosli et al., 2022). According to a Dewanta study (cited by Fatimah Kartini Bohang, 2020) in Indonesia, TikTok was played 45.8 million times and had about 10 million active users in the first quarter (Q1) of 2018. The majority of users were young people. Madhani et al. (2021) have reported that 30 million Indonesians actively use TikTok. Eka et al. (2022) hold the same opinion that Asian countries (Thailand, Cambodia, Vietnam, Malaysia, and Indonesia) are active TikTok social media users, each with unique values and attractions in a variety of sectors, including education.

Research conducted by Anjani (2019), Azwana (2022), Firdaus et al. (2024), and Fauziyah et al. (2022) has determined that TikTok can serve as a highly effective educational platform. First and foremost, TikTok caters to the educational requirements of students. Second, TikTok attracts students with a plethora of engaging features that can seamlessly integrate into the classroom. Furthermore, TikTok corresponds with the growth of maturity and expertise, as well as the attributes of millennial students who are deeply engrossed in and well-acquainted with the digital realm, particularly electronic devices.

In conclusion, TikTok is the most popular social media platform among the millennial generation. The appeal of TikTok is its ability to showcase a diverse array of video content, all of which is interspersed with music and has a brief duration. This captivates students' interest through a diverse range of content, including educational material that offers a concise explanation of the subject matter. By modifying teaching aidsand student characteristics, TikTok can be utilized by educators and students as a learning tool to create an engaging and dynamic learning environment (Azwana, 2022).

■3.0 METHOD

This study uses the ADDIE model to create teaching aids for the Form 4 Invention topic of technical drawings, specifically isometric drawings, using the social media platform TikTok as a learning tool (refer to Figure 1). The development of these teaching aids follows a structured process consisting of five phases: analysis, design, development, implementation, and evaluation. Researchers conducted a validation process for the teaching aids developed using the TikTok application and structured interview questions, following which researchers made improvements based on suggestions from three experts. Subsequently, a panel of five experts specializing in the field of invention, which included four invention teacher and one invention lecturer actively participated in the study. The research then proceeded by assessing the practicality and effectiveness of the created teaching aids on a sample of 45 Form 4 students from three school in the Perak area enrolled in the Invention course.

The research approach refers to the specific methodology used to achieve the study's goals and objectives. Every study employs distinct methodologies and techniques to acquire pertinent information and data for analysis, tailored to the study's specific objectives and goals. This study employs a mixed-methods research approach that integrates qualitative and quantitative methods, along with the implementation of the ADDIE model design.

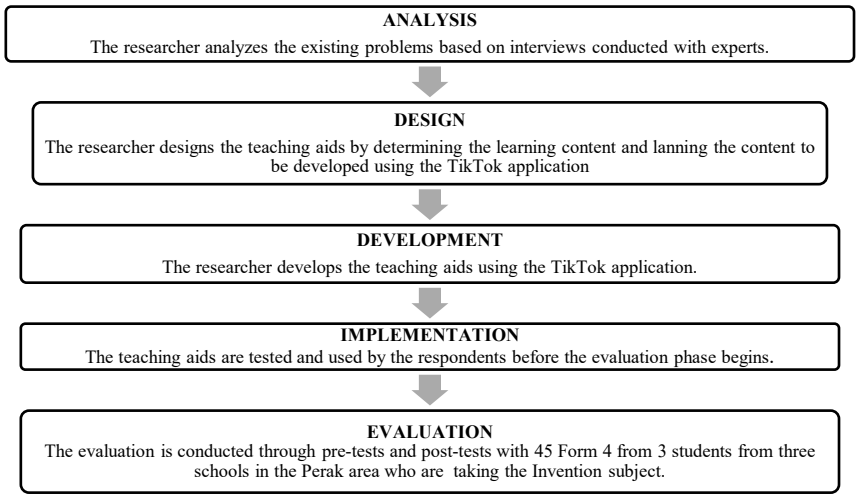


Figure 1 The ADDIE Model with a brief explanation related to the study

3.1 Analysis Phase

During this stage, the researcher analyzes the objective of creating TikTok-based teaching aids aimed at enhancing both the teaching and learning of technical drawings, especially isometric drawings. The researcher examines the challenges encountered by students while studying the topic of technical drawings, particularly isometric drawings. This analysis involves structured interviews with five field experts — four teachers and one lecturer — specializing in the subject of Invention as shown in Table 1..

Table 1 List of informants involved in the study analysis

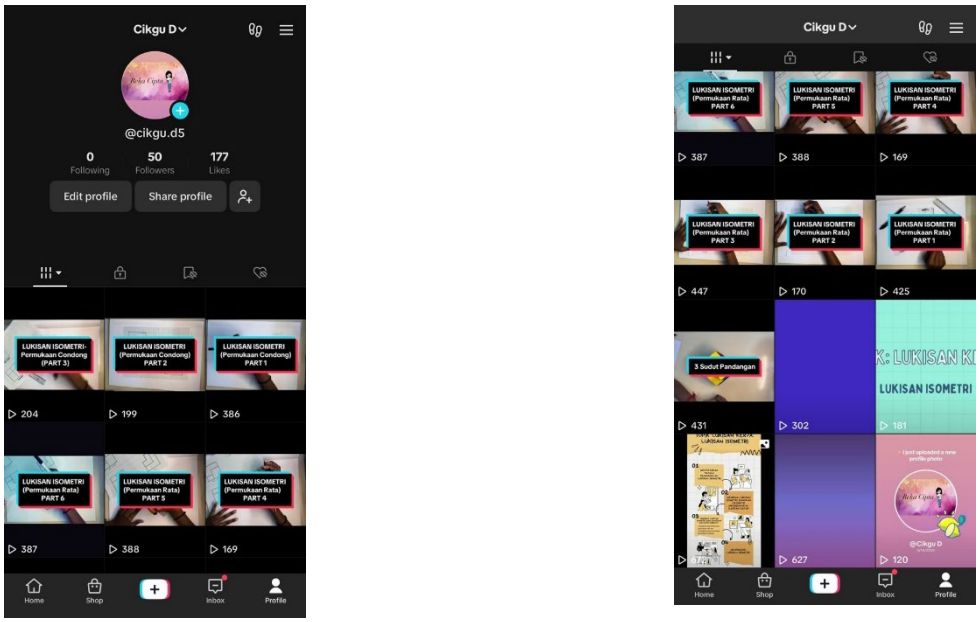
Informant	Position	Backgorund
Informant 1	Lecturer	Invention lecturer
Informant 2	Teacher	Invention teacher
Informant 3	Teacher	Invention tutor teacher
Informant 4	Teacher	Invention teacher
Informant 5	Teacher	Invention teacher

3.2 Design Phase

During the development of teaching aids using TikTok, the design of the aids is established by identifying the appropriate learning content to be developed in accordance with the Standard Curriculum and Assessment Document (DSKP). The researcher has meticulously organized the content of tutorial videos on technical drawings, specifically isometric drawings. The content follows a systematic structure, beginning with an introduction, delving into a detailed explanation of the process, and culminating in the presentation of the final product.

3.3 Development Phase

The TikTok app serves as the primary design inspiration for these teaching aids. Researcher have developed interactive notes and step-by-step tutorial videos to demonstrate the process of creating isometric drawings as teaching aids. The teaching aids include learning standards, technical drawing notes, and interactive isometric drawing notes, are presented in Figure 2. As a result, students are able to follow each step in the creation of isometric drawings by dividing the video tutorials on drawing isometric drawings into multiple sections in the main section. The teaching aids undergo rigorous testing and evaluation by a panel of field experts, who unanimously deem them suitable for both students and teachers (refer to Table 2).



(a) (b)

Figure 2 The TikTok application provides teaching aids focused on the topic of technical drawings: (a) TikTok Account; (b) List of videos on the topic of technical drawings

Table 2 List of validation experts involved in validating and testing the teaching aids before field testing

Expert	Serving Institutions	Expertise
Expert 1	Universiti Pendidikan Sultan Idris	Senior lecturer Department of Engineering Technology Technical and Vocational Faculty
Expert 2	Universiti Pendidikan Sultan Idris	Senior lecturer Department of Engineering Technology Technical and Vocational Faculty
Expert 3	Universiti Pendidikan Sultan Idris	Senior lecturer Department of Engineering Technology Technical and Vocational Faculty

3.4 Implementation Phase

Experts evaluate the teaching aids that have been developed prior to their implementation by students. This phase also encompasses the process of enhancing the quality of the instructional materials. The experts showcase the fully developed teaching aids to assess their usability and identify any potential issues. Following the implementation of improvements, the teaching aids are utilized by the experts prior to the evaluation stage. Researchers also showcase the fully developed teaching aids to assess their usability and detect any potential issues. Following the implementation of enhancements, the teaching aids are utilized by experts prior to the evaluation stage. The efficacy of the developed teaching aids will be assessed by administering pre- and post-tests to Form 4 students enrolled in the Invention subject.

3.5 Evaluation Phase

The researcher administers a pre-test before the students use the teaching aids and a post-test after they have used them. The purpose of this evaluation is to assess the usability of the instructional aids that have been developed. Referring to Table 3, a total of three schools were involved in this evaluation study. Each school contributed 15 students as respondents, making a total of 45 respondents overall. Additionally, the selected school locations varied, with one school situated in a rural area and the other two located in urban areas. The gender composition in Schools 1 and 2 was mixed (male & female), whereas all students in School 3 were male. The scores obtained by students from the pre- and post-tests indirectly indicate a relationship between urban and rural school settings.

Table 3 Overall scores for the pre-test (before) and post-test (after) using the teaching aids.

School	Students	Gender Student	Area	Location
1	15	Male - Female	Rural area	Sungai Siput, Perak
2	15	Male - Female	Urban area	Ipoh, Perak
3	15	Male	Urban area	Ipoh, Perak

■4.0 FINDINGS

As stated in the methodology section, this study employs a mixed-method approach (qualitative and quantitative methods). The qualitative method was conducted during the analysis phase (with informants), while the quantitative method was carried out during the evaluation phase (with students). The findings obtained are divided into two parts:

4.1 Qualitative Findings (Needs Analysis with Informants)

The findings reveal six key themes or elements that serve as the foundation for the development of the TikTok-based application as shown in Figure 3. This study demonstrates an interrelated structure focused on the creation of video-based teaching aids. Referring to Figure X, the essential elements in developing the TikTok application are: (i) easily accessible videos; (ii) concise videos that are rich in information; (iii) clear audio; (iv) the use of easily understandable language; (v) step-by-step processes for producing technical drawings that students can follow; and (vi) ease of availability.

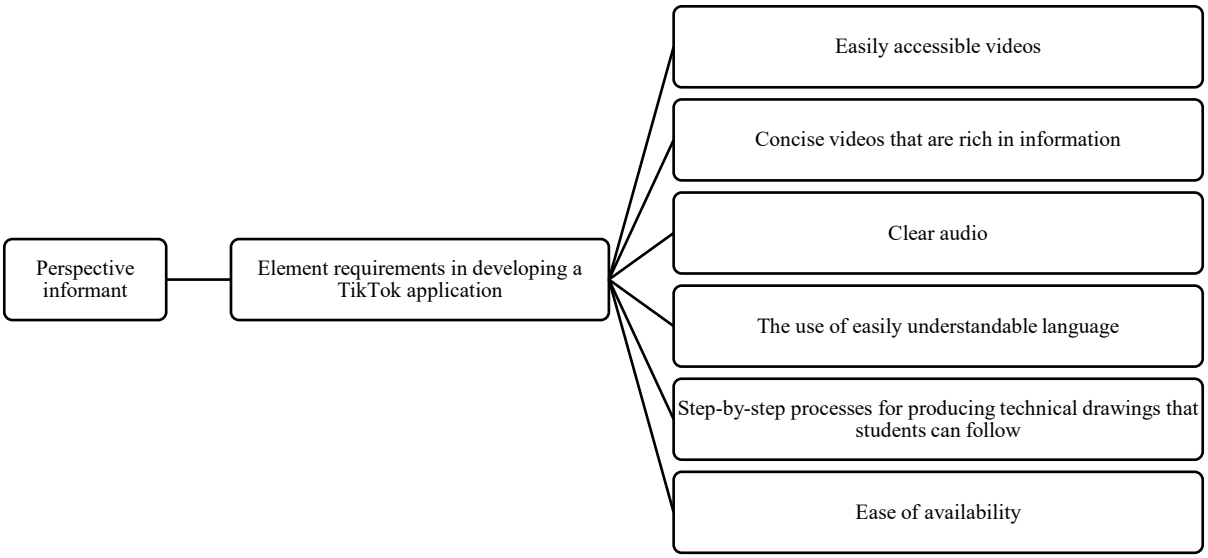


Figure 3 Summary of themes in developing a TikTok-based application focused on the topic of technical drawing.

Based on all five informants, the researcher observed several aspects of importance, necessity, visual understanding, and access to learning materials in the post-pandemic phase. As stated in the studies by Hamat et al. (2020), Mastor et al. (2021), and Ramli & Abd Rahman (2021), the global Covid-19 phenomenon marked the starting point for countries, including Malaysia, to adapt to technology. The learning methods that once relied on one-way communication have now transformed into two-way interactions—where students can ask questions,

share opinions, and provide suggestions to teachers, fostering critical, creative, and open thinking. Moreover, with the integration of social media in education, the need to develop a teaching aid that can be accessed by students anytime and anywhere gives them the freedom to learn beyond the constraints of school hours. This offers convenience especially for students who genuinely utilize platforms like TikTok as a source of learning.

4.1.1 Easily Accessible Videos

One of the key elements identified is that students find it easy to access the developed videos. These videos refer to the TikTok-based application, which incorporates a significant amount of video content. When full access is granted to students, it becomes easier for them to browse, follow, learn from, and share these educational videos.

> *"… aaa… what's important when using social media platforms like this is that we need to make it easily accessible… the username should align with the video's objective… then, it should be made public for others to view the video, open access for sharing with others, and so on… so that the educational video can spread more easily."*
>
> (Informant 1)
>
> *"Video access is extremely important, because if teachers and students can't access it, it becomes difficult for students to revise…"*
>
> (Informant 3)
>
> *"teaching aids you want to developed will make it easier for both students and teachers to understand and teach this challenging topic."*
>
> (Informant 4)

4.1.2 Concise Videos That Are Rich In Information

In addition, it is not only the technical aspects that need to be emphasized. The video content itself also needs to be strengthened, particularly in delivering concise yet informative content. According to the informants, if a video is too long, it becomes difficult for them to stay focused on the learning material. This issue has also been discussed in studies by Abd Gani et al. (2024) and Mastor et al. (2021), which highlight the decreasing attention span of students due to external factors that cause them to quickly lose interest in educational videos.

> *"For this topic, students find it difficult to visualize the drawings they need to create, and they can't imagine it, making it hard for them to master this topic. When a teacher has knowledge and experience in this field, it's not a problem, but the challenge arises when transferring that knowledge to the students. This is where teaching aids are needed to make the content easier to understand, in addition to the existing knowledge."*
>
> (Informant 1)
>
> *". The short videos in the teaching aids you develop can attract students' interest and provide information concisely and clearly. Teachers can also use these TikTok teaching aids for demonstrations and visual sharing because they can be accessed at any time."*
>
> (Informant 2)
>
> *"If the learning is teacher-centered or relies solely on the teacher's explanation, it is less effective as students will struggle to understand the concepts of technical drawing, especially isometric drawings".*
>
> (Informant 4)

4.1.3 Clear Audio

In addition, audio is also a key element that must be considered thoroughly. This is because if the audio used is unappealing or the delivery (tone of voice) in the video lacks confidence, students may struggle to follow the lesson. This is especially true when they are at home, where many factors can prompt them to scroll to other videos.

> *"Besides the video, uh... audio also plays a role in delivering knowledge… if the audio is not clear, it's hard for students to obtain information from the video… afraid it'll just go to waste."*
>
> (Informant 2)
>
> *"The voice must be clear, easy for students to understand… and use language that's simple… because when students are staring at their phones, they might get bored and start scrolling to something else."*
>
> (Informant 4)
>
> *"You should emphasize the audio, because in the topic of technical drawings, we need to give lots of instructions… since there are many lines that need to be drawn… especially in isometric drawings."*
>
> (Informant 5)

4.1.4 The Use Of Easily Understandable Language

The use of Malay as the medium of instruction is a common practice in national schools. Therefore, the informants suggested that Malay should be used in the instructional videos to align with students' familiarity. However, some informants also proposed adding other language options to enhance the educational value of the videos. As Malaysia is a multicultural country, English could serve as a useful alternative for students who may not fully understand certain terms in Malay.

"The students are already used to speaking in Malay… so you can make the explanation video in the national language. But if there's also an English version, that would be fine too… uh… as an added value for the teaching aid."

(Informant 1)

"Therefore, the teaching aids you have developed will make it easier for both students and teachers to understand and teach this challenging topic."

(Informant 4)

"…uh, I think the use of language also plays a role. Teachers in schools mostly use Malay as the medium of instruction. So in my opinion, Malay should be used in the explanation."

(Informant 5)

4.1.5 Step-By-Step Processes For Producing Technical Drawings That Students Can Follow

The informants also discussed the issue regarding the steps involved in producing technical drawings. It was noted that the time allocated in the classroom is very limited, so students are required to do practice outside of formal learning hours or at home. Therefore, with the creation of these instructional videos—especially those that clearly outline the steps of producing technical drawings—students can follow the process more easily, which helps them understand the subject matter in a more simplified manner.

"Using TikTok as a teaching aid, students can watch the videos repeatedly. If they don't understand, they can repeat it, and they can see up close where the illustration is shown clearly. This is helpful because students may not fully understand when taught in class, or if they miss a topic, your teaching aid will help at any time."

(Informant 1)

"The videos that demonstrate each step also help students to visualize the drawings more realistically and to understand the techniques for drawing isometric drawings more clearly."

(Informant 3)

4.1.6 Ease Of Availability

The need for teaching aids that are easily accessible greatly helps teachers share the learning videos. According to the informants, students can also easily review the topic of technical drawings at home without any additional charges incurred.

"…using TikTok as a teaching aid can be considered suitable and easy to use for both students and teachers because this platform is popular and user-friendly".

(Informant 2)

""In my opinion, developing teaching aids using TikTok is very suitable for use today. This is because it makes it easier for students to learn more clearly and allows them to watch the videos you make repeatedly during revision at home. TikTok is a popular platform among students, which can increase their interest and engagement in learning."

(Informant 5)

4.2 Quantitative Findings (Assessment Analysis of Students)

This study employs a quantitative approach, utilizing pre- and post-tests to compare the scores achieved by the students. Table 4 displays the aggregate scores for these examinations, showing the scores of each individual student and the percentage difference calculated to evaluate their comprehension before and after using teaching aids on technical drawing. The researcher divided the students according to their schools, with each school represented by 15 students. A total of three schools were involved, and 45 students participated in the pre- and post-tests. According to the evaluation tests, the average scores showed an increase compared to the pre-test scores. Five students, specifically *Student: 5, 6, 12, 22, 26,* obtained a perfect score of 30/30 (100%) on the post-test. Furthermore, upon closer examination, all five students showed an increase in their percentage scores ranging from 23.33% to 33.33%. This percentage difference can be calculated as follows: *((Post-test Score – Pre-test Score) / Total Score) × 100%).* The percentage difference clearly illustrates the efficacy of the teaching aid's created using the TikTok application.

In summary, nearly half of the students (20 individuals) showed a significant improvement, with a percentage difference above 30.0%. Fourteen students (*Students: 3, 4, 6, 11, 15, 21, 22, 23, 28, 30, 38, 42, 43, 45)* recorded a percentage difference within the range of 15.00% to less than 30.00%, while the remaining students fell below the <15.00% range. The highest percentage differences were recorded by *Student 19* (46.44%) and *Student 27* (43.33%), which confirms that the school is located in an urban area in Ipoh, Perak. However, out of all the students, only *Student 13* and *Student 14* received low scores of 10/30 (33.33%) and 9/30 (30.00%), respectively. Interestingly, these students did not show any percentage difference (0.00%) when comparing their pre-test and post-test scores. This could be attributed to their failure to adhere to the identical procedures demonstrated in the tutorial videos for creating isometric drawings.

Based on the school status, the percentage difference across the three schools showed a 6.62% variation, with an average mean score of 20.93 out of 30. This indicates that students were able to correctly answer 21 out of 30 questions using the TikTok-based teaching aid. When broken down by school, the total score data revealed that the rural school, *School 1* (total score=323; mean=21.53), outperformed the urban schools, followed by *School 2* (total score=318; mean=21.20) and School 3 (total score=301; mean=20.06). This suggests that students in rural areas may have a unique interest in TikTok when it is integrated with digital teaching methods.

Furthermore, when examining the percentage differences among the three schools, *School 2* recorded the highest improvement at 7.34%, which may indicate a cumulative effect of using the TikTok application in the classroom. This was further supported by two students

in the school who recorded percentage differences above 40.00%, demonstrating that the use of this teaching aid is suitable for classroom implementation.

Interestingly, what surprised the researcher was that all students in *School 3*—who were male—showed a very significant improvement, with an average percentage difference above 30.00%. This raises the question of whether male students are particularly attracted to learning through platforms like TikTok when it is used as a medium for academic instruction.

Overall, 42 out of 45 students showed score improvement, indicating the teaching aid's effectiveness. Based on the percentage growth, it can be confirmed that there was a total score of all school 644 (mean = 14.31) in the pre-test and 942 (mean = 20.93) in the post-test, with an average percentage difference of 6.62%.

Table 4 Overall scores for the pre-test (before) and post-test (after) using the teaching aids.

School	Student	Pre-test	Post-test	Percentage difference (%)
1	Student 1	10/30	20/30	33.33
	Student 2	12/30	15/30	10.00
	Student 3	9/30	15/30	20.00
	Student 4	15/30	20/30	16.67
	Student 5	20/30	30/30	33.33
	Student 6	22/30	30/30	26.67
	Student 7	15/30	25/30	33.33
	Student 8	20/30	21/30	3.33
	Student 9	20/30	23/30	10.00
	Student 10	15/30	19/30	13.33
	Student 11	11/30	18/30	23.33
	Student 12	21/30	30/30	30.00
	Student 13	10/30	10/30	0.00
	Student 14	9/30	9/30	0.00
	Student 15	11/30	18/30	23.33
	Score (total)	**240**	**323**	**-**
	Mean score	**16.00**	**21.53**	**-**
	Percentage difference (%)	**-**	**-**	**5.53**
2	Student 16	10/30	20/30	33.33
	Student 17	14/30	23/30	30.00
	Student 18	15/30	25/30	33.33
	Student 19	12/30	26/30	46.66
	Student 20	9/30	12/30	10.00
	Student 21	9/30	15/30	20.00
	Student 22	12/30	20/30	26.66
	Student 23	23/30	30/30	23.33
	Student 24	17/30	27/30	33.33
	Student 25	11/30	24/30	43.33
	Student 26	21/30	30/30	30.00
	Student 27	11/30	24/30	43.33
	Student 28	14/30	20/30	20.00
	Student 29	15/30	24/30	30.00
	Student 30	15/30	22/30	23.33
	Score (total)	**208**	**318**	**-**
	Mean score	**13.86**	**21.20**	**-**
	Percentage difference (%)	**-**	**-**	**7.34**
3	Student 31	15/30	24/30	30.00
	Student 32	17/30	28/30	36.66
	Student 33	11/30	22/30	36.66
	Student 34	10/30	21/30	36.66
	Student 35	9/30	11/30	6.66
	Student 36	10/30	14/30	13.33
	Student 37	11/30	15/30	13.33
	Student 38	16/30	23/30	23.33
	Student 39	14/30	23/30	30.00
	Student 40	16/30	27/30	36.66
	Student 41	15/30	19/30	13.33
	Student 42	20/30	25/30	16.66
	Student 43	13/30	20/30	23.33
	Student 44	9/30	11/30	6.66
	Student 45	10/30	16/30	20.00
	Score (total)	**196**	**301**	**-**
	Mean score	**13.06**	**20.06**	**-**
	Percentage difference (%)	**-**	**-**	**7.00**
	Overall score	**644**	**942**	**-**
	Overall mean score	**14.31**	**20.93**	**-**
	Overall Percentage difference (%)	**-**	**-**	**6.62**

As a result, this teaching aid effectively supports Form 4 students in their study of invention. The tests conducted reveal that the teaching aid significantly enhances student motivation and enthusiasm for the subjects under instruction. The evaluation phase received positive feedback, indicating the significant potential of the developed teaching aid among students. Table 4 displays the pre-test and post-test scores, specifically the scores obtained before implementing the teaching aid and the scores obtained after utilizing the newly developed teaching aid. According to the data presented in the table above, the overall scores showed an increase from the pre-test to the post-test. The researcher's use of the social media platform TikTok as a teaching aid for technical drawing, specifically isometric drawing, yielded satisfactory results by effectively enhancing the understanding of the participants.

In the end, the participants gave the teaching aid extremely positive feedback. Through the utilization of tutorial videos on TikTok, the developed teaching aid effectively enhanced students' comprehension of technical drawing, specifically isometric drawing. These videos allowed students to repeatedly view and engage with the content, thereby promoting their learning process.

In summary, the development of this instructional tool has successfully accomplished the objectives outlined in the study. The primary objective of developing this teaching aid was to create a tool that could effectively support students and teachers in the study of technical drawing, specifically focusing on the Form 4 topic. However, reseachers still need to implement certain enhancements to ensure the more effective and efficient use of this instructional tool.

■5.0 DISSCUSSION

One of the issues encountered in the development of this teaching aid is the lack of examples for creating technical drawings. The provided examples only cover the basics of isometric drawing. Isometric drawings can be created using various projection angles, such as 30 degrees, 45 degrees, and 60 degrees, each with different projection methods. All three types of projections are taught within the topic of technical drawing; however, the 30-degree isometric drawing is most commonly used to illustrate an object.

In addition, the developed teaching aid focuses solely on geometric objects with edges. Shapes such as cylinders, triangles, and spheres are not included in the step-by-step drawing instructions. Therefore, if students are required to draw isometric views of non-edged geometric shapes, they may struggle to do so. However, since the teaching aid developed through the TikTok application offers open access, it can be updated and improved based on current needs.

However, with the use of the TikTok application as a learning media platform, students now have the option to learn through social media applications (informal learning). Farha Shaafi et al. (2022) also observed that this application holds great potential to be further developed and explored to create enjoyment in learning through short yet meaningful videos. Furthermore, with smartphones having become a daily necessity, students can easily access information right at their fingertips (Sohpian et al., 2024). Sohpian et al. (2024) also believe that digital technology marks an era where social media should be emphasized in education by creating dedicated learning platforms—to curb the spread of less beneficial content, especially among students.

The issue that often arises and becomes a point of discussion is the "short video format" and its "effectiveness in explaining a topic within a short period of time." However, based on the current learning preferences of students, they are more comfortable with such an approach, as shown in previous studies (Abd Gani et al., 2024; Hamat et al., 2020; Mastor et al., 2021; Thornhill-Miller et al., 2023). Researchers and educators who create such learning platforms must be creative in delivering content. This includes using engaging content, appealing voice intonation, captivating visuals, and aligning with current trends (algorithms) to boost viewer engagement on TikTok. As a result, the short video format currently used can be divided into several segments to make it easier for viewers to replay and understand the content.

Upon closer examination, access to electronic devices is no longer considered a major issue today. This is because the majority of the population now has adequate internet access on average. According to statistical data obtained from Howe (2024) (accessed on 30 May 2025), the population of Malaysia in 2024 reached 34.49 million, while the number of electronic devices in use far exceeded the population, totaling 44.55 million devices—indicating that individuals typically use more than two devices at any given time. Furthermore, the number of active internet users was estimated at 33.59 million. This suggests that the use of electronic devices such as smartphones, laptops, and televisions generally comes with sufficient internet connectivity to access online resources. Additionally, the rapid development of digital infrastructure in both urban and rural areas further supports the implementation of digital learning. However, the researcher acknowledges that there are still certain areas or districts with limited access to the internet. Therefore, the government's role is crucial in ensuring equal access to digital education, so that all communities can benefit from and experience the shift toward digitalised learning.

In summary, the data obtained shows a significant improvement when students are exposed to digitally-based education. The initiative introduced by the researcher serves as a means to reduce teachers' workload and provide students with the flexibility to engage in learning from anywhere. TikTok-based learning can also help minimize the negative influence of social media, which often features content unrelated to education and may contain harmful elements for users. Therefore, the need to further develop teaching aids focused on the TikTok application is highly encouraged—due to its growing usage in Malaysia, particularly among the younger generation (Ying et al., 2025).

■6.0 FUTURE STUDIES

According to the conducted research, the researcher suggests that the sampling method used in this study during the evaluation phase, following the ADDIE model, could be enhanced by increasing the sample size from 15 students to a larger one in future studies. Increasing the sample size generally enhances the effectiveness of the developed teaching aid. The researcher deems the "mixed method" approach, which integrates qualitative and quantitative methods, appropriate for this study.

In future studies, the researcher proposes altering the assessment stage of the ADDIE model by evaluating the same group but employing diverse methodologies. For instance, researchers could assess and examine students using a pre-test that follows the traditional "chalk and talk" instructional approach. Next, the researcher could evaluate the same student cohort using a post-test after implementing the

developed instructional tool. This would assist the researcher in providing additional evidence to support the assertion that traditional teaching methods are ineffective during teaching and learning sessions. Additionally, it would showcase how the TikTok application-developed teaching tool fosters creative and innovative learning, thereby enhancing students' enthusiasm for technical drawing, particularly isometric drawing, in a more engaging manner.

The instruments utilized in the study are appropriate for eliciting responses from experts through interviews during the needs analysis phase, as well as for administering pre- and post-tests during the evaluation phase. In future studies, the researcher recommends enhancing the pre-test and post-test questions.

According to the conducted research, the utilization of the TikTok application as a teaching aid effectively tackles students' difficulties with visualization and greatly improves their visualization abilities, as certain students learn more efficiently through visual means. Consequently, the videos shared on the TikTok platform offer students a convenient means to visually comprehend and acquire proficiency in the techniques of isometric drawing (Fauziyah et al., 2022). Research conducted by Asdiniah and Lestari (2021), Aji (2018), and Awang et al. (2022) has demonstrated that the utilization of TikTok by students can enhance their academic performance. TikTok has a notable impact on students as a learning tool, which directly affects their academic performance due to their frequent use of the app for educational purposes.

This change is beneficial because the application has the potential to enhance students' engagement in learning, as TikTok provides diverse opportunities beyond mere entertainment (Awang, 2022). Teaching that focuses on the internet and new media can equip students with the skills they need to be competitive, as this innovative teaching approach is advantageous for them. According to Madhani et al. (2021), utilizing TikTok in a constructive manner facilitates the harmonization of students' social engagements and academic pursuits. We will primarily focus the allocated time on education. Increased student engagement leads to enhanced learning outcomes. We suggest educators utilize the TikTok application to disseminate information and establish connections with students.

Enhancement recommendations include increased interactivity. Subsequent research endeavors could incorporate additional interactive components, such as interactive assessments, simulations that involve active student participation, or interactive games that necessitate understanding technical drawing, particularly isometric drawing. This would enhance the interactivity and engagement of the teaching aid, making it a more stimulating and captivating medium for student learning. The instructional tool created utilizing the TikTok social media platform is currently exclusively accessible in the Malay language. This presents an obstacle for students and viewers who lack proficiency in Malay and solely comprehend English. Therefore, we anticipate that we will develop a bilingual instructional tool on TikTok for technical drawing, specifically isometric drawing, in both Malay and English. This will effectively assist students, teachers, parents, and any other viewers.

■7.0 CONCLUSION

In conclusion, students' acceptance of the teaching aids created on TikTok, a social media platform, can make it easier for them to understand the material and act as a draw, piqueing their interest in and motivation for the coursework. The teaching aids created using TikTok for technical drawing, specifically isometric drawing for the Form 4 Design course, have a beneficial influence and significance for both students and teachers. There is an expectation that incorporating technology, specifically TikTok, a widely used social media platform among young people, can serve as an effective educational tool for all students in PdPc and non-PdPc settings. We hope that future studies on the development of technology-based teaching aids will address the recommendations for further research that we also discussed.

Acknowledgement

All of authors wish to Cryogenic Specialty Manufacturing Sdn. Bhd. for supporting this project under the Industrial Research Grant Code: 2024-0098-103-29. The authors also acknowledge the contributions of the Department of Engineering Technology, Faculty of Technical and Vocational, Universiti Pendidikan Sultan Idris (UPSI), 35900 Tanjong Malim, Perak for the publication of this article.

Conflicts of Interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper

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