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Enhancing Undergraduate Technology Students' Knowledge of Live Streaming Programs through Media and Communication Activities

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Abstract

This study aimed to investigate the needs of a sample group regarding the development of a live streaming program in conjunction with communication activities to enhance undergraduate students' knowledge of the vMix program, develop and evaluate the quality of the live streaming programs in conjunction with communication activities, assess the learning achievements of the sample group, and evaluate their satisfaction with the developed media and activities. The sample consisted of 80 undergraduate students from the Educational Communication and Technology program who were enrolled in ETM 202: Ad. and PR and had participated in at least one extracurricular activity of the Teen Healing program. Participants were selected using simple random sampling. Data were analyzed using means, standard deviations, and a paired-samples t-test. The findings revealed that the sample group demonstrated the highest overall level of need for the program. Based on these results, a 30-minute live streaming program and communication activities was developed. Expert evaluation of content and media quality rated the program at a very good level. Participants' post-test scores were significantly higher than their pre-test scores at the .05 level. This finding indicates an increase in scores following participation in the combined activities; however, the one-group pretest–posttest design does not establish that the developed media or communication activities alone caused the increase. Overall satisfaction was high.

Keywords: live streaming program, communication activities, vMix program, live broadcasting

1. Introduction

Current technology has transformed how information is shared, emphasizing digital presentations that is accurate and easily accessible. Converting data from analog to digital enables more efficient, faster, and more precise storage and transmission of information, which is crucial for connectivity in a rapidly developing world. Digital communication systems consist of senders, messages, media, and receivers, with the key difference being the "medium" that stores and transmits information digitally. The communication process must convert data into digital form and transform it back into its natural form when it reaches the receiver for accurate understanding. In an era of rapid scientific and technological change, mobile phones have become an essential part of teenagers' lives for communication, entertainment, and education. While providing convenience, inappropriate use may affect behavior, communication, and social relationships. Additionally, mobile phones are seen as symbols of social status among teenagers, reflecting a modern culture that emphasizes connectivity through technology. At the same time, live streaming is another popular technology that allows people to access information and content in real time without constraints, particularly in entertainment, education, and career development, especially among teenagers who are the primary users of this technology. The twenty-first century has witnessed unprecedented advancements in new media technologies, which have become deeply embedded in all aspects of contemporary society. As a result, new media literacy has emerged as a critical competency for effective participation in social, cultural, and civic life. Research indicates that literacy has evolved through several stages, including classical literacy, audiovisual literacy, digital literacy, information literacy, and, most recently, new media literacy. The latter is closely associated with the internet and media convergence, reflecting the increasing integration of digital platforms and content. New media literacy therefore constitutes a foundational skill for citizenship in the twenty-first century, equipping individuals with the knowledge and competencies necessary for meaningful and responsible participation in a rapidly evolving global society (Chen et al., 2011).

Live streaming is not only a source of entertainment but also offers income-generating opportunities and career paths, such as becoming an online DJ or Game Caster, which are just some of the many content creation options that attract viewers. Furthermore, live streaming is a lower-cost alternative to offline events and has the potential to connect with communities and audiences more effectively. In short, live streaming is an important tool that plays a significant role in connecting and sharing information in today's rapidly growing digital world. Live streaming has gained tremendous popularity, especially among Generation Z (ages 11-26), who tend to focus on valuable and meaningful content rather than advertising or product sales. To make communication through live streaming effective, emphasizing valuable content is crucial. Such content must be curated and planned to align with the needs and goals of Generation Z. Creating engaging live streaming content involves not just showcasing products but emphasizing benefits, features, and value clearly, such as demonstrating products in real situations or explaining product features in detail, which helps build trust and increases viewer interest. Additionally, choosing appropriate channels for communicating with Gen Z is important. Responding to Gen Z's needs in live streaming requires careful planning, focusing on creating valuable and interesting content, and selecting communication channels that match this group's preferences and behaviors. With communication technologies and live streaming having overcome many connectivity constraints and enabled large-scale content creation—especially in recent years—software and applications for live streaming have been continuously developed to meet users' needs and convenience, emphasizing tools that provide greater flexibility and control over media production. For example, the "Heal Teen Hearts" program, organized by the Department of Educational Technology and Communications, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi, leverages the knowledge and experience of its personnel to serve society through volunteer work, creating an edutainment-style talk show featuring professional hosts from MCOT Public Company Limited, teenage students, a team of experienced teachers in psychology and teaching, and seven parents. The 30-minute program is broadcast via Zoom and live-streamed on Facebook every Saturday from 21:00 to 21:30. Additionally, summary content is distributed on online platforms to provide long-term public benefit. Currently, the student production team of "Heal Teen Hearts" has been trained in the use of Zoom and OBS (Open Broadcaster Software).

Although OBS has high capabilities for live streaming and content creation, in terms of flexibility such as incorporating images, changing scenes, or adding lower third graphics during broadcasts, it may still be too complex and require more capable tools. In this context, vMix was selected as a digital production tool for the learning materials and communication activities developed in this study. Introducing vMix provided an opportunity for students to examine another approach to managing video and audio inputs, organising visual elements, and producing live streaming content. Rather than focusing solely on software operation, the learning activities were designed to connect explanations of production processes with examples and practical exercises. This approach was intended to help students understand the relationship between production tools and the communication requirements of a live streaming programme.

Promoting undergraduate students' knowledge of vMix software is important for developing their understanding of digital tools used in live streaming production and communication. Such knowledge enables students to explore how technology can be applied to create, manage, and disseminate communication content through online platforms. This need is particularly relevant to the "Heal Teen Hearts" programme, which has been broadcast live on online platforms using Zoom and OBS for more than two years. Building on this existing production experience, there is an opportunity to introduce students to vMix as an additional tool for live streaming production. Therefore, developing a live streaming programme together with communication activities was considered a way to provide undergraduate students with learning opportunities beyond regular classroom instruction. These activities were designed to introduce the use of vMix through programme-based learning materials, practical explanations, and promotional communication that could increase students' awareness of and access to the learning resources.

Although previous studies have addressed digital media literacy, learning media development, and communication activities, there remains a need to develop learning resources that connect live streaming production tools with practical learning activities in specific higher education contexts. In response to this need, this study focused on developing a live streaming programme and communication activities to enhance undergraduate students' knowledge of vMix software. Specifically, the study examined students' needs, evaluated the quality of the developed media and activities, compared students' knowledge before and after participation, and assessed their satisfaction with the learning experience.

2. Literature Review

2.1 New Media Literacy

Digital media literacy is not a separate construct from traditional media literacy but an extension that builds upon its core principles while integrating new concepts shaped by the networked nature of digital media. Many digital phenomena cannot be fully understood without the analytical foundations of traditional media literacy. Within a media education framework, digital media literacy encompasses the abilities to access and navigate digital environments,

critically analyze and evaluate media content, produce media using digital tools, and engage responsibly in online and offline communities. Rather than being limited to technical skills, it is understood as an educational practice that promotes critical thinking, ethical awareness, and reflective engagement with media in cultural, social, and civic contexts. New technologies and tools, video production, digital animation, transmedia navigation, and augmented reality etc. have created a need for new media literacies beyond traditional media literacy. Individuals need to become fluent in critically reading, assessing, and creating new media forms (Balaban-Sali, 2012). As digital media increasingly mediate learning, participation, and citizenship, integrating digital media literacy across curricula is essential for empowering learners as critical and informed participants in contemporary media-rich societies. In this context, the researchers, whose academic background is in mass communication technology, is therefore interested in examining digital media production practices using digital tools as a means of promoting participation within online communities.

2.2 The ADDIE Model

The ADDIE Model is a widely recognized systematic process used for designing and developing learning or training programs. It consists of five main steps: 1) Analysis - studying learner needs and learning goals, 2) Design - determining objectives, teaching methods, and evaluation approaches, 3) Development - creating content and learning materials according to the designed plan, 4) Implementation - applying the program in real situations and making appropriate adjustments, and 5) Evaluation - examining its effectiveness and making improvements. The ADDIE Model helps structure learning processes clearly and enhances their efficiency, making it suitable for use in both educational settings and organizational training programs. There have been research studies that applied the ADDIE Model in designing and developing quality learning media as follows: (Firda et al., 2022; Ranuharja et al., 2021). For these reasons, the researcher has applied this concept in designing and developing media and activities in this research.

2.3 Facebook

Facebook is an online social network platform that provides services through the internet. Facebook Live and Zoom Live each serve different purposes depending on your goals. Facebook Live is ideal for reaching a wide audience and engaging with them through real-time comments, likes, and shares, all without the need for additional downloads or memberships. It allows for unlimited viewers and easy access but lacks the privacy and control Zoom offers, making it less suitable for more private, interactive settings. On the other hand, Zoom is perfect for private events, meetings, and hybrid activities, offering closer connections and better control over participants. If you are looking for a public, open platform to increase awareness, Facebook Live is a suitable option, while Zoom is better suited for more intimate or professional engagements. In this context, live streaming programs refer to the "Heal Teen Hearts" program that was previously presented through live broadcasting via the OBS program on the Heal Teen Hearts Facebook page. Related research includes work by (Thamwipat et al., 2024a; Johnson et al., 2018). Therefore, such platforms can be effectively used for communication and public relations purposes, as is the case with this research.

2.4 Communication Activities

Communication Activities is a social mechanism aimed at creating and maintaining good relationships between organizations or agencies and the public or target groups. Public relations focus on building understanding and positive image for organizations, not limited to advertising or promoting sales of products and services only, but also includes clear communication about the reality of the organization and building good relationships. Related research includes work by (Gasten et al., 2025; Princhankol et al., 2023) interestingly discusses modern public relations approaches using technology: "Public relations (PR) is vital for building brand reputation and embracing new technologies is key to staying competitive. PR professionals must master tools like social media, live video, digital marketing, and AI. These technologies improve engagement, efficiency, and decision-making. This aligns with the academic work of (Nualnimnoi et al., 2022).

2.5 vMix

vMix is live video production software that can turn a regular windows computer into a professional video production studio. The software allows to mix together video and audio sources into a production which can be recorded, streamed and connected to a number of popular video production workflows. The output of vMix can be set up in standard definition (SD), high definition (HD), and even 4K. vMix accepts inputs in multiple formats, including cameras, capture devices, NDI (Network Device Integration) sources, video files, and even more advanced input sources such as SRT and RTSP live video streams (Richards, 2021). This program support multiple camera inputs, NDI sources, remote videos, images, audio, PowerPoint, virtual sets, and more, all of which can be streamed, recorded, and displayed simultaneously. vMix is ideal for events of any size, from multi-camera setups to single webcam productions. It supports live streaming to platforms like YouTube, Facebook, and Twitch and integrates external devices for enhanced content. With features like multi-camera support, high-quality video recording, and seamless integration of audio and graphics, vMix is essential for complex live productions. This software is crucial for creating diverse, high-quality content, making it a

valuable tool for digital knowledge promotion, especially for undergraduate students in technology programs. This is consistent with previous research (Todino & Sibilio, 2019; Zimmer et al., 2018). Educational institutions that offer mass communication programs should apply these findings to their digital media production curriculum, as this adaptation of live streaming in the digital era satisfies viewers and clients with cost-effective and modern approaches that are highly suitable for the current era.

2.6 Objectives of the Research

1) To survey the needs of the sample group regarding the development of live streaming programs combined with communication activities to enhance knowledge about vMix software for undergraduate students.

2) To develop and evaluate the quality of live streaming programs combined with communication activities to enhance knowledge about vMix software for undergraduate students.

3) To evaluate the learning outcomes of the sample group before and after watching live streaming programs combined with communication activities to enhance knowledge about vMix software for undergraduate students.

4) To assess the satisfaction of the sample group toward live streaming programs combined with communication activities to enhance knowledge about vMix software for undergraduate students.

3. Method

The study employed a one-group pretest–posttest design. The same group of students completed a knowledge assessment before and after participating in the live streaming programme and communication activities. As there was no comparison group, the design enabled the researchers to examine changes in scores within the group but did not allow the effects of the media to be separated from those of the workshop instruction, repeated testing, or other possible influences.

3.1 Scope of Study

3.1.1 Population and Sample

The population consisted of 99 second-year undergraduate students in Educational Technology and Communications who have previously participated in extracurricular activities of the "Heal Teen Hearts" program at least once. The sample group consisted of 80 undergraduate students in Educational Technology and Communications who had participated in these extracurricular activities at least once in academic year of 2025. The sample was selected using simple random sampling by drawing lots from participants who attended the public relations activities from the beginning to the end and were willing to complete the questionnaire.

3.1.2 Experts

This study involved nine experts selected through purposive sampling. They were divided into three groups according to their areas of expertise and responsibilities. The first group consisted of three content experts who evaluated the accuracy, relevance, and appropriateness of the content. The second group comprised three presentation media experts who assessed the quality of the presentation media, including its visual and audio elements. The third group consisted of three measurement and evaluation experts who examined the research instruments to establish their content validity using the Index of Item-Objective Congruence (IOC). All experts were selected based on their relevant academic qualifications, professional knowledge, and experience in their respective fields.

3.1.3 Research Instruments

The instruments used in the study "The Development of Live Streaming Programs with Communication Activities to Promote Knowledge of the vMix Program for Undergraduate Students" are as follows: 1) A survey of needs for the development of live streaming programs with public relations activities 2) Quality assessment forms into 2 aspects: content quality and presentation media quality 3) A learning outcome assessment form 4) A satisfaction assessment form. All research instruments had passed human research ethics evaluation with certificate number KMUTT-IRB-COE-2025-035, under the Exemption Review category. The research instruments were reviewed by three measurement and evaluation experts to examine their content validity using the Index of Item-Objective Congruence (IOC). All instruments obtained IOC values ranging from 0.85 to 1.00. In addition, the reliability of the research instruments was examined. The knowledge assessment form yielded a reliability coefficient of 0.841, while the satisfaction assessment form yielded a reliability coefficient of 0.873.

3.1.4 Data Analysis

The statistics used in this research include the arithmetic mean and standard deviation of the sample and t-test. The data obtained from quality assessment forms and satisfaction assessment forms were analyzed to calculate the mean score, which was then interpreted based on the following rating scale levels (Phothisarn, 2004): 4.51–5.00 = Very Good / The Highest, 3.51–4.50 = Good / High, 2.51–3.50 = Moderate, 1.51–2.50 = Low, and 1.00–1.50 = Very Low / Lowest.

4. Results

4.1 Results of Needs Assessment of the Sample Group

The results of the needs assessment for the development of live streaming programs with communication activities to promote knowledge of the vMix program for undergraduate students showed that the overall mean score across all sections is 4.80, with a standard deviation of 0.39. When compared to the established criteria, the overall need was at the highest level, as shown in Table 1.

Table 1. Summary of Needs Assessment Results from the Sample Group

Item	Assessment Analysis	
	$\bar{x}$	S.D.
1. Type of Media Desired		
1.1 A live streaming program no longer than 30 minutes on an online platform for undergraduate students	4.88	0.31
1.2 Digital media to promote knowledge of the vMix program for undergraduate students	4.91	0.28
Average	4.89	0.30
2. Type of Activities Desired		
2.1 Online activities via Zoom program to promote knowledge of the vMix program for undergraduate students	4.86	0.34
2.2 Onsite workshop activities to promote knowledge of the vMix program for undergraduate students	4.87	0.33
Average	4.86	0.33
3. Content Requirements for vMix Program	4.79	0.40
Average		
4. Program Presentation Requirements	4.77	0.41
Average		
Overall Assessment Average	4.80	0.39

4.2 Results of the Development

Pre- and post-development clips of the live streaming programs were presented in video format, with a total duration of 9.52 minutes, consisting of two clips comparing the development of live streaming using OBS and vMix. These clips were selected from live broadcast recordings and edited into short segments taken from the Facebook fan page, as shown in Figure 1.



Figure 1. Sample images comparing live streaming program development using OBS (A) and vMix (B)

The researcher conducted communication activities to enhance undergraduate students' knowledge of vMix software in an on-site format at the Department of Educational Technology and Communications for a duration of two hours, as shown in Table 2.

Table 2. The steps of communication activities to enhance knowledge about vMix software

Activity Implementation Steps	Activity Details
Step 1: Introduction	1. Self-introduction and briefed overview of the activity's background and importance.
	2. Students completed a pre-activity learning assessment.
	3. The instructor began with an ice-breaker by asking students about their basic knowledge and experience with OBS and vMix software.
Step 2: Instruction	4. Students listened to the lecture while viewing accompanying slides.
	5. Students watched two comparison clips (9.52 minutes each) showing before and after the development of live streaming programs using vMix software from the Facebook fan page: "Heal Teen Hearts".
	6. The instructor provided an explanation of the differences between the two programs (OBS and vMix) based on the video media that students have viewed.
	7. Students practice using the software and review what they have learned.
Step 3: Conclusion	8. The instructor and students jointly summarized the information and learning points.
Assessment	9. Students completed a post-activity learning assessment.
	10. Students completed a satisfaction survey regarding the activity.

4.3 Quality Assessment Results

After completing the development of the live streaming programme and communication activities to enhance undergraduate students' knowledge of vMix software, the developed materials were evaluated by six experts. This group consisted of three content experts and three presentation media experts. The content experts evaluated the accuracy, relevance, and appropriateness of the content, while the presentation media experts assessed the quality of the presentation media, including visual and audio elements, as shown in Table 3.

Table 3. Summary of Quality Assessment Results

Items	Analysis Results	
	$\bar{x}$	S.D.
Criteria for Content Quality Assessment		
1. Content	4.86	0.35
2. Language Use	4.80	0.41
Overall Average Assessment Result	4.83	0.37
Criteria for Presentation Media Assessment		
1. Images and Graphics	4.75	0.45
2. Audio	4.66	0.79
3. Program Presentation	4.66	0.79
4. Activity Presentation	4.75	0.45
Overall Average Assessment Result	4.69	0.46

Table 3 shows the results of the content quality assessment and the presentation media assessment for the development of the live streaming programs and the communication activities to enhance undergraduate students' knowledge of vMix software showed an overall mean score of 4.83 with a standard deviation of 0.37 for content quality, and an overall mean score of 4.69 with a standard deviation of 0.46 for presentation media quality. When compared with the established criteria, the overall quality was rated at a very good level.

4.4 Comparison of Learning Outcomes

Table 4. Comparison of Sample Group's Learning Outcomes Before and After Activities

Learning Assessment Results	n	Full Score	M	SD	t	df	Sig
Before participating in communication activities	80	20	5.88	2.55			
					10.36	79	0.000*
After participating in activities	80	20	16.24	4.85			

Note: *Statistically significant at the .05 level

Table 4 shows the learning outcomes of the sample group after participating in the communication activities and viewing the live streaming programs designed to enhance knowledge of vMix software were significantly higher than before participation. This difference was statistically significant at the .05 level.

4.5 Satisfaction Assessment Results

Table 5. Satisfaction Assessment Results of the Sample Group

Item	Analysis Results	
	$\bar{x}$	S.D.
1. Content Average	4.48	0.67
2. Visual and Audio Elements Average	4.45	0.69
3. Program Presentation Average	4.52	0.61
4. Activity Presentation Average	4.48	0.67
Overall Average Assessment Result	4.48	0.66

Table 5 shows the satisfaction assessment results of the sample group toward the live streaming programs and the communication activities designed to enhance knowledge of vMix software, revealing an overall satisfaction level at a high level, with an overall mean score of 4.48 and a standard deviation of 0.66. When considering each aspect—content, visual and audio elements, program presentation, and activity presentation—the satisfaction level was high across all four areas.

5. Discussion

The needs assessment results for the development of live streaming programs combined with communication activities to enhance knowledge about vMix software for undergraduate students showed that the need was at the highest level. This reflects that the sample group had a high demand for developing live streaming content along with promotional activities to enhance understanding of vMix software usage. The analysis results from the sample group's survey indicated that conducting live streaming programs through vMix software should be carried out in conjunction with on-site learning promotion activities to increase the efficiency of learning and practical training. Additionally, there was a comparison of usage between OBS and vMix software to enable learners to select appropriate software that meets their needs and objectives for digital media production efficiently. This aligns with the research by (Waiwingrob et al., 2023); the needs survey results found that the sample group wanted media development combined with activities to promote awareness at the highest level. Subsequently, the researcher used the survey results to design and develop digital content along with awareness promotion activities in the next phase. This study focuses on examining key issues related to new media, aligning with prior research by (Brown et al., 2025), which investigated the TikTok platform. Similarly, (Khoury & Hemsley, 2025; Butkowski & Corry, 2025) explored multiple social media platforms, including TikTok, BeReal, and Threads, while (Robles, 2025) examined content on the microblogging site X (formerly Twitter).

The researcher utilized the survey results to develop media and activities. The design and development of media along with activities in this research employed the ADDIE Model concept, which consists of 5 steps: Analysis, Design, Development, Implementation, and Evaluation. The materials were then submitted to experts for content and presentation media quality assessment. The research findings show that a 30-minute live streaming program was developed along with promotional activities to enhance knowledge about vMix software. The content quality and the presentation media quality assessment by experts was at a very good level. The high assessment results from experts were attributed to the easy-to-understand and concise presentation design, the use of diverse graphics and media to enhance interest, clear and systematic narration, as well as the functions of vMix software that facilitated smooth production with high quality, resulting in more professional content. This aligns with the research by (Kongsuwan et al., 2021), developed media and promotional activities were evaluated by experts. The expert evaluation results showed that the content quality and the presentation media quality assessment was at a very good level. This is also consistent with the research by (Prommapun & Jarueksi, 2020). In conclusion, the developed media appeared to support students' interest and engagement in learning.. Therefore, instructors should continually develop new supplementary learning materials to consistently maintain learners' interest. Although the present study also recorded higher post-activity knowledge scores, the expert ratings should be interpreted as evidence of the perceived quality of the materials, rather than evidence that the materials themselves caused an improvement in students' knowledge.

It was found that the average scores of knowledge assessment after participating in the activities were significantly higher than before participation at the statistical significance level of .05. This aligns with the research by (Krailas et al., 2024) and the research by (Laisakorn et al., 2024). These research findings showed that the awareness assessment results of the sample group after viewing the media and participating in activities were significantly higher than before viewing, with a statistical significance level of .05. This also corresponds with the public relations concept of (Thamwipat et al., 2024b). Therefore, the use of media and activities for public relations can effectively promote information perception among the sample group.

The satisfaction assessment of the development of live streaming programs with communication activities to promote knowledge of the vMix program for undergraduate students shows that the sample group has a high level of satisfaction

with the live streaming program integrated with public relations activities to promote knowledge about the vMix program. This indicates that the sample group was satisfied with the presentation format, content, and effectiveness of the developed program. This aligns with the findings of this study, which show that live streaming presentation formats can attract viewers' attention and help learners understand content more deeply. This also corresponds with research by (Wajasat, 2014), which found that live broadcasting by organizations with modern technology support, combined with personnel who have high digital skills, can create satisfaction for viewers and television stations as service providers, while also meeting the needs and satisfaction of the station's live broadcast time renters. Therefore, developing personnel skills to keep pace with modern technology is a top priority for organizations. This is consistent with the concept describing vMix as a powerful live broadcasting software that enables professional-quality productions on a computer. Because the learners belong to Generation Z, who have an affinity for new technology, they are satisfied with media promoting awareness about the vMix program. Generation Z is often characterized as digital natives, possessing advanced digital literacy and technological proficiency due to their upbringing in an era of rapid technological advancements, widespread internet access, smartphones, and various digital platforms. Given that current trends in new media research largely emphasize the study of engaging content creation on online platforms and social media, as evidenced by studies such as (Salamon et al., 2026; Sujon et al., 2025; Thomas & Talbot, 2025; Tran et al., 2025; Wasike, 2025; Wood, 2025), these works represent recent scholarship published in Scopus Q1 journals. Accordingly, contemporary research agendas should prioritize online platforms, social media, and emerging technologies that facilitate content production and dissemination in digital environments. Such a focus not only aligns with prevailing scholarly trends but also enhances the relevance, timeliness, and academic contribution of the research. Therefore, higher education institutions should promote teaching and learning about new-era technologies to accommodate the challenging changes in the labor market for Gen Z individuals.

Several limitations should be noted. The one-group pretest–posttest design without a comparison group prevents attributing the increase in knowledge scores solely to the programme or communication activities. The immediate post-test also provides no evidence of long-term retention or practical application. In addition, participants' prior involvement in the Heal Teen Hearts programme may limit the generalisability of the findings. Future studies should include comparison groups, delayed assessments, and practical performance measures.

6. Conclusions and Recommendations

This study investigated students' needs and developed a vMix-based live streaming programme with communication activities. Experts rated the content and presentation media quality at a very good level, while students reported high satisfaction. Knowledge scores were significantly higher after participation. However, the one-group pretest–posttest design does not establish that the programme alone caused this improvement. The findings suggest its potential as a supplementary learning resource, although further research using comparison groups and delayed assessments is needed.

6.1 Recommendations for Implementing the Study Results

1) Live streaming programs currently being broadcast by the institution can adopt the format developed from this research for actual broadcasting. This would enhance the digital media production skills of students and institutional personnel, leading to further expertise.

2) The course ETM 202 Advertising and Public Relations can upload the learning materials from this research to the course's Google Site to serve as resources promoting digital skills for undergraduate students, allowing them to access and review the knowledge at any time.

3) Educational institutions can conduct promotional activities for their curricula by leveraging their strengths in digital learning technology through workshops to promote knowledge of vMix software for developing live streaming programs. These workshops could target high school students or equivalent who wish to further their studies during holidays, using the media and activities designed and developed in this research.

6.2 Recommendations for Future Research

1) A comparative study of the effectiveness of vMix software and other software solutions such as OBS, Wirecast, or XSplit should be conducted in order to draw more comprehensive conclusions for the development of live streaming programs.

2) Future studies should use a comparison group or alternative research design to distinguish the contribution of the live streaming materials, instructor-led workshop, and hands-on practice. Delayed post-tests and practical performance assessments are also recommended to examine knowledge retention and the application of vMix skills in live-streaming production.

3) An analysis of the factors influencing the successful use of live streaming in educational contexts should be carried

out, including technical factors, learner engagement factors, and presentation format factors. Such analysis could support the development of engaging, technology-enhanced learning formats that are suited to learners in the digital era.

Declaration of the Use of Generatve AI

During the preparation of this manuscript, the authors used ChatGPT to assist with language editing and polishing of the draft. The tool was used solely to improve clarity, grammar, and overall readability. The authors reviewed and revised the output as necessary and take full responsibility for the content of the manuscript.

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Author Contributions

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

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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.

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