

The Creative Process: Developing Visual Storytelling through Design Thinking

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To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v13-i10/19113> DOI:10.6007/IJARBSS/v13-i10/19113

Published Date: 28 October, 2023

Abstract

The rise of learning innovation suggested that multimedia content are practical tools of communication to support teaching and learning. Despite increasing learning innovations, little research has been undertaken on visual storytelling for education, especially for science syllabus. Visual storytelling is important to improve the communication of scientific information and visualisation. In Malaysian education, visual storytelling techniques are limited, especially in science and technology, where the content consists of complex information. This paper aims to present the development of TikTok for educational content for science subjects by visual storytelling elements approach through the design thinking process. Mix method is applied in this study. A systematic literature review and Likert scale questionnaire are used. The finding indicates the process of developing a science syllabus for primary school students using visual storytelling in social media content and user feedback. In conclusion, this research contributes for future research in education for multimedia educational content.

Keywords: Multimedia Content, Education, Visual Storytelling, Design Thinking

Introduction

The rise of learning innovation suggested that multimedia content are practical tools of communication to support teaching and learning. Research shows that multimedia content aids in information retention and recall. The combination of visual and auditory stimuli helps students retain and retrieve information more effectively compared to traditional text-based approaches (Issa et al., 1999). Multimedia elements, such as images, videos, and diagrams, can simplify complex concepts and make them easier to comprehend and remember. Using visual storytelling in multimedia harnesses the power of visuals to create engaging, emotionally impactful, and memorable narratives by utilising a combination of visuals, sound, and narrative structure where visuals are arranged in a deliberate order to convey a story or message that helps to simplify complex concepts and communicate messages effectively. Hence, visual storytelling makes it easier to understand complex terms, especially in science

subjects as the large portion of the human brain is related to image processing, visual interpretation, and synthesis (Paivio, 2010). The cognitive science literature supports the idea that humans learn to retain and comprehend information most effectively when presented in various media; contrary to strict prose, like text, the format is auditory and visual (Mayer, 1997).

In recent years, there has been a growing emphasis on using visual storytelling elements to present and explain complex scientific subjects. According to (Tyurina, 2021), attention to visual storytelling and data visualisation is growing in science communication. Visual storytelling, as a means of science communication, offers a unique way to address various objectives, from raising awareness to facilitating critical deliberations on scientific concepts (Igarashi et al., 2020). One example of the power of visual storytelling in science communication is the use of comics, a form of sequential art that combines visuals and plain language storytelling (Jarreau et al., 2021). Research has shown that visual storytelling formats, such as comics, aid in information processing and recall, enhance understanding, and increase engagement in science communication (Jarreau et al., 2021). However, the usage of visual storytelling in Malaysia is limited, and there is a knowledge gap in providing a comprehensive overview of visual storytelling applications in educational content for science syllabus, which consists of complex information. Visual storytelling elements can be particularly beneficial for presenting complex scientific subjects that may otherwise be difficult to comprehend or visualise. Furthermore, the visual storytelling approach through the design thinking process can be an effective strategy for developing comprehensive and engaging TikTok educational content for science subjects. This paper aims to present the development of TikTok for educational content for science subjects using a visual storytelling elements approach through the design thinking process.

Literature Review

Defining Visual Storytelling

The word "story" comes from Greek and means knowledge and wisdom. Stories help people learn about various situations and values. Regardless of audience size or composition, storytelling is driven by a desire to connect meaningfully and purposefully with the listeners (Yoder-Wise & Kowalski, 2003). Adding illustrations to a narrative text helps to close the interpretation gap (Caputo, 2003). This technique is called visual storytelling, where stories or messages are conveyed through visual means such as images, graphics, videos, animations, and other visual elements (Caputo, 2003).

Visual storytelling can be used in various fields, such as advertising, marketing, journalism, film-making, and art. It can be an effective way to engage an audience and convey complex ideas or emotions in a simple and engaging way. The use of visual storytelling can vary from using a single image to convey a message to creating a series of images or a video to tell a complete story. The goal is to create a visual experience that resonates with the viewer and communicates a message or story in a memorable and impactful way.

Visual Storytelling in Education

Visual storytelling has emerged as a powerful tool in the field of education, allowing educators to engage students in a more immersive and meaningful way. In recent years, researchers have delved into the potential of storytelling in visualization research, recognizing its ability to convey complex information and elicit emotional responses from viewers. In the field of education, visual storytelling has been increasingly adopted as a method to enhance

the understanding and interpretation of data. Few studies have discussed the usage of visual storytelling in education to make data and statistical indicators more interactive and understandable for students. Stenliden & Jern (2012) discussed geovisual analytics and visual storytelling to improve teaching in social science using geographic information visualization and visual storytelling. The case study was carried out in a school setting involving 28 students aged 12 to use and learn geographic information visualization and Visual Storytelling using the application "Open Statistics eXplorer". The study was carried out to examine the effectiveness, efficiency, and user satisfaction of geovisual analytics. The results show that using geovisual analytics and visual storytelling is usable within the school setting, improves teaching in social science, and enhances students' knowledge and understanding of sophisticated statistical relations. Lundblad & Jern (2012) highlighted the usage of visual storytelling in making data more accessible to perceived in the research focuses on using visual storytelling to educate people about spatial-temporal multivariate statistics data using the same geovisual analytic method and interactive visual story mechanisms to assist teachers in improving a student's knowledge through reflections on how life is lived by using a variety of demographics, such as healthcare, environment, and educational and economic indicators. Lundblad & Jern (2012) used an application called "World eXplorer" to help educators create interactive teaching materials web such as texts, images or videos using hypertext combined with storytelling to enhance the understanding of the data. Moreover, visual storytelling has the potential to engage a diverse and potentially nontechnical community, making data visualizations more accessible and understandable to a wider audience.

Storytelling in education is not a new concept; however, integrating visual elements has added a new dimension to its effectiveness. When it comes to visual storytelling in education, there is a recognized shift from traditional approaches to more interactive and engaging teaching and learning methods. This shift is primarily driven by the recognition that visual storytelling has the potential to enhance students' understanding and retention of information. AminAfshar & Mojavezi (2017) investigate the effects of aural and visual storytelling on Iranian EFL learners' vocabulary learning and retention. The research compared two groups using visual storytelling and aural storytelling where the results of the paper revealed that the experimental group, which used the visual storytelling method, outperformed the control group, which used the aural storytelling method, in both learning and retention of English vocabulary hence introducing visual storytelling as effective strategies for vocabulary learning and retention for language learners.

Design Thinking

Design thinking is an analytical and creative process that exposes a person to opportunities for experimentation, model creation and prototyping, feedback gathering, and redesign (Razzouk & Shute, 2012). The term 'design thinking' has been part of the collective consciousness of design researchers since Rowe used it as the title of his 1987 book (Rowe, 1987). The first design thinking research symposium explored research into design and design methodology, viewed from a design thinking perspective (Cross et al., 1992). Since then, other versions of design thinking have arisen, each based on a distinctive perspective of a design issue and utilising theories and models from design methodology, psychology, education (Dorst, 2011). In recent years, design thinking has gained popularity in fields beyond design, including business, education, and healthcare. It is seen as a way of addressing complex problems and fostering innovation in various contexts.

While there are different models and frameworks for design thinking, they generally follow a similar process that includes empathising, define, ideate, prototype and test. The first stage of design thinking is empathised, which involves understanding the user's needs, desires, and challenges. It is essential to develop empathy to understand people's needs, wants, behaviours, feelings, and thoughts when dealing with goods in a real-world situation (Mortensen, 2019). This involves observing, interviewing, and empathising with users to deeply understand their perspectives and experiences. The second stage involves defining the problem or challenges that the design thinking process will address. This involves synthesising the insights gained in the empathise stage and identifying the key needs and opportunities for design (Mortensen, 2019). The ideate stage involves generating various ideas and solutions for the problem or challenge identified in the define stage. This involves brainstorming, mind mapping, and other ideation techniques to generate creative and innovative solutions.

The prototype stage involves rapidly creating and testing prototypes of the most promising solutions. This may involve creating physical or digital prototypes and testing them with users to gain feedback and insights. The final stage of design thinking involves testing and iterating on the prototypes developed in the previous stage. This may involve refining or modifying the prototypes based on user feedback or going back to earlier stages of the process to refine the problem definition or generate new ideas.

Methodology

This study aims to present the development of educational TikTok content for science subjects using visual storytelling elements approach through the design thinking process. This exploratory research design employs a qualitative method through a case study, and data collection consists of a small set of pre-testing survey by using the Likert scale technique to get feedback on the student's understanding through parents.

Finding and Results

Understanding Stage: Empathise & Define

Based on the research through the literature review in the first stage, there is a knowledge gap in social media learning for kids, especially on the TikTok platform. TikTok can be seen as the next popular social media platform that can cater to e-learning for primary school students. Over the last year, search demand for TikTok has grown by 173% as compared to Instagram Reels, which has only grown by 22%.

The second step of the design thinking process is to establish a clear idea of the problem that will be solved for the user. Based on the observation on social media platforms, there's a lack of Year 1 Science syllabus content development on social media platforms. To develop the content, the first topic in the syllabus *Kemahiran Saintifik* was picked, and all the information was analysed to create more understanding before further development. The information was fragmented into a few subtopics to make planning the visuals and storytelling easy.



Figure 1: Science Syllabus *Tahun 1 – Kemahiran Saintifik*

Exploring Stage: Ideate & Prototype

The exploring stage involves generating ideas and potential solutions to the identified problem. This stage encourages brainstorming and creativity to explore different possibilities and perspectives. Ideate is a crucial step in the design thinking process, which focuses on generating a wide range of creative ideas. During the Ideate step, designers utilize various brainstorming techniques to explore multiple possibilities and generate creative solutions to the problem at hand. In this phase, a script for visual storytelling was developed, and it involves crafting a narrative that effectively communicates the story through visuals, dialogues, and actions to engage and captivate the audience. The story was divided following the basic narrative structure, including a beginning, middle, and ending. After the script is finalized, the next phase is to develop a prototype. The prototype development stage builds upon the ideas generated during the ideation phase. Visual storytelling elements were carefully determined to deliver the concept and engage the audience effectively. The five elements used in this prototype are storytelling, infographic, animation, colour, and sound. The prototype development process involves creating a tangible representation of the proposed solution, allowing testing, and gathering stakeholder feedback.

Materialise Stage: Test & Feedback

This survey is done to look into students' perceptions towards visual storytelling. A total of 13 respondents answered the pre-test to see the student's perceptions. This survey involves participants from 7 - 8 years old, continuing by 9 - 10 years old and 11 - 12 years old. Most students' language proficiency is in English. Based on the survey, most students understand scientific concepts after engaging with visual storytelling in social media, with 61.5 percent agreed with the survey. 53.8 percent of students agree that visual elements such as storytelling, infographic, animation, colour and sound enhanced their understanding and engagement, and 46.2 percent agree that it helped them remember and retain scientific information. 53.8 percent of respondents strongly believe that visual storytelling attracts their attention and keeps them engaged throughout the story. Moreover, 61.5 percent of the respondents strongly agree that visual storytelling adds depth and richness to the overall storytelling experience and effectively conveys the emotion and mood of the story by 46.2 percent. Visual storytelling was visually appealing and aesthetically pleasing, with 38.5 percent of participants agreeing with the survey, and 46.2 percent agreed that the visual storytelling strongly impacted my overall gratification and understanding of the story.

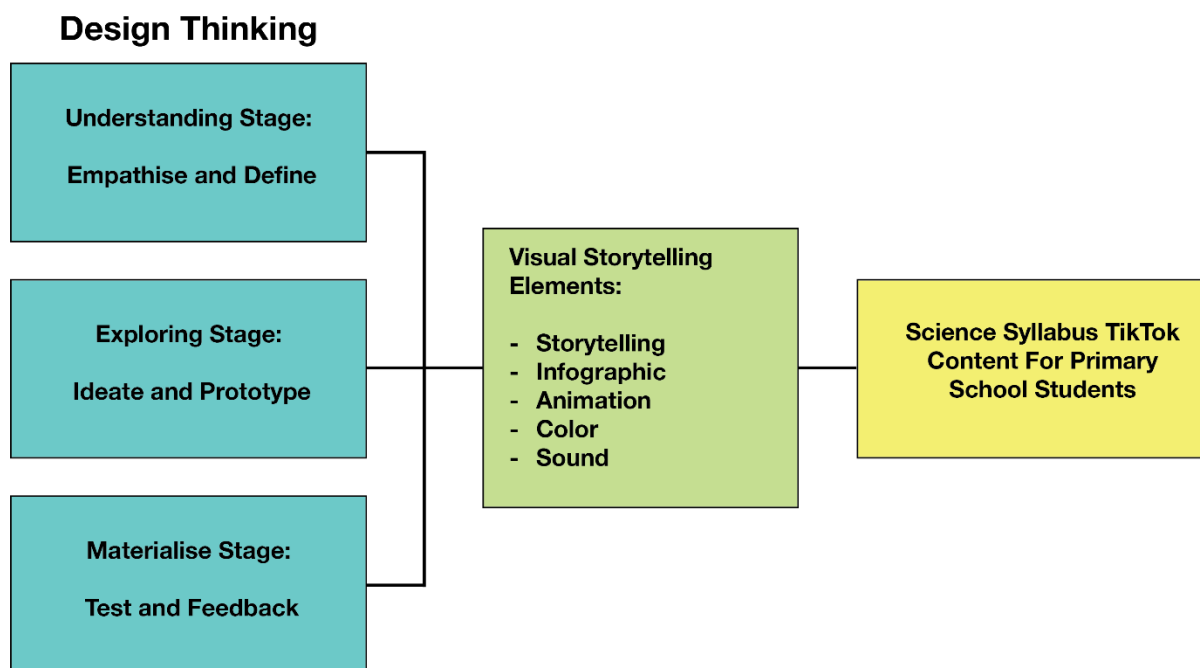


Figure 2: Design Thinking Process

Conclusion

In conclusion, this research presents the development of TikTok for educational content for science subjects by visual storytelling elements approach through the design thinking process. From this research, the design thinking process represents a practical approach to enhancing visual storytelling learning experiences for students. Using design thinking, the researcher identified the process involving three stages. The first stage is the understanding stage which consists of empathise and define. The second stage is the exploring through ideate and prototyping. Lastly, the materialize stage by testing and getting feedback. Throughout the development, problems and needs were identified, and information was conveyed through the prototype using visual storytelling elements. Based on testing, feedback from students was gathered for refining. Significantly, by using the design thinking process, educators can produce effective visual storytelling content for social media that will increase students' understanding and engagement. This study serves as a guideline for educators to develop educational social media content, especially for science subjects, on the TikTok platform. Furthermore, developing visual storytelling in educational content through the design thinking process provides an innovative and effective way of presenting the scientific concept for students' learning. This research supports the Malaysia Education Blueprint 2013–2025 in promoting innovation in online learning in Malaysia, especially for science and mathematics subjects (STEM) (Kementerian Pendidikan Malaysia, 2013).

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