

The Development of a Metaverse Exhibition with Communication Activities to Enhance Digital Information Literacy on GO Green via the MCOT Throughout Thailand Facebook Page

Pornteera Srisutitada¹, Kuntida Thamwipat¹, Pornpapatsorn Princhankol¹

¹King Mongkut's University of Technology Thonburi, Bangkok, Thailand

Correspondence: Kuntida Thamwipat, King Mongkut's University of Technology Thonburi, Thailand.

Received: September 16, 2025

Accepted: October 23, 2025

Online Published: October 28, 2025

doi:10.11114/smc.v14i1.7970

URL: <https://doi.org/10.11114/smc.v14i1.7970>

Abstract

This research aimed (1) to explore the needs of the sample group in developing a metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Throughout Thailand Facebook page; (2) to develop and evaluate the quality of the metaverse exhibition with communication activities; (3) to assess the awareness of the sample group; and (4) to evaluate the satisfaction of the participants toward the media and activities developed on the online platform. Sample group in this study consisted of 100 followers of the MCOT Throughout Thailand Facebook page, selected through simple random sampling by lottery from those who had engaged with the media and communication activities and voluntarily agreed to complete the questionnaire. Research findings revealed that the participants expressed a high level of need for a metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Throughout Thailand Facebook page. Subsequently, the researcher developed the media combined with the communication activities and had them evaluated by experts for quality. Expert evaluation indicated that the quality of the content and media presentation was rated at a good level. The assessment of participants' perception showed that their post-exposure perception after viewing with the media and activities was significantly higher than their pre-exposure perception at the .05 level of significance. Furthermore, the participants' satisfaction with the media and activities was rated at the highest level. Therefore, the developed media and activities were effectively shared on its Facebook page.

Keywords: metaverse exhibition, communication activities, digital information literacy, Mass Communication Organization of Thailand (MCOT)

1. Introduction

At present, technology plays a significant role in various aspects of society and the economy, including education, communication, and the administration of both public and private sectors. Technology serves as a medium for connectivity and acts as a driving force for effective and widespread communication, thereby fostering lifelong learning without limits. The use of technology also serves as a channel to expand and disseminate information and knowledge, enabling unrestricted access for everyone regardless of location. Therefore, technology has become an essential part of modern human life. Moreover, it has significant impacts on all aspects of the world, including communication, business, education, society and culture, as well as the environment. Technology is a powerful tool that can transform the world for the better. However, it must be used with mindfulness and responsibility to ensure that such transformation contributes positively and sustainably to the world and society. Therefore, technology should be utilized appropriately and efficiently in all aspects of daily life, with mindfulness and discipline in its use in every situation, so that the resulting changes can benefit the world and society in a sustainable and lasting manner (ICHI media, 2024) The metaverse, or three-dimensional virtual technology in an online format, can be considered a digital space created to simulate reality. The metaverse offers the advantage of facilitating communication among younger generations, allowing them to connect conveniently from anywhere in the world. The metaverse integrates various types of technologies, such as Virtual Reality (VR), Meatspace, and the Multiverse, enabling people to access digital worlds comprehensively through online platforms. It also allows users to create avatars or virtual identities that can enter the metaverse to engage freely in various activities, including work or collaborative tasks within designated online spaces. This facilitates an immersive experience, effectively conveying the content or messages that organizations intend to present. At present, the metaverse is also being applied in

various fields, including healthcare, e-learning, e-commerce, work, and many other areas (It 24 hrs, 2021). The metaverse can be effectively utilized for exhibitions, which are displays of knowledge or activities through various media, allowing audiences to gain awareness. Exhibitions also serve as educational media, providing knowledge and data to stimulate audience engagement and achieve specific objectives. Moreover, exhibitions are no longer confined to physical spaces; they can also be conducted online, commonly referred to as E-Exhibitions, which allow convenient access. The content or knowledge presented in an exhibition through electronic media depends on the organizer's objectives and can be delivered in the form of images, sound, and text. At present, online exhibitions have attracted significant interest and have an influence on education, science, business, society, politics, industry, healthcare, and other fields (Chatmueangphak, N., 2009).

Digital Information Literacy refers to the ability to be aware of and to manage information comprehensively, emphasizing skills in accessing, identifying, evaluating, and effectively and efficiently using information from various sources. These skills are not new, arising from the information age, but have long been essential for enhancing individual success and quality of life. In the past, information literacy was limited to traditional media, such as books, radio, and journals. However, in the 21st century, the scope of information literacy has expanded to include modern technological media, such as online databases, the Internet, multimedia, and digital documents. Consequently, contemporary information literacy requires a combination of research, evaluation, and technology skills integrated with existing knowledge to achieve objectives effectively. Information literacy has thus become one of the key learning objectives, requiring the ability to access, evaluate, and use information appropriately. This enables individuals to develop analytical thinking, research skills, and lifelong learning capabilities. The key components of information literacy can be summarized into three main aspects (Rattanoubon, A., 2005):

1. Information Access Skills: This involves both physical and cognitive abilities to access information in technology-rich environments, as well as knowledge and strategies for searching, selecting, and synthesizing information from general and electronic databases, such as the Internet.
2. Information Evaluation Skills: This includes the ability to analyze and interpret information, as well as to determine which sources are reliable, based on factual accuracy and validity.
3. Information Use Skills: This involves understanding the economic, social, cultural, and legal issues related to information, as well as using information ethically and efficiently to manage data retrieved in accordance with specific objectives.

Developing these information literacy skills helps individuals become knowledgeable and fosters continuous lifelong learning. This aligns with the concept of sustainable development, which is a development approach that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (Thaipat Institute, 2015). Achieving sustainable development involves three key components: economic growth, social inclusion, and environmental protection. There is particular emphasis on eradicating poverty and hunger, as well as reducing social inequalities, as follows:

1. Planet (Environment): Protecting and preserving natural resources and the climate for future generations.
2. Prosperity (Economy and Wealth): Promoting well-being among the population in harmony with nature.
3. Peace (Peace and Justice): Upholding the principles of living together peacefully, fostering a harmonious and inclusive society.
4. Partnership (Development Partnerships): Encouraging collaboration among all sectors to drive the sustainable development agenda.

Go Green is a concept focused on environmental friendliness. It emphasizes caring for and preserving the Earth, as well as promoting sustainable development, in order to reduce potential environmental impacts such as global warming, deforestation, and improper waste management. Go Green not only highlights the importance of forests but also emphasizes the protection of living organisms within the environment. In particular, it focuses on wildlife conservation, as certain animal species play a significant role in maintaining ecological balance (Bio-Circular-Green Economy, 2024).

The Mass Communication Organization of Thailand (MCOT) Public Company Limited, or MCOT, is an organization primarily engaged in the mass media industry. It provides valuable content across multiple platforms to meet the needs of its target audiences while maintaining social responsibility. In addition, MCOT promotes informative content and knowledge to foster an aware and informed society. Currently, MCOT, through its initiative MCOT Radio Go Green, is aware of environmental issues and recognizes their impact on contemporary Thai society. In response, MCOT launched the MCOT Radio Go Green project in 2023 to promote public awareness of the value of the environment (MCOT, 2025), and it continues to operate to the present day. The current goal is to disseminate digital information about Go Green to Generation Z listeners, who are characterized by high Internet and information access. They prefer content that is concise,

easily understandable, and quickly comprehensible, and tend to scroll past material that does not capture their interest. Spending most of their time on online platforms and social media—including Twitter, Facebook, YouTube, LINE, and Instagram—members of Generation Z are considered digital natives. Consequently, they have grown up with the ability to access large amounts of information rapidly, and they transition into adulthood faster than previous generations, often ending childhood by the age of 12. This has made Generation Z a more complex and distinct group compared to previous generations, as they have grown up in an era where vast amounts of news and information are readily accessible online. In Thailand, 94% of Generation Z prioritize smartphones as essential devices that can be used in any situation (Limitless Education, 2020). Therefore, to align with key organizational policies and promote information literacy among listeners, the use of metaverse technology provides an engaging platform for presenting online content to this generation. Based on the aforementioned background and significance, as well as studies related to environmental media development by The Mass Communication Organization of Thailand (MCOT) Public Company Limited, nationally published research includes (1) The Development of a Digital Content set to Promote the Paper-Cycle Project: Separate, Exchange, Renew on MCOT's social media platforms by Thamwipat, K., et al (2024). (2) Research by Princhankol, P., et al (2024). The Development of Digital Content for Public RelationsLive Broadcast Programs on the Thai News Agency Live Platform. (3) Research by Princhankol, P., et al (2024). The Development of an Electronics Book for Public Relations the Mellow Pop MCOT Streaming Platform on Google Sites. (4) Research by Thamwipat, K., et al (2024). The Development of Video Content Series Titled “Little Sports Tips” on the 9 Stadium Facebook Page. (5) Research by Thamwipat, K., et al (2023). The Creation of Video Content for Public Relations Program Promotion Devison, MCOT Pcl., Using A Problem Agitate Solve Storytelling Technique. (6) The Development of Digital Content in the Form of Photo Alblum for Publicizing Secondary City Tourism Attractions on the Online Platform of Backbone Mcot Page. Research by Thamwipat, K., et al (2023). (7) Development of an Online Content Set Combined with Interactive Communication Activities to Promote News Literacy among University Students. Research by Nualnimnoi, J., et al (2022) (8) Development of a Content Set for Public Relations Communication on ‘MCOT Water Conservation: Continuing the Royal Initiative’ on the Social Media Platforms of MCOT Public Company Limited by Thamwipat, K., et al (2020). (9) Research by Thamwipat, K., et al (2021). The Development of Content Set for Public Relations on Social Media of MCOT Public Company Limited, Titled in Blood Donation “The More We Give, The More We Get”. And (10) Research by Thamwipat, K., et al (2015). The Development of Sticker Characters on Application Line Entitled “ASEAN” for Public Relations the Image of MCOT Public Company Limited. Additionally, internationally published research from the Department of Learning Technology and Communication, King Mongkut's University of Technology Thonburi, related to metaverse exhibitions, includes the following: Research by Kaewsomnues, A. et al. (2023). who studied the Development of an E-Exhibition in Conjunction with a Game-Based Learning Communication Activity, and research by Thamwipat, K. et al. (2024), who focused on the Development of Digital Content in the Metaverse Combined with Participatory Communication and Learning with Religious Leaders to Enhance Students' Perception of the Community Mosque. However, no studies have yet developed media or metaverse exhibitions combined with communication activities to promote digital information literacy related to environmental issues.

Research Objectives

1. To investigate the needs of the sample in the development of a metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page.
2. To develop and evaluate the quality of a metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page.
3. To assess the perception of digital information literacy of the sample regarding the metaverse exhibition, combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page.
4. To evaluate the satisfaction of the sample with the metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page.

Research Hypotheses

1. The target participants' needs for the development of a metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page are at a high level or above.
2. The quality of the metaverse exhibition, combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page, is at a good level or above.
3. The participants' perception after viewing the metaverse exhibition, combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page, is higher than before exposure to the media and activities at a significance level of .05.

4. The participants' satisfaction with the metaverse exhibition, combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page, is at a high level or above.

2. Method

In this study, the research was conducted as detailed below:

2.1 Content Scope

The content of this study consists of a metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page, with the following content scope:

The metaverse exhibition to promote digital information literacy on Go Green includes the following content:

- a. Accessing basic digital information literacy on Go Green
- b. Evaluating digital information literacy on Go Green
- c. Using digital information literacy on Go Green

2.2 Population

The population for this study on the metaverse exhibition, combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page, consists of 27,000 MCOT Facebook followers across Thailand (MCOT Throughout Thailand, 2024).

2.3 Sample

The sample for this study on the metaverse exhibition, combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page, consists of MCOT Facebook followers across Thailand. The sample was obtained through simple random sampling from those who had viewed the media and participated in the communication activities and were willing to complete the questionnaire. A total of 100 participants were selected, based on the Taro Yamane sample size table with a $\pm 10\%$ margin of error (TSIS Team, 2020). The use of Taro Yamane's formula for sample size determination is appropriate for this study, as the total population is known. Since the MCOT Facebook page preferred to minimize the time commitment and the number of participants, a margin of error of $\pm 10\%$ was selected. Moreover, this research primarily focused on design and development for practical application rather than on large-scale data collection.

2.4 Experts

The experts are individuals with knowledge, skills, and expertise selected to evaluate the quality of the metaverse exhibition, combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page nationwide. They were chosen using purposive sampling, ensuring that they are genuinely qualified and willing to serve as experts. The experts were categorized into three groups: content experts, presentation/media experts, and measurement and evaluation experts, with three experts in each category, all selected through purposive sampling.

2.5 Research Instruments

The research instruments used to collect data in the study on the development of media and activities to enhance digital information literacy on Go Green via the MCOT Facebook page are as follows:

1. Questionnaire on the needs for a metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page
2. Metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page
3. Assessment form for the quality of the developed media and activities

The questionnaire items were designed using a 5-point Likert scale (GreedisGoods, 2018) and divided into two sections:

1. Content quality assessment, and 2. Presentation/Media quality assessment
4. Perception assessment questionnaire – The items were designed using a 5-point Likert scale (GreedisGoods, 2018)
5. Satisfaction assessment questionnaire – The items were designed using a 5-point Likert scale (GreedisGoods, 2018)

All research instruments used in this study underwent Index of Item-Objective Congruence (IOC) evaluation (Mahachulalongkornrajavidyalaya University, 2015) by three measurement and evaluation experts, yielding IOC values between 0.5 and 1.00. Additionally, all instruments were approved by the Human Research Ethics Committee of the University, approval number:

KMUTT -IRB-2025/0609/180: This was completed prior to data collection from the sample group.

2.6 Research Methodology

The development of a metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page is a research and development study. The researcher conducted experiments with the sample group, with the research procedure detailed as follows:

1. Survey the needs of MCOT to inform the development of a metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page.
2. Develop a Metaverse exhibition with communication activities to enhance digital information literacy on GO Green via the MCOT Throughout Thailand Facebook Page
3. Have experts evaluate the quality of the exhibition in terms of content and presentation using the quality assessment form to identify deficiencies and make necessary corrections prior to dissemination.
4. Disseminate the metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page nationwide. The exhibition and activities will be promoted through a quiz-based game to enhance digital information literacy regarding Go Green, covering the following three components. The activities will be conducted four times over four weeks throughout May 2025.
5. Have the sample group complete the pre- and post-assessment questionnaires on perception and the satisfaction questionnaire after experiencing the developed media and activities.
6. Collect and analyze data obtained from the expert quality assessments (content and presentation), the perception assessment, and the satisfaction assessment of the sample group. The data will be averaged and compared with the research hypotheses.

Table 1. Research Procedure Steps

Order	Description
Step 1	Survey the needs of MCOT to inform the development of a metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page.
Step 2	Study relevant concepts, theories, and previous research to serve as a guideline for developing media and activities. All research instruments were evaluated by experts, and approval for human research ethics (IRB) was obtained.
Step 3	Develop of a metaverse exhibition with communication activities to enhance digital information literacy on GO Green via the MCOT Throughout Thailand Facebook Page
Step 4	Reviewed by the academic advisor
Step 5	Experts evaluated the quality of content and presentation media
Step 6	Have the sample group view the exhibition and participate in Q&A activities over a period of three weeks.
Step 7	Have the sample group complete perception tests and satisfaction assessments.
Step 8	Compute statistical values, summarize, and evaluate the results.

2.7 Statistics Used in the Study

Statistics used for data analysis included calculating the mean ($\bar{x}$), standard deviation (SD), and conducting a paired-sample t-test to compare participants' awareness before and after viewing the exhibition and participating in activities.

3. Results

From Table 2, the results of the survey on participants' needs indicate that the participants expressed a high level of desire for the development of a Metaverse exhibition combined with communication activities to enhance digital information literacy on Go Green via the MCOT Facebook page ($\bar{x} = 3.91$, S.D. = 1.26). The highest mean score was for the Visual Aspect, which was at a high level ($\bar{x} = 4.10$, S.D. = 1.15), followed by the Content Aspect, also at a high level ($\bar{x} = 4.06$, S.D. = 1.14).

Table 2. Survey Results on the Needs of the Sample Group

Items Assessed	Results of the Analysis	
	$\bar{x}$	S.D.
1. Type of Media Desired		
1.1 Infographic Media	4.72	0.47
1.2 Motion Graphic Media	2.15	0.95
Overview	3.44	1.49
2. Type of Activity Desired		
2.1 Conduct online activities using weekly Q&A game sessions	4.52	0.69
2.2 Conduct hybrid activities by combining on-site and online sessions in a single day	2.85	1.21
Overview	3.68	1.29
3. Content Aspect Desired		
3.1 Accessing Basic Information on Go Green	4.66	0.51
3.2 Evaluating Information on Go Green	4.50	0.62
3.3 Using Information on Go Green	4.51	0.62
3.4 Risks in Using Information on Go Green	2.56	1.08
Overview	4.06	1.14
4. Visual Aspect Desired		
4.1 Use real images combined with graphics in the media	2.75	1.35
4.2 Use colorful and visually pleasing graphics with a natural theme	4.43	0.66
4.3 Use simply designed graphics with an earth-tone theme	4.61	0.54
4.4 Include concise explanatory text in the media	4.62	0.54
Overview	4.10	1.15
Summary	3.91	1.26

3.1 Results of the Development of Media and Activities



Figures 1-3. Examples of the Metaverse exhibition combined to promote digital information literacy on Go Green via the MCOT Facebook page



Figures 4-7. Examples of the communication activities to promote digital information literacy on Go Green on the MCOT Facebook page

3.2 Results of the Evaluation of the Quality of Content and Presentation Media by Experts

Table 3. Results of the Content Quality Evaluation by Experts

Items Assessed	Results of the Analysis	
	$\bar{x}$	S.D.
1. Content Aspect		
1.1 The content is accurate, clear, and credible	4.33	0.58
1.2 The sequencing of the infographic content is stepwise and continuous, making it easy to understand	4.33	0.58
1.3 The text is arranged in an aesthetically pleasing manner	4.33	0.58
1.4 The content is appropriate for the target audience	4.33	1.15
Overview	4.33	0.65
2. Language Usage and Visual Content Aspect		
2.1 The language used is correct and appropriate	4.00	1.00
2.2 The text used for communication is concise and clear	4.00	1.00
2.3 The illustrations correspond well with the content	4.67	0.58
2.4 The illustrations are appropriate and accurate in relation to the presented content	4.67	0.58
Overview	4.33	0.78
Summary	4.33	0.70

From Table 3, the evaluation of content quality by subject matter experts regarding the development of a Metaverse exhibition combined with communication activities to enhance digital information literacy on GO Green via the MCOT Facebook page shows that the overall quality is at a good level ($\bar{x} = 4.33$, S.D. = 0.70). The highest-rated aspect is the use of language and content illustrations, which is also at a good level ($\bar{x} = 4.33$, S.D. = 0.78), followed by the content itself, which is at a good level as well ($\bar{x} = 4.33$, S.D. = 0.65).

Table 4. Expert Evaluation of Presentation Media Quality

Items Assessed	Results of the Analysis	
	$\bar{x}$	S.D.
1. Typography Aspect		
1.1 The font size is easy to read and clear	4.00	0.00
1.2 The font color and style are visually appealing	4.33	0.58
1.3 The text is arranged in an aesthetically pleasing manner	4.33	0.58
Overview	4.22	0.44
2. Images Aspect		
2.1 The images used are appropriate and engaging	4.33	0.58
2.2 The images effectively convey the intended meaning	4.33	0.58
2.3 The images are clear, sharp, and consistent with the content	5.00	0.00
Overview	4.67	0.50
3. Presentation of the Metaverse Exhibition Aspect		
3.1 The presentation format is appropriate	4.67	0.58
3.2 The Metaverse exhibition combined with communication activities to promote digital information literacy on GO Green on the MCOT Facebook page is engaging	5.00	0.00
3.3 The duration of the media presentation is appropriate	4.33	0.58
Overview	4.67	0.50
4. Communication Activities Aspect		
4.1 The online activity format is appropriate	4.33	0.58
4.2 The quiz-based game is engaging and interesting	4.33	0.58
4.3 The duration of the activity is suitable	4.00	0.00
Overview	4.22	0.44
Summary	4.44	0.50

From Table 4, the expert evaluation of the presentation media quality for the research on developing a metaverse exhibition combined with communication activities to enhance digital information literacy on GO Green via the MCOT Facebook page shows that the overall quality is at a good level ($\bar{x} = 4.44$, S.D. = 0.50). The highest average scores were for the image quality and metaverse exhibition presentation aspects ($\bar{x} = 4.67$, S.D. = 0.50), followed by font and color usage and communication activities ($\bar{x} = 4.22$, S.D. = 0.44).

Table 5. Perception results of the sample group

Variables	N	Mean	S.D.	T	Sig
Before watching	100	2.08	0.82	42.56*	0.00
After watching	100	4.66	0.48		

*at the significance level of .05

From Table 5, the assessment of participants' perception in the study on the development of a metaverse exhibition combined with communication activities to enhance digital information literacy on GO Green via the MCOT's Facebook page shows that, The results of the pre-exhibition assessment showed that the participants' perception was at a low level ($\bar{x} = 2.08$, S.D. = 0.82). In contrast, the results of the post-exhibition assessment indicated that the participants' perception was at the highest level ($\bar{x} = 4.66$, S.D. = 0.48). When the perception scores were analyzed using a t-test, the calculated t-value was 42.56, showing that the participants' perception scores after viewing the exhibition were significantly higher than before at the .05 level of significance (t-test = 42.56).

Table 6. Results of Participant Satisfaction Evaluation

Items Assessed	Results of the Analysis	
	$\bar{x}$	S.D.
1. Content Aspect		
1.1 Sequencing of infographic content	4.84	0.37
1.2 Clarity of exhibition and communication activity content	4.71	0.46
1.3 Interest level of exhibition and communication activity content	4.73	0.45
1.4 Usefulness of exhibition and communication activities for practical daily life	4.73	0.45
Overview	4.75	0.43
2. Images Aspect		
2.1 The images used in the exhibition and activities are beautifully designed	4.82	0.39
2.2 The images clearly convey meaning and are easy to understand	4.74	0.44
2.3 The images and text are attractive and engaging	4.66	0.48
2.4 Clarity in conveying the meaning of the images	4.71	0.46
Overview	4.73	0.44
3. Presentation Aspect		
3.1 The metaverse exhibition presentation is interesting	4.75	0.44
3.2 The online communication activities are engaging	4.73	0.47
3.3 The use of quiz-based games in the activities is engaging	4.69	0.46
3.4 The metaverse exhibition combined with communication activities is easily accessible	4.75	0.44
Overview	4.73	0.45
Summary	4.74	0.44

From Table 6, the evaluation of participants' satisfaction regarding the research on the development of a metaverse exhibition combined with communication activities to enhance digital information literacy on GO Green via the MCOT Facebook page shows that the overall satisfaction was at the highest level ($\bar{x} = 4.74$, S.D. = 0.44). The highest-rated aspect was content, with a mean score at the highest level ($\bar{x} = 4.75$, S.D. = 0.43), followed by presentation, also at the highest level ($\bar{x} = 4.73$, S.D. = 0.45).

4. Discussion

The purpose of this study was to develop a metaverse exhibition combined with communication activities to enhance digital information literacy on GO Green via the MCOT Facebook page. The discussion of the results is as follows:

The survey of the target group revealed that the participants expressed a high demand for the development of a metaverse exhibition combined with communication activities to enhance digital information literacy on GO Green via the MCOT Facebook page across Thailand ($\bar{x} = 3.91$, S.D. = 1.26). This finding aligns with the study by Chinnak, K., et al. (2024), who investigated the development of media to promote cultural tourism in the old town area of Ubon Ratchathani Municipality. In that study, 70 young tourists were surveyed using questionnaires, semi-structured interviews, and focus group discussions, and the data were analyzed using percentages, means, and descriptive analysis. The results showed that the participants also demonstrated a high demand for tourism promotion media.

The development of the metaverse exhibition, combined with communication activities to enhance digital information literacy on GO Green on the MCOT Facebook page across Thailand, was structured with the following content scope:

a. Accessing digital information literacy – Basic digital information literacy on GO Green.

- b. Evaluating digital information literacy – Assessing the credibility and relevance of GO Green information.
- c. Using digital information literacy – Applying the acquired GO Green information effectively.

The research team applied the ADDIE Model by Kurt, S. (2018) as a guiding framework for planning and designing the project. This model was used to structure the workflow, design the exhibition components, and ensure that all elements were accurate, appropriate, clear, and easily understandable.

1. Analysis: Involves analyzing content or requirements.
2. Design: Involves interpreting the data obtained from the analysis and designing the content and communication activities to enhance awareness, including defining the scope of content and the layout of components.
3. Development: Involves determining the content and designing activities according to the set objectives and then creating or developing the designed materials. The media prototype was first presented to the advisor for review and revised to ensure appropriateness. Subsequently, it was evaluated by three content experts and three presentation/media experts. Revisions were made based on the suggestions from both groups of experts. In terms of content, adjustments were made to ensure suitability, including the creation of summary infographics with accompanying images to enhance clarity and understanding. For the media aspect, adjustments were made to the font size and the layout of the text to enhance readability.
4. Implementation: refers to the stage of disseminating the designed and developed media on the MCOT Facebook page. This phase involves testing the effectiveness of the media with a sample group of 100 participants who willingly engaged in the activities and completed the questionnaires. Taro Yamane's formula was used with a $\pm 10\%$ margin of error, as the population was known and the study focused on practical design rather than large-scale data collection.
5. Evaluation refers to the stage in which the results are analyzed using statistical methods and summarized. This aligns with the study by Princhankol et al. (2024), which developed an electronic book with summary infographics to be published on the Google Site for the Presentation Skills course. The study found that the development of the media set applied the 5-step ADDIE Model in its design and development as follows: 1) Analysis, 2) Design, 3) Development, 4) Implementation, and 5) Evaluation. These steps resulted in media that is engaging, visually distinctive, modern, and clearly conveys meaning. Similarly, the metaverse exhibition, combined with communication activities to enhance digital literacy about GO Green via the MCOT Facebook page, applied the ADDIE Model in its design and development. This approach ensured the media was of high quality, with easily understandable content and aesthetically pleasing graphics, which satisfied the audience. This finding aligns with the study by Konkrathok, P. et al. (2025) on using the ADDIE Model to produce digital content on TikTok through a service-learning approach. The content development was conducted using the ADDIE Model framework, resulting in 10 content clips on TikTok and one communication activity. Experts evaluated the media and activity and found that the content quality was at a very good level. The researchers suggested that the use of the ADDIE Model to develop digital content on the online platform is effective and practical.

The evaluation of the media quality by content experts for the research on developing a metaverse exhibition combined with communication activities to enhance digital literacy about GO Green via the MCOT Facebook page revealed that, when compared with the established criteria, the overall quality was rated as good ($\bar{x} = 4.33$, S.D. = 0.70), supporting the initial hypothesis. The researchers applied infographic design principles in the layout and arrangement of components, which enhanced comprehension, memorability through visuals and colors, and enabled the presentation of information in various formats. These factors increased the engagement and attraction of the target audience. This finding aligns with the study by Chiengkham et al. (2014) on the development of a 3D virtual exhibition about social and cultural development in Thailand at the Princess Maha Chakri Sirindhorn Anthropology Centre (Public Organization), where the overall content quality was also rated good ($\bar{x} = 4.12$, S.D. = 0.66). Similarly, the evaluation of the media quality by presentation experts for the same research showed an overall rating of good ($\bar{x} = 4.44$, S.D. = 0.50), consistent with the hypothesis. The infographic-based design was engaging, easily accessible, and comprehensive. The metaverse exhibition facilitated easier understanding of the content, aligning with the study by Kanchulee, K. (2024) on learning innovation development using the Gather Town metaverse platform in a network of small schools and border patrol schools, where the media presentation quality was also rated good ($\bar{x} = 4.43$, S.D. = 0.70). And in both of these aspects, the findings are consistent with the study by Bae, H.K., et al. (2024). The findings revealed that the content component was closely associated with child development, highlighting the importance of creativity and active learning while leveraging technology to enhance engagement within the Metaverse. This approach enabled children to participate more enthusiastically through diverse activities encompassing exploration, creation, problem-solving, and reflection. In terms of presentation media, the results indicated that the highly realistic and interactive format effectively supported active learning and fostered learners' motivation and interest in the educational content.

The evaluation of the participants' perception after studying the development of a metaverse exhibition, combined with communication activities to enhance digital literacy about GO Green via the MCOT Facebook page, revealed the following results. The pre-test, with a full score of 100, showed that participants had a mean score of 41.51 with a standard deviation of 10.98. After engaging with the metaverse exhibition and related communication activities, the post-test scores, also out of 100, showed a mean of 93.28 with a standard deviation of 4.60. Statistical analysis using a t-test yielded $t = 42.56$, confirming the hypothesis. These results indicate that the metaverse exhibition, combined with communication activities, designed with clear graphics and text to attract attention, effectively enhanced participants' knowledge and understanding of the GO Green digital literacy content. This finding aligns with the research of Kasetiam, N., et al. (2023), who studied the development of online lessons using a metaverse approach combined with active learning for a technology problem-solving course for grade 3 secondary students. Their study found that students' post-test achievement was significantly higher than pre-test scores at the .05 level. Furthermore, GO Green content represents highly important digital information literacy that is both nationally and internationally relevant. As the Mass Communication Organization of Thailand serves as the primary media agency in Thailand, it has a policy to promote awareness of this issue widely and continuously to Thai audiences through its various platforms. (MCOT, 2025). It is also consistent with the study by Setiawan, W., et al (2024). The findings suggested that learning media within the Metaverse can substantially enhance learner engagement and experiential learning by enabling real-time interaction with digital content and experimentation within diverse simulated environments. Moreover, the adoption of Metaverse technology fosters greater flexibility and accessibility in learning processes. Its integration into educational contexts further contributes to the advancement of pedagogical practices and educational management, rendering them more innovative, adaptive, and effective.

The evaluation of participants' satisfaction with the metaverse exhibition, combined with communication activities to enhance digital information literacy about GO Green on the MCOT Facebook page, revealed the highest level of satisfaction ($\bar{x} = 4.74$, S.D. = 0.44), which supports the research hypothesis. This highest level of satisfaction is attributed to the metaverse exhibition and communication activities being easy to understand and highly accessible. These findings are consistent with the study by Piyanaraphiboon, K., et al. (2023), who investigated the development of e-learning media via the metaverse to enhance computational thinking skills for grades 1–3. Their program included instructional media, learning games, and 12 practice exercises. The post-use satisfaction assessment showed a mean score of 4.50, also at a very high level. It is also consistent with the study by Park S., & Kim S., (2022). The findings revealed that virtual worlds incorporating game mechanics—such as points, rewards, and missions enhance learners' engagement and enjoyment. Elements of interaction and challenge contribute to emotional satisfaction and deeper learning experiences, while higher levels of satisfaction are positively associated with increased engagement and sustained learning outcomes.

Based on the results of the media design and development in this study, the outcomes aligned with the research hypotheses. Most studies on metaverse exhibitions indicate that the application of technologies such as VR/AR, 3D virtual environments, blockchain, and AI can transform traditional exhibitions into an immersive experience.

In this immersive environment, visitors can: interact actively with the content (interactivity), access the exhibition anytime and anywhere (ubiquity), and create new social dimensions, including learning and communication, as well as opportunities in the creative economy. These findings are consistent with the study by Boonlue, S. (2020), who proposed an interesting idea that the rapid advancement of digital technologies and the internet have disrupted traditional ways of living, working, and learning, leading to the emergence of the Metaverse—a boundless integration of the physical and virtual worlds. Through immersive technologies, individuals can engage in novel forms of commerce, education, and social interaction, while also exploring alternative identities. However, although virtuality offers new opportunities and experiences, it cannot wholly replace the authenticity of real-world engagement. Accordingly, this study employed innovative technological media in conjunction with communication activities to enable participants to experience a combination of virtual and real environment experiences, thereby fostering enhanced perception and comprehension.

Limitations

In this study, the free version of the Spatial.io program was used. Therefore, if researchers wish to use Spatial.io without limitations, additional costs would be required to upgrade to a paid version.

Suggestions

1. It is recommended to apply metaverse technology for promoting important information in educational institutions, such as campaigns on e-cigarettes, because this technology can provide an immersive experience to the audience, giving them a sense of participation and enjoyment, which facilitates easier understanding and retention of information.
2. In communication campaigns aimed at raising awareness, shaping attitudes, or influencing behavior among the target audience, in addition to using technological media, communication activities such as quizzes and games should be included. These activities, along with incentives or rewards, help stimulate interest and increase

engagement with the target audience on online platforms.

3. The topic of digital information literacy on GO Green is important and has become an international trend. Therefore, key organizations or agencies, such as educational institutions and mass communication organizations, should continuously disseminate this digital content to the public to promote awareness, attitudes, and behaviors on a broad scale.

Acknowledgments

Not applicable.

Authors contributions

Srisutitada, P., was responsible for study design, media production, data collection, and drafted the manuscript. Thamwipat, K., and Princhankol, P. were responsible for revision. All authors read and approved the final manuscript.

Funding

Not applicable.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Redfame Publishing.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

Open access

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

References

- Bae, H. K., Kim, H. Y., & Lee, T. (2024). Metaverse adoption: A Systematic Literature Review. *International Journal of Contemporary Education*, 7(2), 15-28. https://doi.org/10.1007/978-3-031-61163-6_2
- Bio-Circular-Green Economy. (2024). The "Go Green" Investment Trend Encourages Thai Entrepreneurs to Embark on the Path to Sustainability. <https://bcg.in.th/news/go-green/>
- Boonlue, S. (2020). Metaverse for Education: The Connection between the Metaverse with the Real World of Learning to Create Immersive Learning. *Academic Journal of North Bangkok University*. 11(1), 9-16. <https://so01.tci-thaijo.org/index.php/NBU/article/view/258310>
- Chatmueangphak, N. (2009). Organizing an Exhibition. Kroobannok. <https://www.kroobannok.com/6709>
- Chiengkham, R., Nilsook, P., & Wannapiroon, P. (2014). The 3D Virtual Exhibition about the Social and Cultural Development in Thailand, Maha Chakri Sirindhorn Anthropology Centre. *Technical Education Journal, King Mongkut's University of Technology North Bangkok*, 5(2), 85-93. <https://ojs.kmutnb.ac.th/index.php/jote/article/view/3215/2512>
- Chinnak, K., Srithong, P., & Suprit, M. (2024). Development of Media to Promote Old Cultural Tourism in Ubon

- Ratchathani Municipality. *Humanities and Social Sciences Journal, Ubon Ratchathani Rajabhat University*, 15(2), 275-289. <https://so01.tci-thaijo.org/index.php/humanjubru/article/view/276960>
- GreedisGoods. (2018). "What is a Likert Scale?" (The Likert Measurement). <https://surl.li/ayihpf>
- ICHI media. (2024). Technology Changes the World. <https://ichi-media.com/cutting/2024/02/23/2165/>
- iT 24 Hrs. (2024). What is the Metaverse? The Metaverse is a new way of life close to us. iT 24 Hrs. <https://it24hrs.com/2021/what-is-metaverse-how-to-connect-new-world-metaverse/>
- Kanchulee, K. (2024). The Development of a Learning Innovation on the Metaverse Gather Town platform in a network of Small and Border Patrol Police Schools: A Case Study "Adventure in Cleaning Land". *National Library Academic Journal*, 12(1), 55–68. <https://so04.tci-thaijo.org/index.php/nlt/article/view/273188>
- Kaewsomnues, A., Jirachai, P., & Thamwipat, K. (2023). Development of an E-exhibition in conjunction with a Game-based Learning Communication Activity. *Science, Engineering and Health Studies*, 17, 23040014. <https://doi.org/10.69598/sehs.17.23040014>
- Kasetiam, N., Roungrong, P., & Raungbundit, T. (2024). Development of an Online Metaverse Lesson using Active Learning approach Titled 'Technology for Solving Problems' in Design and Technology Course for 9th Grade Students. *Journal of Education and Innovation*, 26(1), 152-162. https://so06.tci-thaijo.org/index.php/edujournal_nu/article/download/262572/181433/1086099
- Konkrathok, P. Thamwipat, K., & Princhankol, P. (2025). Using the ADDIE Model to Produce Digital Content on TikTok through Service-learning Approach. 2025 SPUC National and International Conference. July 1, 2025, 24-37. <https://www.chonburi.spu.ac.th/spucon2025/>
- Kurt, S. (2018). ADDIE Model: Instructional Design - Educational Technology. [Educationaltechnology.net. https://educationaltechnology.net/the-addie-model-instructional-design/](https://educationaltechnology.net/the-addie-model-instructional-design/)
- Limitless Education. (2020). Gen Z Learners: Challenges for Thai Teachers. <https://www.shorturl.asia/gcYIL>
- Mahachulalongkornrajavidyalaya University. (2015). Item-Objective Congruence. <https://www.mcu.ac.th/article/detail/14329>
- MCOT. (2025). Business Overview of MCOT. <https://investor.mcot.net/th/corporate-info/business-overview>
- MCOT Throughout Thailand. (2024, Oct 10). MCOT Facebook page followers across Thailand: 27,000 people [Facebook post]. https://www.facebook.com/allmcot?locale=th_TH
- Mustoip, S., & Bae, H. K. (2024). Metaverse-based Learning Media Development. *International Journal of Contemporary Education*, 7(2), 20-30. <https://doi.org/10.1063/5.0235323>
- Nualnimnoi, J., Thamwipat, K., & Meejaleurn, S. (2022). The Development of Online Content Set with Interactive Communication Activity to Promote Fake News Literacy for Students. *Journal of Learning Innovation and Technology*, 2(1), 89-96. <https://so06.tci-thaijo.org/index.php/JLIT/article/view/257279/173269>
- Park, S., & Kim, S. (2022). Identifying World Types to Deliver Gameful Experiences for Sustainable Learning in the Metaverse. *International Journal of Contemporary Education*, 7(3), 45-60. <https://doi.org/10.3390/su14031361>
- Piyanaraphiboon, K., Jantima, S., & Suwannasri, P. (2023). E-learning Media through the Metaverse System to Develop Computational Skills of Students in Grades 1–3. *Science and Technology to Community*, 1(1), 1-12. <https://doi.org/10.57260/stc.2023.510>
- Princhankol, P., Thamwipat, K., Binsatera, T., & Niruttisart, T. (2024). The Development of Digital Content for Public RelationsLive Broadcast Programs on the Thai News Agency Live Platform. *RMUTP Research Journal Humanities and Social Sciences*, 9(2), 45-59. <https://so05.tci-thaijo.org/index.php/rmutphuso/article/view/274024/184405>
- Princhankol, P., Thamwipat, K., Klinhomkrun, K., Jongdamkeng, P., & Sansopa, P. (2024). The Development of an Electronics Book for Public Relations the Mellow Pop MCOT Streaming Platform on Google Sites. *Journal of Science and Technology, Southeast Bangkok University*, 4(2), 15-29. <https://ph02.tci-thaijo.org/index.php/JSCI/article/view/254697/171513>
- Rattanoubon, A. (2005). Principles for Enhancing Information Literacy for Thai Society. *Journal of Education Studies*, 34(2), 61-75. <https://doi.org/10.58837/CHULA.EDUCU.34.2.7>
- Thaipat Institute. (2015). Brundtland Commission Report. <https://www.thaicrs.com/2015/09/brundtland-report.html>
- Thamwipat, K., Pongpimol, P., Supinanont, P., & Princhankol, P. (2024). The Development of Digital Content in the Metaverse Combined with Participatory Communication and Learning with Religious Leader to Enhance Students'

- Perception of the Community Mosque. *International Education Studies*, 17(1), 58-68. <https://doi.org/10.5539/ies.v17n1p58>
- Thamwipat, K., Princhankol, P., Bantisak, C., & Binraman, P. (2024). The Development of Digital Content Kit for Public Relations of the Project “Paper-Cycle Separate, Exchange & New” on Social Media of MCOT Plc. *Journal of Mass Communication Technology, RMUTP Research Journal Humanities and Social Sciences*, 9(1), 39-56. <https://so05.tci-thaijo.org/index.php/jmctrmutp/article/view/266255/182715>
- Thamwipat, K., Princhankol, P., Waiyasil, H., Ngenjareanrung, C., & Srisutitada, P. (2024). The Development of Video Content Series Titled “Little Sports Tips” on the 9 Stadium Facebook Page. *Journal of Science and Technology, Southeast Bangkok University*, 4(2), 30-43. <https://ph02.tci-thaijo.org/index.php/JSCI/article/view/254696/171512>
- Thamwipat, K., Princhankol, P., Silawan, S., Chuatrakul, O., & Vicheansin, T. (2023). The Creation of Video Content for Public Relations Program Promotion Devision, MCOT Pcl., Using A Problem Agitate Solve Storytelling Technique. *Journal of Science and Technology, Southeast Bangkok University*, 3(1), 66-79. <https://ph02.tci-thaijo.org/index.php/JSCI/article/view/249895/169213>
- Thamwipat, K., Princhankol, P., Aeowjaroen, P., Preedakullaphat, P., & Suwanmanee, K. (2023). The Development of Digital Content in the Form of Photo Alblum for Publicizing Secondary City Tourism Attractions on the Online Platform of Backbone Mcot Page. *Siam Communication Review*, 22(2), 56-72. <https://so05.tci-thaijo.org/index.php/commartsreviewsiamu/article/view/269309>
- Thamwipat, K., Princhankol, P., Sueapoch, S., & Chirtawormanee, S. (2020). The Development of Content Set for Public Relations Communication Titled in MCOT Conservation of Royal Initiative on social media of MCOT Plc. *Siam Communication Review*, 19(2), 116-125. <https://so05.tci-thaijo.org/index.php/commartsreviewsiamu/article/view/248319/168554>
- Thamwipat, K., Princhankol, P., Kaongam, K., Waiwingrob, P., & Narkdang, P. (2021). The Development of Content Set for Public Relations on Social Media of MCOT Public Company Limited, Titled in Blood Donation “The More We Give, The More We Get”. *Journal of Science and Technology, Southeast Bangkok College*, 1(2), 39-52. <https://ph02.tci-thaijo.org/index.php/JSCI/article/view/244284/166121>
- Thamwipat, K., Princhankol, P., Paiboonnapapong, J., Patitas, C., & Pawatkongsin, T. (2015). The Development of Sticker Characters on Application Line Entitled “ASEAN” for Public Relations the Image of MCOT Public Company Limited. *Journal of Communication and Innovation NIDA*, 2(2), 155-184. <https://so02.tci-thaijo.org/index.php/jcin/article/view/47743/39630>
- TSIS Team. (2020). Sample size Determination Using a Ready-made Table. [thetsis.com. https://www.thetsis.com/post/research-tips-sampling](https://www.thetsis.com/post/research-tips-sampling)