Blended and Collaboration-Based Learning Management Model to Enhance Mobile Website User Experience (UX) Design Skills

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This study presents a collaborative learning model designed to enhance mobile website design skills with a focus on user experience (UX). The model, assessed by nine experts across utility, feasibility, propriety, and accuracy, demonstrates high-quality scores, reflecting substantial agreement and effectiveness. Specific strengths include the model's adaptability to the curriculum (4.56) and its applicability to university students (4.44). Areas for improvement, with mean values of 3.89, highlight opportunities for refinement, particularly in the appropriateness of learning processes and the precision of details within activities. Synthesizing steps from cooperative, blended, and Project-Based Learning, the model aligns with Stufflebeam's framework, emphasizing high feasibility, utility, propriety, and accuracy. Comparative insights with previous research validate its strength across diverse educational contexts. The model's success, proven through evaluation and refinement, carries significant implications for education by enhancing both technical skills and a holistic understanding of user experiences in mobile web design. Despite acknowledged limitations, the collaborative learning model invites continued exploration and adaptation, ensuring its relevance in the evolving landscape of educational practices.

Keywords: blended learning, collaboration-based learning, mobile website design, user experience, Thailand

INTRODUCTION

In the rapidly advancing landscape of information technology, where communication and data processing have become fast and convenient, and limitless calculations are possible, concerns have emerged about the impact of Artificial Intelligence (AI) on human careers. However, amidst the rise of AI, certain information technology roles necessitate distinctly human skills, notably those of *User Experience*

Designers (UX designers). These professionals play a crucial role in planning and managing businesses to deliver optimal user experiences, crafting designs that address user needs and problems across software, product, system development, and program creation.

Since 2007, user experience design has become a guiding principle in the web design industry, evolving from the Information Design model to the science of user-centered experience design. Today's user experience designers, positioned between art directors and web developers, possess the ability to manage projects effectively. The science of UX design is not only a catalyst for enhancing web sales, increasing user conversions, and facilitating design customizations but also a key element of academic study, with universities offering specialized programs and certifications in this field (Mendoza, 2014).

In the United States, the current job market is witnessing a noticeable skills gap. With over 7 million open jobs (Fox, 2018), companies like Google, Apple, IBM, and Bank of America are redefining their hiring criteria, focusing more on specific skill sets than formal education. Facebook's vice president of human resources has even stated that "skills matter most," urging job seekers to emphasize relevant skills, even without direct experience (Hess, 2018). LinkedIn's analysis of job postings underscores the importance of both hard and soft skills, with *User Experience Design* (UX Design) ranking among the critical hard skills.

Problem Statement

In the realm of modern education, the confluence of technology and pedagogy demands an exploration to meet the rising need for adept mobile website designers grounded in user experience principles. This study addresses a multifaceted problem with two core research objectives.

Firstly, it strives to create a comprehensive collaborative learning model using multiple integrated techniques. This pedagogical process immerses students in collaborative activities tailored to mobile website design techniques, with a focus on user experience principles. The evolving technological education landscape necessitates an effective strategy to engage students and provide a holistic learning experience, preparing them for contemporary design challenges.

Secondly, the study assesses the collaborative learning model's effectiveness in cultivating mobile website design skills with a user experience focus. The evaluation covers dimensions like student engagement, skill acquisition, and overall enhancement of user experience design capabilities. This process yields valuable insights into strengths and areas for refinement, contributing empirical evidence to contemporary educational practices.

In summary, this study addresses the intersection of technology, collaborative learning, and user experience design. It aims to provide innovative pedagogical solutions to meet the evolving demands of education, preparing students for the dynamic field of mobile website design.

Research Objectives

RO1: *Development of Collaborative Learning Model*

Create a comprehensive collaborative learning model that incorporates various integrated techniques for the explicit purpose of honing mobile website design skills rooted in the principles of user experience (UX).

The primary aim is to devise a structured and effective pedagogical approach that engages students in collaborative learning activities. This model will be developed to address the numerous facets of mobile website design, emphasizing user experience principles. By combining diverse instructional strategies, the goal is to offer a holistic learning experience that fosters a deep understanding of the subject matter.

RO2: *Assessment of Collaborative Learning Model*

Evaluate and measure the effectiveness and quality of the developed collaborative learning model for cultivating mobile website design skills based on user experience.

Once the collaborative learning model is established, it is imperative to gauge its impact and efficacy. This objective entails conducting a comprehensive assessment to ascertain the model's ability to facilitate meaningful learning outcomes. The assessment will encompass various dimensions, including student engagement, skill acquisition, and the overall enhancement of user experience design capabilities. This evaluative process will provide valuable insights into the strengths and potential areas of improvement in the collaborative learning model.

RESEARCH THEORIES AND CONCEPTS

Blended Learning: A Holistic Training Approach

Blended learning, at its core, represents a dynamic and integrated approach to training that harnesses a diverse range of training media, including technologies, activities, and various types of events (Lakhal & Meyer, 2020). The term '*blended*' encapsulates the synergy between traditional instructor-led training and modern digital and online formats, forming a cohesive and effective training program tailored to a specific audience.

The evolution of blended learning has been spurred by the recognition that a one-size-fits-all training approach is no longer sufficient in the rapidly changing landscape of education and professional development. This multifaceted approach combines the best of both worlds, leveraging the strengths of traditional face-to-face instruction while integrating the flexibility and innovation afforded by online and electronic formats.

Blended learning programs, as highlighted by Saengrith et al. (2022), are characterized by their adaptability and utilization of various e-learning forms. These can range from interactive online modules and virtual simulations to live webinars and collaborative group activities. The blend often includes instructor-led training sessions, creating a harmonious amalgamation of traditional and contemporary teaching methodologies.

Blended learning harnesses the power of diverse technologies, ensuring that learners engage with content through various digital mediums (Divaharan & Chia, 2022). This may involve interactive e-learning platforms, virtual reality simulations (Sarapak et al., 2022), or mobile applications tailored to enhance the learning experience (Kumar et al., 2021).

The inclusion of a wide array of activities is fundamental to the success of blended learning. From group assignments to problem-solving activities, the approach seeks to actively involve learners in the learning process, fostering engagement and skill development.

In essence, blended learning stands as a testament to the adaptability and innovation required in modern educational and training paradigms. This holistic approach not only acknowledges the diverse needs of learners but also maximizes the potential for effective knowledge acquisition and skill development in today's dynamic learning environments.

Project-Based Learning (PBL): Fostering Holistic Student Development

Project-based learning (PBL) stands as a transformative educational approach (Dias & Brantley-Dias, 2017; Larmer et al., 2015), offering students a unique avenue for comprehensive skill development and deep content understanding. This method serves as more than just an instructional strategy; it is a dynamic tool that motivates, prepares, and engages students in a multifaceted learning experience.

Larmer et al. (2015) outline the following key aspects of PBL:

- **Motivation:** PBL inherently motivates students by presenting learning within a context that is both relevant and engaging. Projects often connect academic content to real-world scenarios, fostering a sense of purpose in students.
- **Preparation for Future Success:** Beyond academic knowledge, PBL equips students with the practical skills essential for success in college, careers, and life. This aligns with the evolving demands of the workforce, emphasizing not just what students know but what they can do.
- **Meeting Standards and Demonstrating Skills:** PBL aligns with educational standards and assessments, providing a platform for students to showcase in-depth knowledge and critical

thinking skills. It shifts the focus from rote memorization to the application of knowledge in meaningful projects.

- **Enhancing Teaching Satisfaction:** Project-Based Learning empowers teachers to move beyond traditional instructional methods. It allows for a more dynamic and interactive teaching approach, enhancing job satisfaction and fostering a positive teaching and learning environment.
- **Facilitating Communication and Community Connection:** PBL extends beyond the classroom, creating avenues for schools and districts to connect with parents, communities, and the wider world (Park, 2023). It emphasizes collaborative efforts, breaking down the traditional walls of education. In addition, Srikan et al. (2021) contributes to the PBL discourse by introducing a PBL model with its structured five-step process. In conclusion, PBL, with its inherent motivation, skill development, and community engagement aspects, stands as a cornerstone in contemporary education. The integration of PBL models further enriches the educational landscape, ensuring that students not only grasp academic content but also emerge as well-rounded individuals prepared for the challenges of the future.

User Experience Mobile Website Design Essential Skills

In the realm of user experience (UX) mobile website design, acquiring a diverse set of skills is paramount to creating digital landscapes that captivate and engage users. Garrett (2006) provides a comprehensive breakdown of these skills, illustrating the multifaceted nature of designing for the user experience:

- **Determining User Needs (User Needs):** A UX designer must delve into the psyche of users, understanding their requirements, preferences, and pain points to inform the design process.
- **Grouping Users (User Segmentation):** Recognizing the diversity among users and creating user segments ensures tailored designs that cater to different user demographics.
- **User Research:** A foundational skill involves conducting thorough research to gather insights into user behavior, preferences, and expectations.
- **Persona Creation:** Crafting detailed personas enables designers to embody user archetypes, ensuring a user-centric approach throughout the design journey.
- **Content Requirements:** Understanding the type and format of content that resonates with users is crucial for creating meaningful and engaging digital experiences.
- **Content Priority Determination:** Prioritizing content based on user needs and business goals ensures a streamlined and user-friendly design.
- **Information Architecture:** Intuitively structuring information facilitates seamless navigation and enhances overall user satisfaction.
- **Navigation Design:** Designing effective navigation systems ensures users can effortlessly traverse through the website, enhancing their overall experience.
- **Information Design:** Presenting information in a visually appealing and comprehensible manner contributes to the overall effectiveness of the design.
- **Making Wireframes:** Translating design concepts into tangible wireframes provides a skeletal framework for the website's structure and layout.
- **Visual Design:** Applying principles of visual design, including color, typography, and imagery, elevates the aesthetic appeal and user engagement of the website.

Unger and Chandler (2012) expand on the UX designer's skill set, emphasizing the holistic nature of the profession:

- **Understanding the Project Ecosystem:** Contextualizing design within the broader project ecosystem ensures alignment with overarching goals and objectives.
- **Writing Project Proposals**: Effective communication through project proposals is essential for garnering support and resources for UX design initiatives.
- **Identifying Goals and Project Execution:** Setting clear goals and strategizing project execution are fundamental for successful UX design outcomes.

- **Finding Business Needs:** Aligning design objectives with the business's needs ensures that the UX design contributes to broader organizational goals.
- **Persona Creation:** Developing realistic personas aids in empathizing with end-users and tailoring designs to their unique characteristics.
- **Creating Content Strategies**: Devising effective content strategies ensures that the website communicates seamlessly with the target audience.
- **Design:** Design includes storyboards, diagrams, website, flowchart, task flow, wireframe, and prototype, which brings design concepts to life.
- **Testing Design Results with Users:** User testing provides valuable feedback, allowing for refinement and improvement based on real user interactions.
- **Website Creation:** Bringing the design vision to fruition involves the practical application of technical skills to create a fully functional website.

Panatkool's (2013) conceptual insights further enrich the UX designer's toolkit:
- **Understanding the Program That Will Be Created:** Grasping the intricacies of the intended program ensures designs align with the project's objectives.
- **Persona Creation:** The continuation of persona creation emphasizes its ongoing importance in maintaining a user-centric design approach.
- **Writing a Storyboard:** Visualizing the user journey through storyboards aids in identifying potential pain points and refining the overall user experience.
- **Making Card Sort Analytics:** Employing card sorting techniques helps in organizing and structuring content for optimal user comprehension.
- **Drawing a Wireframe:** Articulating design concepts through wireframes serves as a critical step in the iterative design process.
- **Navigation Design**: Reiterating the importance of effective navigation design for a seamless user experience.

Mendoza's (2014) perspective emphasizes the practical skills required for mobile web design within the UX framework:
- **Creating Plans:** A UX designer must possess strategic planning skills, outlining the blueprint for successful mobile web design.
- **Understanding Devices (iPhone or Android):** Familiarity with diverse devices, such as iPhones and Androids, is essential for optimizing designs across platforms.
- **Creating Wireframes:** The ability to translate design concepts into tangible wireframes remains a foundational skill for UX designers.
- **Prototyping:** Bringing designs to life through prototyping facilitates a dynamic and interactive preview of the final product.

In the dynamic landscape of UX mobile website design, these skills collectively form the palette from which designers draw to craft immersive and user-centric digital experiences.

Generative AI

Generative AI (GenAI) stands at the forefront of Artificial Intelligence (AI) technology, revolutionizing the way content is generated within natural language conversational interfaces. This transformative approach diverges from the conventional method of curating existing webpages; instead, GenAI can autonomously create novel content in various forms, encompassing texts, images, videos, music, and even software code (Kanbach et al., 2023; UNESCO, 2023).

The underlying mechanism of GenAI involves extensive training using diverse datasets derived from webpages, social media interactions, and other online sources. Through the ingestion of vast amounts of data, GenAI gains an understanding of human thought patterns, reflected in the symbolic representations across different modalities. Whether it's analyzing the distribution of words in natural language, pixels in images, or other elements in various data sets, GenAI excels at identifying and replicating common patterns.

Despite its tremendous potential, higher education currently grapples with a significant deficit in GenAI training programs (Chiu, 2023). This education gap reflects the rapid evolution of AI technologies,

highlighting the need for academic institutions to adapt and integrate GenAI into their curricula. As GenAI continues to shape the landscape of content creation, addressing this educational gap becomes imperative for preparing future professionals and researchers to harness the full potential of this innovative technology.

Collaborative Networks

In the realm of UX design education, the collaborative learning management format takes center stage, employing a fusion of techniques aimed at cultivating website design skills specifically tailored for mobile devices and centered around enhancing user experience. Noteworthy tools such as Generative AI, exemplified by platforms like Google Bard and ChatGPT, play a pivotal role in this educational paradigm, facilitating the learning process by providing students with tools for self-driven exploration. These tools empower students to efficiently access information, adapting to the dynamic landscape of the digital era. They serve as instrumental aids in diverse tasks, from crafting user research questionnaires and developing Personas to creating prototypes and websites (Agranoff, 2007).

Within the context of UX design education, the interconnectedness of networks and collaboration is paramount. A network devoid of cooperation fails to realize its set goals and objectives. Networks serve as indispensable catalysts for fostering cooperation, offering platforms for organizations to unite, tackle challenges, and define activities collaboratively (Agranoff, 2007; Rattanaarun et al., 2023). This collaborative dynamic extends beyond hierarchical structures, representing a voluntary alliance marked by shared knowledge creation, resource-sharing, and collaborative problem-solving (Smith & Wohlstetter, 2006).

Scholarly investigations have identified various forms of collaborative networks (Kanawapee et al., 2022; Phiraisaengchan et al., 2020). In the context of UX design education, a cooperation network becomes the linchpin, connecting the operational environment with each stakeholder. Functioning voluntarily with a shared purpose, these networks foster active participation in collaborative pursuit of problem-solving contribute significantly to ongoing improvement and development within this cooperative framework.

Research Design Synthesis

In the pursuit of developing an innovative Blended and Collaboration-Based Learning Management Model to enhance the skills of mobile website user experience (UX) design, the study engaged in a comprehensive synthesis of collaborative learning steps extracted from relevant literature. This synthesis process is reviewed in Table 1, where the cooperative learning steps proposed by various researchers were systematically compiled.

The synthesized cooperative learning steps were determined to encompass five key stages:
- **Teaching Stage:** Emphasizing the initial phase of knowledge dissemination and skill acquisition.
- **Group Activity and Work Monitoring Stage:** Focusing on collaborative endeavors and ongoing supervision of group tasks.
- **Evaluation Stage:** Addressing the assessment of individual and collective performance.
- **Quality Improvement Stage:** Encompassing measures to enhance and refine the learning process based on evaluation outcomes.
- **Presentation Stage:** Centered around showcasing acquired knowledge and skills.

In summary, the researcher distilled the collaborative learning steps into a cohesive framework consisting of the aforementioned five stages. This framework serves as a foundational structure for the subsequent development of the Blended and Collaboration-Based Learning Management Model, with each stage playing a crucial role in enhancing mobile website UX design skills.

TABLE 1
COLLABORATIVE LEARNING STEPS SYNTHESIS

Researcher Concepts	Collaborative Learning Steps							
	Preparation stage	Teaching stage	Stage of group activities and following up on work	Evaluation stage	Conclusion	Quality Improvement Steps	Presentation Stage	Reflection Stage
Reid et al. (2002)		√	√			√	√	√
Johnson and Johnson (2019)	√	√	√	√				
Bower and Richards (2006)		√	√					√
Martin and Dixon-Woods (2022)	√	√	√	√	√	√		
Khaemmanee (2009)	√	√	√	√				
Jaitiang (2007)	√	√	√	√	√			
Summary		√	√	√		√	√	

Table 2 serves as a comprehensive synthesis of key steps in organizing blended learning, offering a nuanced understanding of the learning management process. The researcher distilled insights from various authors, capturing four pivotal steps essential to effective blended learning management:

- **Team/Group Work:** Involves collaborative efforts within a team or group setting to foster collective learning experiences (Langprayoon & Mahawan, 2023; Rossett & Frazee, 2006).
- **Lectures with Synchronized Learning:** Encompasses the delivery of lectures accompanied by synchronized learning activities, ensuring real-time engagement and interaction (Bhadri & Patil, 2022; Finlay et al., 2022; Langprayoon & Mahawan, 2023; Truss & Anderson, 2023).
- **Asynchronous Learning through Online Lessons:** Focuses on self-paced learning through online lessons, allowing flexibility in accessing course materials and resources (Bhadri & Patil, 2022; Finlay et al., 2022; Langprayoon & Mahawan, 2023; Truss & Anderson, 2023).
- **Summary and Discussion:** Involves the critical steps of summarizing learning content and engaging in discussions, promoting reflection and a deeper understanding of the material (Bhadri & Patil, 2022; Finlay et al., 2022; Langprayoon & Mahawan, 2023; Rossett & Frazee, 2006; Truss & Anderson, 2023).

This synthesized framework provides a holistic view of blended learning management, incorporating elements of teamwork, synchronized lectures, asynchronous online learning, and reflective practices. Each step contributes to a dynamic and adaptive learning environment, aligning with contemporary educational strategies that prioritize collaborative, technology-enhanced, and reflective learning experiences.

TABLE 2
BLENDED LEARNING ORGANIZATION STEPS SYNTHESIS

Learning Management Steps	Rossett and Frazee (2006)	Truss and Anderson (2023)	Finlay et al. (2022)	Bhadri and Patil (2022)	Langprayoon & Mahawan (2023)	Summary
Lesson Introduction	√				√	
Workshop	√					
Teaching and mentoring	√		√			
Training	√					
Problem-based work	√					
Student connection	√	√				
Team/group work	√				√	√
Lectures with synchronized learning		√	√	√	√	√
Asynchronous online lesson learning		√	√	√	√	√
Assignment					√	
Self-learning		√			√	
Information searching					√	
Training practice					√	
Summary and discussion		√	√		√	√
Reflection		√				
Examination				√		

Table 3 encapsulates the essential learning management steps in Project-Based Learning, offering a comprehensive overview of the process. The synthesis of insights from various authors yields a structured framework consisting of five key steps:

- **Problem Identification Step:** Involves recognizing and defining the problem or challenge that forms the basis of the project (Panich, 2011; Younis et al., 2021).
- **Planning Step:** Encompasses the strategic planning phase where project goals, tasks, and timelines are outlined (Panich, 2011; Younis et al., 2021).
- **Action Step:** Engage students in active project work, applying their skills and knowledge to address the identified problem (Almulla, 2020; Nurbekova et al., 2020; Panich, 2011; Yoelao, 2014; Younis et al., 2021).
- **Collaborative Group Organizing Step:** Focuses on organizing and structuring collaborative groups, emphasizing teamwork and shared responsibilities (Almulla, 2020; Yoelao, 2014; Younis et al., 2021).
- **Work Presentation Step:** Involves showcasing the results of the project, and encouraging students to present and communicate their findings (Almulla, 2020; Yoelao, 2014; Younis et al., 2021).

This synthesized framework provides a robust foundation for educators implementing Project-Based Learning, emphasizing problem-solving, collaboration, and presentation skills.

TABLE 3
PROJECT-BASED LEARNING MANAGEMENT STEPS

Learning Management Steps	Panich (2011)	Yoelao (2014)	Nurbekova et. al. (2020)	Almulla (2020)	Younis et. al. (2021)	Summary
Problem identification step	√				√	√
Planning step	√					√
Action step	√		√	√	√	√
Learning review step	√		√			
Basic knowledge step		√	√			
Stimulate interest step		√				
Collaborative groups organization step		√	√	√	√	√
Knowledge seeking step		√				
Learning summary step		√				
Presentation step	√	√				√
Evaluation step			√	√	√	

This synthesized framework provides a robust foundation for educators implementing Project-Based Learning, emphasizing problem-solving, collaboration, and presentation skills.

Table 4 presents a concise synthesis of crucial components contributing to user experience (UX) design skills, as elucidated by various authors in the field. The components encompass a comprehensive range of elements essential for effective UX design. The summarized elements are as follows:

- **Project Ecosystem Comprehension:** Understanding the broader context and environment in which the design project operates.
- **Work Planning:** Strategic planning to organize and structure the design workflow effectively.
- **User Research:** Research to understand the needs, preferences, and behaviors of the target audience.
- **Work Analysis:** Analyzing the requirements and parameters of the design project.
- **Visual Design:** Crafting the visual elements and aesthetics of the website or application.
- **Interaction Design:** Designing interactive elements to enhance user engagement and usability.
- **Navigation Design:** Structuring and designing the navigation system for seamless user interaction.
- **Information Content Design:** Developing and organizing content to facilitate effective communication.
- **Create a Website Prototype:** Build a preliminary model or representation of the website to visualize the design concept.
- **Website Creation:** The actual development and implementation of the designed website.

Authors contribute distinct emphases to these components. They include:

Unger and Chandler (2012) who emphasized the need for project ecosystem comprehension, work planning, user research, visual design, navigation design, information content design, and creating a website prototype. Hix and Hartson (1993) highlighted the need for project ecosystem comprehension, work planning, and user research. Garrett (2006) focused on work planning, user research, visual design,

interaction design, navigation design, information content design, and creating a website prototype. Hamm (2014) stressed work planning and information content design. Siriborvornratanakul (2018) centered on visual design and navigation design. Panatkool (2013) placed importance on project ecosystem comprehension and creating a website prototype.
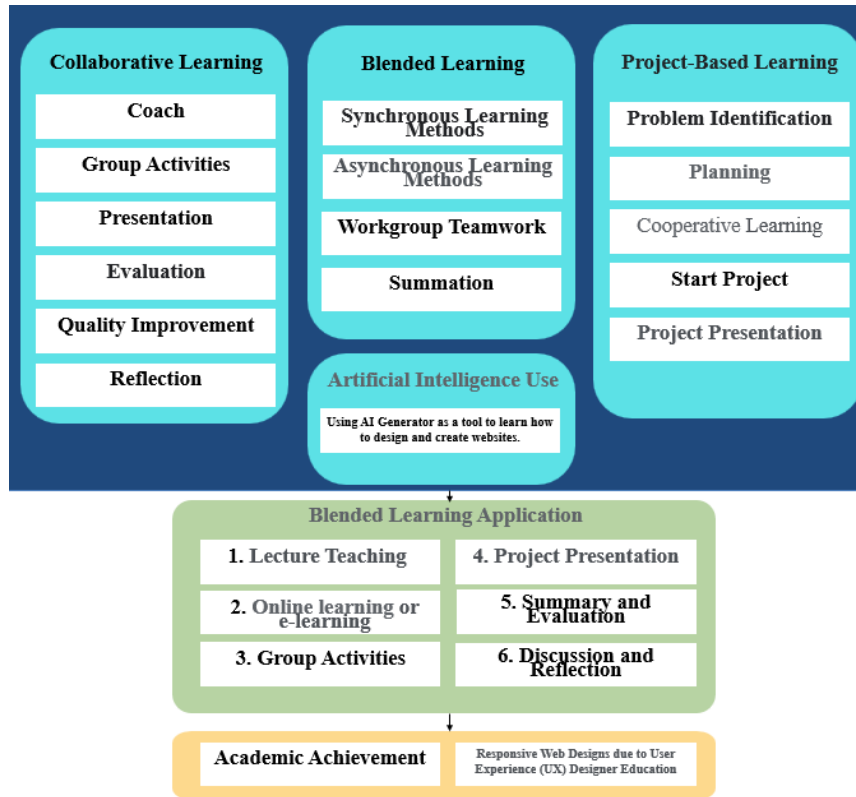
The aggregated components underscore the multifaceted nature of UX design skills, covering various aspects from planning and research to design and development. This synthesis provides a comprehensive foundation for understanding the holistic skill set required in the field of user experience design.

In summary, the components of *user experience (UX) design skills* in Table 4 include the following: Web Design Planning, User Research, Website Content Design, Website Design (Visual Design, Interaction Design, Navigation Design), Website prototyping, and Website Development.

TABLE 4
USER EXPERIENCE (UX) DESIGN SKILLS SYNTHESIS

Authors	Components									
	Project Ecosystem Comprehension	Work Planning	User Research	Work Analysis	Visual Design	Interaction Design	Navigation Design	Information Content Design	Create a website Prototype	Website Creation
Unger and Chandler (2012)	✓	✓	✓		✓	✓			✓	✓
Hix and Hartson (1993)				✓	✓	✓				
Garrett (2006)			✓	✓	✓	✓	✓	✓	✓	✓
Hamm (2014)			✓		✓					
Siriborvornratanakul (2018)					✓	✓				
Panatkool (2013)	✓						✓			
Summary		✓	✓		✓	✓	✓	✓	✓	✓

FIGURE 1
CONCEPTUAL FRAMEWORK

RESEARCH FRAMEWORK

Collaborative Learning Model Development

The research aims to construct a collaborative learning model that integrates advanced techniques to enhance mobile website design skills rooted in user experience. Figure 1 illustrates the conceptual framework, shaped through an in-depth exploration of concepts and theories drawn from diverse sources, including books, online materials, and existing research. This preliminary phase, known as Documentary Analysis, provides the foundational knowledge necessary for synthesizing collaborative learning management.

The methodology employs content analysis as a key tool, scrutinized under the guidance of an advisor and co-advisor. Feedback and recommendations from these experts guide adjustments to refine the model. Additionally, a focus group involving nine university-level teaching staff experts, well-versed in computer studies, curriculum development, behavioral science research, educational innovation, and measurement and evaluation, was convened in 2023. Their insights and recommendations contribute to shaping a robust and fitting collaborative learning model (Figure 2). Artificial Intelligence is strategically integrated into each learning unit, enhancing the synthesis and effectiveness of the model.

Collaborative Learning Model Assessment

The evaluation process focuses on assessing the quality of the collaborative learning model devised for enhancing mobile website design skills with a user-centric approach. Leveraging a collaborative learning model quality assessment model, opinions from nine subject matter experts, gathered through a focus group discussion, form the basis of the assessment. The meta-evaluation employs a comprehensive 5-level rating scale, examining the quality of the learning management model across various aspects and specific

evaluation criteria including *utility, feasibility, propriety*, *accuracy*, and *evaluation accountability* (Stufflebeam, 2015; Wongrugsa et al., 2022) as articulated by the Joint Committee on Standards for Educational Evaluation (JCSEE) (Yarbrough et al., 2010).

Data Analysis: Assessing Collaborative Learning Model Quality

The evaluation of the collaborative learning model's quality, designed for the enhancement of mobile website design skills with a focus on user experiences, involved a meticulous data analysis process. Descriptive statistics, specifically employing the *Google Sheets* program, were instrumental in unraveling insights from the collected data.

The criteria for interpreting the mean, inspired by the Likert scale, guided the analysis and interpretation of the results. This scale categorizes mean scores into five distinct levels:

5.00: Signifying the utmost level of agreement or effectiveness.
4.50 – 4.99: Indicating a high level of agreement or effectiveness.
3.50 – 4.49: Reflecting a substantial level of agreement or effectiveness.
2.50 – 3.49: Denoting a moderate level of agreement or effectiveness.
1.50 – 2.49: Suggesting a minimal level of agreement or effectiveness.
1.00 – 1.49: Representing the least degree of agreement or effectiveness.

This systematic and quantitative approach to data analysis ensures a nuanced understanding of the collaborative learning model's performance, allowing for precise interpretations and informed decision-making based on the mean scores obtained.

RESEARCH RESULTS

The collaborative learning management model is centered around the utilization of blended techniques to cultivate skills in designing user-experience-driven mobile websites. As illustrated in Figure 2, this collaborative learning model employs a combination of approaches for the development of mobile website design skills, grounded in user experience. These encompass 1) classroom lectures, 2) online self-learning, 3) group activities, 4) presentations, 5) summation and evaluation, and 6) discussion, feedback, and reflection (Figure 2).

FIGURE 2
BLENDED AND COLLABORATIVE LEARNING MODEL
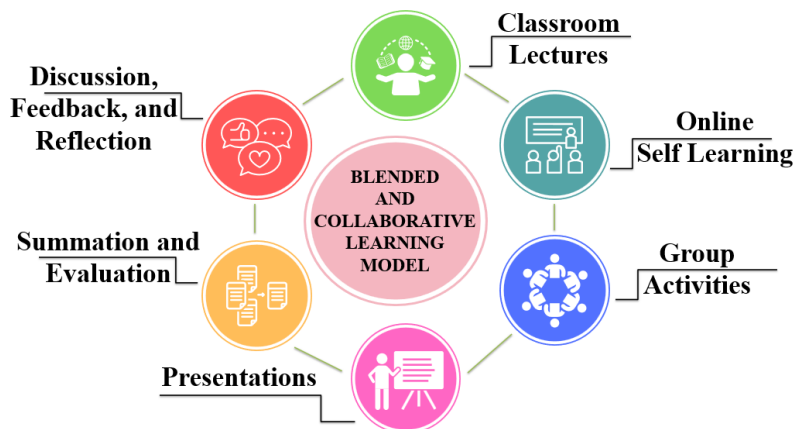
The evaluation of the collaborative learning model's quality involves the integrated use of techniques for developing mobile website design skills based on user experience. The assessment, conducted by nine experts across four domains (utility, feasibility, propriety, and accuracy), reveals favorable results in terms of mean scores. The expert quality assessment, depicted in Table 5, highlights commendable mean scores

for utility (4.21), feasibility (4.29), propriety (4.10), accuracy (4.09), and an overall overview score of 4.17. These scores, falling within the range of 3.50 to 4.49, signify a substantial level of agreement and effectiveness in the collaborative learning model's quality.

TABLE 5
EXPERT QUALITY ASSESSMENT OF THE MODEL

Aspect	Experts (n=9)		Assessment Results
	Mean	**SD**	
Utility	4.21	0.68	*
Feasibility	4.29	0.63	*
Propriety	4.10	0.59	*
Accuracy	4.09	0.65	*
Overview	**4.17**	**0.64**	*

*3.50 – 4.49: Reflecting a substantial level of agreement or effectiveness.

The assessment of the collaborative learning model, aimed at developing mobile website design skills with a user experience focus, reveals noteworthy insights from the expert evaluations (n=9). Table 6 outlines the mean scores and standard deviations across various aspects, providing a comprehensive view of the model's perceived quality.

High-Quality Aspects
The data indicates that the collaborative learning model excelled in several dimensions, with items scoring within the range of 4.50 – 4.99, reflecting a high level of agreement or effectiveness. Notably, item 2.2, emphasizing the adaptability of the learning model to the curriculum for designing mobile websites from a user experience standpoint, received the highest mean score of 4.56. This suggests that experts view this particular aspect as exceptionally effective and well-aligned with the curriculum, showcasing a high level of quality. Following closely, item 2.1 emphasizes the model's applicability to university students, earning a mean score of 4.44. This further reinforces the model's versatility and suitability for higher education contexts.

Areas for Improvement
While the overall quality is commendable, certain aspects scored slightly lower, with mean values of 3.89. These include items 3.1 and 3.2, highlighting the appropriateness of cooperative and blended learning processes to diverse learning styles. Additionally, item 4.1, assessing the precision of components within the learning model, and item 4.4, focusing on the accuracy of details within learning activities, also received mean scores of 3.89. These areas suggest potential avenues for enhancement and refinement.

Overall Implications
The high mean scores across various dimensions underscore the effectiveness and appropriateness of the collaborative learning model. The data suggest that experts perceive the model as well-structured, applicable, and beneficial for students, particularly in the context of mobile website design with a user experience emphasis. The areas with slightly lower mean scores could be focal points for future refinement to ensure an even higher standard of quality in these dimensions.

In conclusion, the data results indicate a strong foundation for the collaborative learning model, providing valuable insights for further development and refinement, ultimately contributing to the ongoing evolution of effective educational methodologies in the realm of mobile website design and user experience.

RESEARCH FRAMEWORK

Synthesis of Learning Management Steps

The collaborative learning management model presented in this study is an amalgamation of synthesized steps derived from various educational methodologies. For cooperative learning, the synthesized steps include teaching, group activities with work monitoring, evaluation, quality improvement, and leadership. In the realm of blended learning, the model encompasses team/group work, lectures with synchronized learning, asynchronous online lessons, and summarizing and discussing. Additionally, Project-Based Learning involves steps such as problem identification, planning, action, collaborative group organization, and work presentation.

Collaborative Learning Model Evaluation

Nine experts rigorously evaluated the collaborative learning model designed to enhance mobile web design skills with a focus on user experiences. The format of collaborative learning relies on a versatile combination of techniques, incorporating online self-learning, classroom lectures, group activities, presentation of work, summary and evaluation, and discussion and reflection.

Quality Assessment Based on Stufflebeam's Concept

The assessment of the learning management model aligns with Stufflebeam's conceptual framework, emphasizing utility, feasibility, propriety, and accuracy. Evaluating the model against these criteria revealed an overall high level of quality. Notably, the model demonstrated high feasibility, indicating its practical applicability. The utility aspect, reflecting its usefulness, also received a high-quality rating. In terms of propriety, denoting suitability, the model showcased a high level of appropriateness. Lastly, the accuracy aspect, focusing on precision, was also deemed to be of high quality.

Comparative Insights

These findings are consistent with the research conducted by Ruenphongphun (2022) and Wongrugsa et al. (2022), who employed the JCSEE's standards to assess the suitability of a Digital Citizenship Skills model for online teaching and learning and undergraduate vocational education. Both studies incorporated in-depth interviews and content analysis using Stufflebean's (2015) *utility, feasibility, propriety*, and *accuracy* assessment standards. The parallel emphasis on these standards across different educational contexts underscores the robustness and validity of the collaborative learning model in the present study.

In conclusion, the synthesis of diverse learning management steps, coupled with the comprehensive evaluation based on established criteria, positions the collaborative learning model as a highly effective and adaptable framework for enhancing mobile web design skills with a user experience emphasis. The alignment with established evaluation standards further reinforces the model's credibility and applicability in diverse educational settings.

ACHIEVEMENTS AND INSIGHTS

In conclusion, the collaborative learning model, having been developed through the synthesis of relevant research documents and continuous refinement based on expert suggestions, has proven to be a robust framework for cultivating mobile web design skills with a user experience emphasis. The comprehensive learning management process, encompassing online self-learning, classroom lectures, group activities, work presentations, summarizing and evaluating, and discussion and reflection, underwent rigorous analysis and quality assessment. The conclusive evaluation, undertaken by nine expert evaluators, attested to the high quality of the collaborative learning model.

Implications for Education

The success of this collaborative learning model carries significant implications for educational practices, especially in the dynamic realm of mobile web design. By seamlessly integrating various

techniques and leveraging diverse learning formats, the model not only enhances technical skills but also fosters a holistic understanding of user experiences in web design.

Limitations and Opportunities for Future Research

Despite the evident strengths, it is essential to acknowledge certain limitations. Future research endeavors could explore the applicability of the collaborative learning model across different educational contexts and diverse student populations. Additionally, a more in-depth investigation into specific factors influencing the effectiveness of each learning technique within the model could provide valuable insights for further refinement.

Call for Continued Exploration

The collaborative learning model presented here lays the groundwork for continued exploration and adaptation. Its success, validated by expert assessments, invites educators and researchers to delve deeper into the model's potential applications, adaptability to emerging technologies, and its impact on students' proficiency and creativity in mobile web design. The nature of educational practices necessitates ongoing evaluation and enhancement, ensuring the model's relevance and effectiveness in an ever-evolving educational landscape.

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