

The Development a Three–Language Online Electronic Comic Book Series Called “The Amazing Phetchaburi” (Chinese, English, and Thai)

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Abstract

This article aimed 1) to create the three–language online electronic comic book series “The Amazing Phetchaburi” (Chinese, English, and Thai); 2) to assess the quality of the series, which was available in three languages; and 3) to evaluate user satisfaction with the series. The sample consisted of 419 participants, including learners, academics, and tourists, drawn from a population of 423 individuals interested in Phetchaburi craft guilds. They were selected using purposive sampling and Yamane’s formula with a margin of error of 0.05. The instruments for collecting data were a trilingual e–comic prototype, an expert evaluation form, and a user satisfaction questionnaire. Data were analyzed using descriptive statistics and content analysis. The research results were as follows: 1) The trilingual online e–comic was effectively developed into seven episodes. It incorporated Phetchaburi’s cultural heritage, including stucco, wood carving, banana–stalk carving, and painting, into a fantasy–adventure narrative presented in a digital format accessible on multiple devices. 2) Five experts evaluated the e–comic from seven different angles (usability, content and storyline, language, illustrations, color and typography, character design, and values/benefits) and assigned an overall score of 4.22 with a standard deviation of 0.53, indicating high quality. 3) The trilingual online e–comic showed a consistently high level of satisfaction across all measured dimensions among the 419 participants. These findings suggest that trilingual e–comics serve as an effective tool for preserving and promoting cultural heritage while enhancing user engagement through digital storytelling.

Keywords: Trilingual E–Comic; Cultural Heritage; Instructional Design; User Experience

Introduction

In the twenty-first century, digital technology and educational innovation have served as the primary drivers of rapid transformation, significantly influencing the evolution of learning environments and the dissemination of knowledge (Brahmawong, 2002). Nevertheless, scholars and practitioners persist in questioning the preparedness and suitability of deploying new technologies within real-world educational settings, despite this advancement. Recent studies have demonstrated the significance of aligning educational media with contemporary learning behaviors, especially among younger populations, to ensure relevance and foster engagement (Clark & Mayer, 2016; Damjub, 2023). Furthermore, government agencies and educational authorities have underscored the significance of foreign language acquisition (Department of Academic Affairs, Ministry of Education, 2002), highlighting its importance in fostering intercultural understanding, enhancing employment prospects, and improving communication skills. Nonetheless, a considerable research gap persists in the convergence of cultural heritage, digital technology, and trilingual education, especially concerning the transmission of indigenous wisdom. The primary factors contributing to the rapid transformation of the twenty-first century are innovative pedagogical methods and advancements in digital technology. This modification has significantly influenced the intelligence and learning capabilities of individuals (Brahmawong, 2002). Researchers and educators continue to examine the safety and suitability of implementing new technologies in actual classroom settings, despite these advancements. Recent studies indicate that educational media must be tailored to align with contemporary pedagogical approaches, particularly for younger learners, to remain pertinent and maintain their engagement (Clark & Mayer, 2016; Damjub, 2023). Furthermore, governmental agencies and educational establishments have highlighted the importance of acquiring foreign languages (Department of Academic Affairs, Ministry of Education, 2002), emphasizing their role in promoting intercultural understanding, improving employment opportunities, and enabling effective communication. Research on the integration of cultural heritage, digital technology, and trilingual education remains limited, especially concerning the dissemination of indigenous knowledge. The study focuses on Phetchaburi Province, Thailand, renowned for its extensive artistic and cultural heritage, encompassing painting, banana-stalk carving, wood carving, and stucco craftsmanship. These traditional crafts are of considerable worth; however, their transmission across generations is becoming increasingly challenging due to the rising prevalence of digital lifestyles and subsequent generational shifts (Thanarotrungreang, 2019).

The researchers possess extensive expertise in language instruction and the study of indigenous cultures. Researchers recognized the necessity of developing innovative and engaging methods to educate young adults aged 18 to 30, as they are vital to maintaining positive perceptions of creative media and cultural education. Consequently, subsequent research ought to aim to broaden the participant demographic of the trilingual online electronic comic book series *The Amazing Phetchaburi* to encompass a wider age spectrum, given that the current investigation was limited to a specific demographic cohort. The study focused on cultural awareness and the preservation of heritage. Previous research indicates that e-learning and digital media have the potential to enhance learner engagement (Damjub, 2023); nonetheless, there is a deficiency of scholarly inquiry into the sustainable and accessible incorporation of trilingual language acquisition alongside cultural capital.

The findings are anticipated to enhance academic discourse by demonstrating how digital media can connect language education with cultural preservation, while also providing societal benefits through improved accessibility and fostering a greater understanding of diverse cultures.

Research Objectives

1. To create the three-language online electronic comic book series "The Amazing Phetchaburi" (Chinese, English, and Thai).
2. To assess the quality of the "The Amazing Phetchaburi" online electronic comic book series, which is available in three languages (Chinese, English, and Thai).
3. To evaluate user satisfaction with the "The Amazing Phetchaburi" three-language online electronic comic book series (Thai, English, and Chinese).

Literature Review

1. Models of Instructional Design for the Creation of E-Books

The development of effective e-learning resources is frequently based on instructional design models. The ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) is a widely used framework for the design of instructional media, including e-books. Content developers are able to align learning objectives with learner requirements through multimedia, text, and interactive elements as a result of the systematic process, which guarantees accountability and adaptability at each stage (Branch, 2009). The ASSURE model (Smaldino, Lowther & Mims, 2018) similarly underscores the importance of integrating technology with

learner-centered instruction. The model emphasizes the importance of analyzing learner characteristics, selecting appropriate media, and requiring active learner participation. Research has demonstrated that both ADDIE and ASSURE offer dependable guidelines for the development of instructional media that enhance learner engagement and effectiveness (Clark & Mayer, 2016). Although these models are acknowledged in e-book development, few studies explore their potential in creating trilingual digital comics that blend cultural heritage and language education.

2. The Creation of Comics as Educational Media

For an extended period, comics have been acknowledged as potent instruments for visual narrative, as they integrate text and images to improve comprehension and engagement (McCloud, 1993). Careful planning, scriptwriting, paneling, and graphic design are all necessary for the systematic production of comics to guarantee that the content is accurate, coherent, and age-appropriate. The procedures detailed by Vimonchandra (2006) prioritize plot structure, character development, and scene-setting, while Isaramongkolphan (2014) emphasizes practical steps such as scene design, panel sequencing, and script drafting. Additionally, recent research indicates that comics have the potential to promote multiliteracies, increase learner motivation, and facilitate both entertainment and education (Damjub, 2023; Lankshear & Knobel, 2008). However, the majority of current research has concentrated on monolingual or bilingual comics, resulting in a dearth of research on trilingual formats that fulfill both linguistic and cultural objectives.

3. E-Comics and Cultural Preservation

In the digital era, e-comics have been increasingly employed to encourage the acquisition of cultural knowledge in conjunction with language learning. Research suggests that digital comics can enhance learner motivation, increase reading comprehension, and provide flexible access to knowledge (Mayer, 2020). In Thailand, research has drawn attention to the importance of incorporating local cultural heritage into contemporary learning platforms to guarantee its sustainability for future generations (Thanarotrungueang, 2019). E-comics are widely acknowledged as innovative learning aids, but few empirical studies have systematically investigated their efficacy in preserving local wisdom and cultural capital while simultaneously promoting the development of multilingual languages. The present study underscores a knowledge deficit in the current literature that exists at the intersection of technology, language pedagogy, and cultural preservation.

In summary, the literature review indicates that the ADDIE and ASSURE models offer robust frameworks for the development of instructional media, while comic production theory

provides methodological foundations for effective visual storytelling. The value of e-comics for cultural engagement and learning has been emphasized in previous research; however, the integration of trilingual content with local cultural heritage has not been adequately addressed. This study addresses the disparity by utilizing instructional design theories and comic production principles to create a trilingual online e-comic (*The Amazing Phetchaburi*) that is designed to promote language learning and cultural preservation among young audiences.

Conceptual Framework

This research is a developmental study that focuses on the creation and evaluation of a trilingual online electronic comic book series entitled “*The Amazing Phetchaburi*” (Chinese, English, and Thai). The researcher defines the research conceptual framework based on the principles of instructional design theory (ADDIE and ASSURE models) together with concepts of comic production and cultural preservation. These perspectives were synthesized to guide the design, development, and implementation of the trilingual e-comic as an innovative learning medium. The details are as follows:

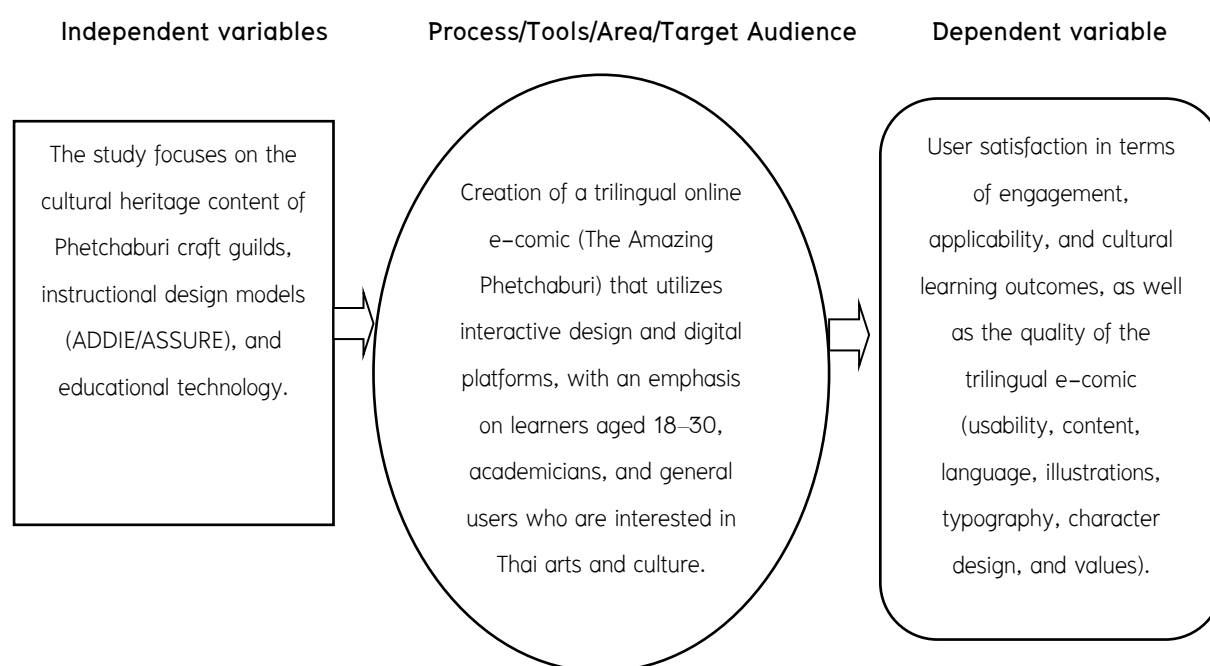


Figure 1 Conceptual Framework

Research Methodology

This study focused on the development of a three-language online electronic comic book series titled “The Amazing Phetchaburi” (Chinese, English, and Thai). A mixed-methods research design—integrating both quantitative and qualitative approaches—was employed to ensure comprehensive development, evaluation, and analysis. The research process was organized into five systematic stages: (1) population and sample, (2) research instruments, (3) instrument development, (4) data collection, and (5) data analysis.

1. Population and sample

The population consisted of 423 individuals who were interested in Phetchaburi craft guilds and the trilingual online e-comic (Thai-English-Chinese). The population was divided into three groups:

1.1 Learners (n = 388): 117 English majors, 200 Thai (B.Ed.) majors, 71 Chinese (B.Ed.) majors, and students from the Faculty of Humanities and Social Sciences.

1.2 Participants included academics and the broader public (n = 15).

1.3 Foreign nationals and tourists (n = 20).

A purposive sampling technique was employed as part of the research methodology in the step of selecting participants. The inclusion criteria were as follows:

- (i) interest in Phetchaburi artisan guilds, and
- (ii) willingness to use the trilingual e-comic in a preferred language.

The sample size was determined using Yamane’s (1973) formula:

$$n = \frac{N}{1 + Ne^2} = \frac{423}{1 + 0.05^2} = 419$$

With $N=423$ and $e=0.05$, the minimum sample size required was approximately 419 participants.

2. Research Instruments

2.1 The development of a three-language online electronic comic book series titled “The Amazing Phetchaburi” (Chinese, English, and Thai)—a digital publication encompassing stucco, wood carving, banana-stalk carving, and painting presented as an interactive e-book accessible on multiple devices with a three-language toggle feature.

2.2 Quality Evaluation Form—5-point rating scale across seven dimensions: (1) Usability, (2) Content & Storyline, (3) Language Appropriateness, (4) Illustrations & Graphics, (5) Color & Typography, (6) Character Design, and (7) Values & Benefits; completed by experts in educational technology, arts & culture, and language.

2.3 The User Satisfaction Questionnaire is a five-point Likert scale that is divided into three components: educational and cultural value, satisfaction with content/format/system, and respondent profile.

Content validity was verified using the Index of Item–Objective Congruence (IOC), assessed by at least three experts. Items with an IOC of ≥ 0.50 were retained.

3. Instrument Development

(A) Development of the e-Comic

Content framework: The narrative follows a fantasy–adventure theme integrating semi-academic content on Phetchaburi crafts.

Script writing: Concise, age-appropriate dialogues with trilingual vocabulary and cultural annotations.

Comic format: Graphic novel style with interactive navigation, multilingual switching, and vibrant Thai-inspired color schemes.

Plot design: Master Phet guides the protagonists *Tontan* and *Tonnam* through journeys of discovery, learning, and heritage preservation.

Graphics and digital system: Developed as an interactive e-book with sound, animations, and cross-platform compatibility.

Expert Reviews and Revisions:

Content validation: Conducted through IOC analysis (≥ 0.50) by specialists in Phetchaburi arts, trilingual communication, and educational technology.

Graphic validation: Art and culture experts reviewed authenticity; child development and educational media experts ensured appropriateness for youth.

Technical validation: Assessed device compatibility, multimedia rendering, UX design, and interface stability.

(B) Development of the Evaluation Instruments

Indicators were aligned with research objectives and seven quality dimensions. Instruments used a 5-point scale with categories from “Very Good” to “Needs Improvement.” Expert IOC reviews and iterative revisions ensured content validity.

4. Data Collection

4.1 Review of the background

Relevant documents, manuals, and prior studies on instructional media design, Thai arts and culture, and the Phetchaburi craft guilds were reviewed to establish a theoretical foundation for the development of the trilingual online e-comic.

4.2 Expert consultation and prototype design

Experts in content, graphic design, and language reviewed the initial concepts. The process included defining the plot and academic content, designing characters and scenes, preparing manuscripts and storyboards, and developing a preliminary prototype.

4.3 Expert quality review

The quality of the prototype was verified by experts. The Index of Item–Objective Congruence (IOC) was calculated to ensure content validity, and revisions were implemented accordingly.

4.4 Determination of the population and sample

A purposive sampling method was explicitly integrated into the data collection process to recruit participants meeting the inclusion criteria.

The population ($N = 423$) was divided into three groups (learners, academics/public, foreign participants), with a final sample size of approximately 419 determined via Yamane's formula.

4.5 Pilot testing

A pilot test was conducted with 30 learners who evaluated the preliminary version of the e-comic. Feedback on engagement, accuracy, comprehension, and suggestions for improvement was collected and analyzed to enhance the final version.

4.6 Field administration

The finalized e-comic was distributed to the selected sample groups. Participants completed both the quality evaluation form and satisfaction questionnaire (5-point Likert scale).

4.7 Data management

All collected data were coded, checked for completeness, and organized for statistical analysis.

5. Data Analysis

Descriptive statistics, including the mean ($\bar{x}$), standard deviation (SD), and percentage. Items with an IOC of 0.50 or higher are retained.

Ethical considerations: Prior to participating, all participants were provided with study information and provided informed consent. Participants were permitted to withdraw at any time without incurring any penalties, and no personally identifiable information was collected. This approach ensured that the study adhered to ethical standards while maintaining participant autonomy. Additionally, the data collected were analyzed in accordance with established guidelines to ensure validity and reliability of the findings.

Research Results

The three objectives of this study—the development of a three-language online electronic comic book series titled "The Amazing Phetchaburi" (Chinese, English, and Thai) —were as follows: (1) To create the three-language online electronic comic book series "The Amazing Phetchaburi" (Chinese, English, and Thai). (2) To assess the quality of the "The Amazing Phetchaburi" online electronic comic book series, which is available in three languages (Chinese, English, and Thai). (3) To evaluate user satisfaction with the "The Amazing Phetchaburi" three-language online electronic comic book series (in Thai, English, and Chinese). The results are summarized below. A sample of the book cover is presented in Figure 2.



Figure 2 Cover page of “The Amazing Phetchaburi” trilingual e-comic

Objective 1. The results showed that the trilingual online comic series “*The Amazing Phetchaburi*” (Chinese, English, and Thai) was successfully developed by integrating contemporary instructional technology with Thai cultural content. The final product consisted of a seven-episode fantasy-adventure narrative that effectively conveyed knowledge of Phetchaburi’s cultural heritage through engaging storylines and character interactions. The e-comic simultaneously provided content in three languages—Chinese, English, and Thai—thereby enhancing its accessibility for both domestic and international audiences. The development process adhered to a systematic workflow, ensuring accuracy of cultural content, appropriateness of language for the target group, and suitability of the visual design for digital platforms. The results are presented in Table 1.

Table 1 E-comic development workflow summary with ADDIE and ASSURE Model

Step	Input	Process	Output	ASSURE Integration
1. Define the content framework	Learner/context analysis; interviews with local experts; scholarly sources; historical documents	Analysis: investigate learner characteristics, learning context, objectives, and essential content; analyze–synthesize key concepts and scope learning outcomes	A content framework aligned with objectives that encompasses local wisdom, culture, and the arts	A – Analyze learners: Identify target learners’ background, prior knowledge, cultural context, language proficiency, and digital readiness.
2. Designing the script and plot	Approved content framework and learning objectives	Design: organize the plot (beginning–middle–end); map learning points to scenes/characters; draft trilingual dialogues; plan multimedia use and activities	A coherent, complete script/plot that aligns with objectives and embeds learning points	S – State objectives: Clearly define specific, measurable learning objectives aligned with curriculum and cultural outcomes.
3. Comic format	Script and narrative; UX/UI guidelines	Design: develop page layout and panel grid, pagination, color scheme, and typography; define caption/speech–balloon conventions; consider accessibility/responsiveness	A digital–comic format tailored for web and mobile, with a clear visual/style guide	S & S – Select media and materials: Choose appropriate media (digital comic, trilingual dialogues, multimedia integration) and align with learner needs and accessibility.

Step	Input	Process	Output	ASSURE Integration
4. Create visual and digital systems	Storyboards and comic mockups; asset list	Development & Implementation: produce original graphics (characters, scenes, elements); integrate multimedia (text, stills, audio, video); build the platform with three–language toggle; conduct technical QA and pilot use	A trilingual (Thai–English–Chinese) online comic with audio on a functional platform, ready for real–world use	U & R – Utilize media & Require learner participation: Implement media effectively (web/mobile platforms, audio, interactive features); encourage learners to interact, explore, and practice language–culture connections.
5. Evaluation	Trilingual manuscript and platform; expert/user evaluation tools	Evaluation: formative reviews (linguistics, culture, ed–tech) and user try–outs with iterative refinements; summative assessment post–use (quality, appropriateness, efficacy)	A comprehensive, accurate, standards–compliant e–comic plus an evaluation report for further enhancement	E – Evaluate & Revise: Assess effectiveness with experts and users; collect feedback on cultural relevance, usability, and learning achievement; revise content and platform iteratively.

Table 2 Storyline Table

Episode / Title	Key Events	Main Activities	Embedded Phetchaburi Craft Knowledge	Expected Learning Outcome
Ep. 1 – Discovery of the Notebook 第一集： 时间之门—— 神奇时光笔记	Tontan and Tonnam discover their grandfather’s ancient notebook.	Read the notebook and open a magic portal.	Importance of record–keeping and transmitting cultural heritage.	Spark curiosity about local history.
Ep. 2 – Into Historic Phetchaburi 第二集： 碧武里的工匠大师	The children are transported back to Phetchaburi’s heyday.	Meet Master Phet and enter the world of traditional arts.	Overview of the Phetchaburi Craft Guilds and artisans’ historical roles.	Understand the meaning of “craft guilds” and their social value.

Episode / Title	Key Events	Main Activities	Embedded Phetchaburi Craft Knowledge	Expected Learning Outcome
Ep. 3 – The Art of Stucco 第三集： 神奇的泥塑	Master Phet teaches stucco making at an ancient temple.	Try forming simple Thai motifs in stucco.	Phetchaburi stucco—signature Thai patterns and techniques.	Appreciate craftsmanship, precision, and perseverance.
Ep. 4 – Enchanted Wood 第四集： 中魔法的木雕	Learn wood selection and carving.	Sketch basic motifs and observe real carving.	Phetchaburi wood carving—artistic meaning and faith traditions.	Recognize the value of woodcraft and its ties to community life.
Ep. 5 – Banana-Stalk Rituals 第五集： 香蕉树芯雕刻的秘密	Join an auspicious ceremony featuring banana-stalk carving.	Design a small banana-stalk pattern.	Banana-stalk carving as an art in religious and festive rites.	Understand the role of art in everyday life and religion.
Ep. 6 – Facing Thong-In 第六集： 黄金笔记争夺战	Thong-In steals master patterns to sell abroad.	Plan with artisans to safeguard the patterns.	The value of preserving local wisdom.	Develop a preservation mindset to protect Thai arts.
Ep. 7 – Return to the Present 第七集： 回到现代	Tontan and Tonnam return to the present with key insights.	Write reflections and share experiences.	Passing cultural heritage to the next generation.	Foster pride in local identity and readiness to share it globally.

The following were obtained from Tables 1 and 2:

1. Content framework: A comprehensive overview of the local wisdom and cultural arts of the Phetchaburi craft guilds, as derived from scholarly literature, historical documents, and interviews with local experts.

2. Script and plot: A seven-episode fantasy-adventure narrative that incorporates knowledge of stucco, wood carving, banana-stalk carving, and painting, with trilingual dialogues in Thai, English, and Chinese.

3. Digital-comic format: The layout, color palette, typography, and character style have been specifically designed to ensure a comfortable reading experience on mobile devices and the web.

4. Digital media system: A platform that supports multimedia (e.g., narration/audio) and all-new, original illustrations. The system also supports the switching of Thai, English, and Chinese languages.

5. Testing and refinement: A master version that is complete, accurate, and standards-compliant is the result of expert evaluations (language and culture) and real-world try-outs. This comprehensive approach enhances user engagement and ensures accessibility for a diverse audience. By incorporating feedback from various cultural perspectives, the final product is both inclusive and universally appealing.

Objective 2. The results showed that the "Amazing Phetchaburi" trilingual online comic book series (in Chinese, English, and Thai) was rated as very acceptable on all levels. Five experts in Thai, English, Chinese, digital media, and local arts and culture gave their opinions, and they all agreed with each other. The average score was 4.22, and the standard deviation was 0.53. Illustrations, character design, and usability obtained higher average scores than the other examined elements. This indicates that the visual presentation, the organization of the story, and its suitability for practical learning were all satisfactory. The findings indicate that the e-comic successfully amalgamates aesthetic value, cultural relevance, and educational functionality. So, the trilingual e-comic is seen as a good way to study and share cultures in a new way that encourages creative and language-based learning. Table 3 displays the results.

Table 3 Presents the results of the expert quality evaluation.

Dimension	Mean	S.D.	Quality Level
1. usability	4.25	0.52	Very Good
2. content and storyline	4.18	0.56	Very Good
3. language	4.12	0.60	Very Good
4. illustrations	4.30	0.50	Very Good
5. color and typography	4.22	0.53	Very Good
6. character design	4.24	0.54	Very Good
7. values/benefits	4.22	0.51	Very Good
Total	4.22	0.53	Very Good

Table 3 shows that experts judged the overall quality of the "Amazing Phetchaburi" online e-comic as very satisfactory, with a mean of 4.22 and a standard deviation of 0.53. This graph shows that the experts all agreed on the same level across all the areas that were looked at.

Objective 3. The results indicated that users were quite happy with the trilingual online comic book series "The Amazing Phetchaburi" (Thai, English, and Chinese) in all areas. A total of 419 people looked at the e-comic by taking part in small-group interviews and filling out a five-point satisfaction evaluation. The average score was 4.23, with a standard deviation of 0.55, which shows that the people who answered were all in accord. The factor that got the best score was perceived advantages ($M = 4.28$, $SD = 0.52$), followed closely by interest in text and illustrations ($M = 4.25$, $SD = 0.55$). These results indicate that the e-comic is captivating, provides significant cultural and educational benefits, and is appropriate for utilization as a medium for language and cultural instruction. Table 4 shows the results.

Table 4 Results of user satisfaction

Dimension	Mean	S.D.	Satisfaction Level
1. Interest in content and illustrations	4.25	0.55	Very Good
2. Language comprehensibility	4.18	0.58	Very Good
3. Usability	4.20	0.57	Very Good
4. Perceived advantages	4.28	0.52	Very Good
5. Applicability as a learning medium	4.23	0.54	Very Good
Total	4.23	0.55	Very Good

Table 4 shows that 419 people were thrilled with the trilingual online e-comic. The average score was 4.23, and the standard deviation was 0.55. This means that all of the people who answered agreed on the same thing. The dimension that had the highest mean score was perceived advantages ($M = 4.28$, $SD = 0.52$). The next highest ratings were for interest in the content and illustrations ($M = 4.25$, $SD = 0.55$), usefulness as a learning tool ($M = 4.23$, $SD = 0.54$), usability ($M = 4.20$, $SD = 0.57$), and language comprehension ($M = 4.18$, $SD = 0.58$). These results show that the e-comic is fun, easy for students to use, and a beneficial way to teach people about other cultures and languages. The scores that stay the same across all dimensions show that it is a useful learning tool. The survey results about how happy people were with the trilingual online comic book series "The Amazing Phetchaburi" (in Thai, English, and Chinese) showed that most people were pleased with it. A five-point Likert scale satisfaction questionnaire was used by 419 people to rate the e-comic. The tool showed strong internal consistency, with a Cronbach's alpha (α) of .89, which means it was very reliable. The average score for user satisfaction was 4.23, and the standard deviation was 0.55. The IQR was 0.40, and

the median was 4.20. This means that most of the answers were close together and not very skewed. The perceived advantages ($M = 4.28$, $SD = 0.52$) got the highest score of the five categories tested, followed by interest in content and illustrations ($M = 4.25$, $SD = 0.55$). These findings suggest that the e-comic possesses cultural and educational significance while maintaining learner engagement.

The numbers and the open-ended part of the questionnaire showed three common themes: 1. The language switch feature is useful. Many users said they liked being able to switch between Thai, English, and Chinese because it helped them learn new words and understand things better. 2. The font size should be better for phones. Some people said that the text looked small on their phones and suggested either making the font bigger or letting users change the text size to make it easier to read. 3. Wanting to add voiceover, participants suggested adding optional voice-over narration to help with pronunciation practice, make it easier to access, and attract more interested people, especially younger learners and people who are new to the language. The results show that people like the trilingual e-comic, consider it easy to use, and think it is a beneficial way to learn and share culture. The results are shown in Table 4.

Discussions

The planned technique for making digital material worked well for the series. It distinguishes itself because it combines modern comic art with cultural knowledge about the Phetchaburi artisan guilds. It also offers content in Thai, Chinese, and English, which makes it easier for many people to grasp. This method aligns with McCloud's (1993) concept that comics represent a visual language that enhances engagement and understanding and Mayer's (2020) claim that multimedia learning promotes active cognitive processing.

The concept and development of Marvelous Phetchaburi Craft Guilds show innovative ways to use digital media by combining historical and cultural stories into an engaging visual story with subtitles in three languages. You may learn at your own pace and on your own time using this format, which is available through mobile apps and websites. Schools teach this way in the digital age.

Also, the e-comic's usability and graphics were created to follow the Clark and Mayer (2016) multimedia learning principles of signaling, coherence, and contiguity. For instance, the speech balloons were put right adjacent to the characters' main points of interest. This helped the story flow better and made it easier to understand. Using color signaling and consistent framing of

characters also helped readers pay more attention to crucial cultural symbols, which made them more engaged in them and better able to grasp them.

Experts who looked at all the parts, such as how accurate the information was, how relevant the language was, how appealing the images were, and how well the design worked, said that the quality was very high. These results are in line with the ideas put forth by Clark & Mayer (2016), who stress the importance of making sure that verbal and visual parts work well together and using signaling and layout well to make things easier to understand.

Experts found a few important strengths:

- Content: It is accurate, suits the context, and is consistent with the traditional history of Phetchaburi.
- Language: All three versions of the language need to be clear, correct, and right for the people who will read them.
- For example, bright, culturally relevant pictures that help people remember and understand.
- Technical design and layout: it works on many devices, loads quickly, looks appealing, and is easy to use.

The fact that the usability and illustration tests fit with the coherence–signaling–contiguity framework suggests that the visual organization helps readers think clearly. For example, putting short explanations next to photos made sure that the meanings were adjacent to each other, which helped with learning in two ways.

These results are in line with what Damjub (2023) said, which was that digital comics made with a learner–centered strategy that includes storytelling, interactivity, and culturally relevant material can improve both engagement and long–term understanding. Damjub also added that multimodal learning tools that mix text, visuals, and narration not only keep kids interested, but they also hold their attention while they read.

So, The Amazing Phetchaburi does an excellent job of illustrating these principles through its interactive access, three languages, and visual story flow.

The study intended to see how delighted people were with "The Amazing Phetchaburi," an online comic book series that can be read in Thai, English, and Chinese. Both students and the general public said they were very happy with everything, but especially with:

- (a) a story and pictures that make you want to read more,
- (b) how easy it is to grasp in three languages, and
- (c) Getting to the internet is simple.

The trilingual framework was well-received because it helped students learn languages and comprehend cultures by letting them examine how Thai, English, and Chinese are used in different situations.

New Knowledge from Research

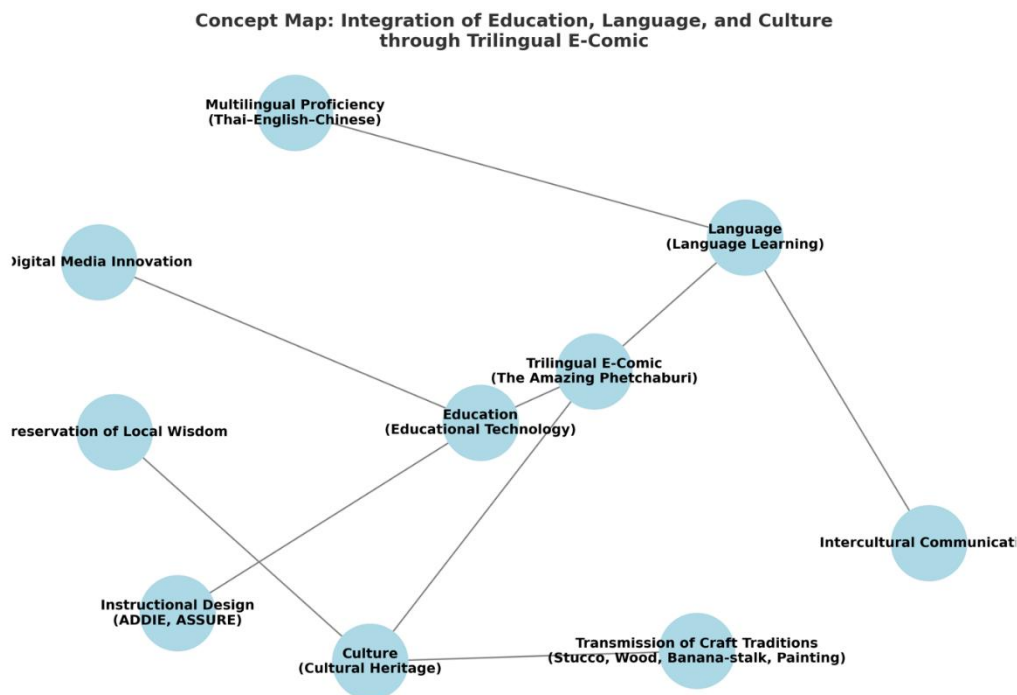
1. Making Learning Materials: We can employ structured instructional design approaches like ADDIE and ASSURE to create trilingual e-comics that are both fun and educational for students.

2. Digital Media for Cultural Preservation: Interactive digital formats can help get the traditional arts and local knowledge of Phetchaburi, such as stucco, wood carving, banana-stalk carving, and painting, to more people and younger people.

3. Better Language Learning: The three-language design (Thai, English, and Chinese) not only helps people learn more than one language, but it also makes it simpler for people from different cultures to talk to each other and for people all over the world to obtain the information.

4. User-Centered Innovation: The fact that learners and the public are so happy with trilingual digital comics shows that they are an excellent method to learn since they are easy to use, clear, and culturally relevant.

This information can be shown on a concept map that brings together three areas: language learning, educational technology, and cultural heritage. The Amazing Phetchaburi trilingual e-comic is the main new idea that connects them together.



Conclusion

The creation of the trilingual online e-comic series "The Amazing Phetchaburi" successfully achieved all three goals. The initiative made a Thai-English-Chinese fantasy-style comic that was judged "excellent" by experts in every way, and users said they were thrilled with every part of it. The comic provided information about the craft guilds in Phetchaburi. All of these results indicate that the resource does a good job of using modern digital technology to teach young people about Thai culture, both in Thailand and around the world. It can also be used as a model for culturally based digital learning media.

Suggestions

Develop an enhanced edition of the e-comic that incorporates deeper interactive activities—e.g., AR (augmented reality) experiences or a point-based gamification system—to increase learner engagement.

Implement a real-time language toggle to support comparative learning across the three languages.

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