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A blended and project-based learning management model using artificial intelligence to enhance Thai undergraduate student digital media creation skills

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Abstract: This study developed and implemented a blended learning management (BLM) model integrating project-based learning (PjBL) and artificial intelligence (AI). The model was designed through a literature analysis and an expert evaluation using a focus group discussion. In November 2024, seven specialists assessed the model's usefulness, feasibility, appropriateness, and accuracy, and their evaluation indicated a high overall quality. Structured into five stages—project planning, practical development, AI integration, feedback loops, and final presentation—the model was implemented using 108 first-year undergraduate students enrolled in a Thai university Bachelor of Science in Information Technology program during the 2024 academic year to evaluate its effectiveness. Research instruments included a BLM plan, a multiple-choice academic achievement test, and a digital media creation skills assessment based on a scoring rubric. Data analysis was conducted using descriptive statistics and t-tests. The findings revealed that students' digital media creation skills after model learning significantly exceeded the predetermined criterion of 80% at the .01 level of statistical significance. Additionally, students demonstrated significantly higher academic achievement in digital media creation after using the model than before, also at the .01 level of statistical significance. This study presented a BLM that synergizes PjBL and AI to cultivate digital media competencies. Structured into five stages—project planning, practical development, AI integration, feedback loops, and final presentations—the model was validated through expert evaluation and empirical testing. These findings underscore the efficacy of blending hands-on, collaborative learning with AI-driven tools to meet contemporary educational demands.

Keywords: *Academic achievement, Artificial intelligence, Blended learning, Digital media creation skills, Project-based learning, Thailand.*

1. Introduction

The growing share of older adults worldwide presents several challenges for different sectors. However, one that is not commonly thought about is how the elderly are affected and how they handle natural and man-made disasters and humanitarian aid delivery [1]. As life expectancy rises worldwide and birth rates decline in many nations, most countries, Thailand included, have experienced a transition to aging societies.

In today's digitally interconnected world, media no longer merely serves as a 'background' in our lives but also influences how we communicate, think, and feel across different societal domains. Digital media (e.g., the Internet, mobile applications, and social media) have become an active platform for communicating with others, acquiring information, and expressing identities and ideologies. In particular, entertainment applications have evolved into "facilitators" of economic activity, civic engagement, and media learning centers.

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While 'media literacy' is increasingly becoming a vital educational component, there is an urgent need for academia to help learners, especially younger people who are 'digital natives', to develop the practical skills needed for creating, interpreting, using, and evaluating digital content in critical and creative ways. To meet this challenge, the author evaluated a blended, project-based course integrated with artificial intelligence technologies to enhance undergraduate students' digital media creation skills in Thailand.

Moreover, these connections are often established through multiple devices simultaneously, allowing users to stream videos, use social media, and search the Internet. Different forms of digital media also offer users access to content when and where they want it. Digital media allows the audience to make sense of the content and inquire through interactive means and also allows immediate and quick means of communication and expands the reach of the message to more significant audiences. Therefore, content creators must ensure that their target audience receives clear and relevant information. The media's production and dissemination achieve this.

Therefore, this study focuses on digital media creation skills [1-3] emphasizing the ability to produce and refine digital content, such as videos, images, and websites, using digital tools creatively and analytically. This is consistent with Dahya [4] who considered the importance of contextualized media production, technological tools, media types, and design elements in shaping digital content, particularly for youth. Various educational approaches support the development of digital media skills, including blended learning, project-based learning, problem-based learning, flipped classrooms, collaborative learning, and artificial intelligence-assisted learning. This research integrates explicitly blended learning, project-based learning, and artificial intelligence in digital media creation.

Blended learning (BL) combines offline learning, digital media, and project-based instruction, facilitating diverse learning methods and student engagement. Numerous other studies have confirmed that blended learning enhances professional skills and academic performance [5-9] and Project-based learning (PjBL) emphasizes collaborative research, planning, and project execution in real-world contexts [10-12]. Other researchers have also demonstrated its effectiveness in improving analytical thinking, creativity, teamwork, and problem-solving skills [13-15].

Artificial Intelligence (AI) has also become essential in creating digital media content [16-19]. AI is involved in automated content generation, information/data analysis and extraction, assistive human-machine content creation, and producing videos, sounds, and personalized content recommendations. Existing literature has also shown that generative AI improves design abilities and user interaction in learning environments [20, 21].

A blended learning model (BLM) with project-based learning (PjBL) and AI to enhance digital media creation skills and academic achievement. This research aimed to propose a BLM with PjBL and AI to enhance digital media creation skills and academic achievement to enhance digital media creation skills for undergraduate students.

2. Literature Review

2.1. Digital Media Production Skills

In recent years, digital media production has become essential in industries centered around creative production and education and employment environments. Scholars have defined digital media production in various ways, though all agree that digital media production involves a meeting of creativity, technological capability, and critical engagement. Jenkins [3] defines digital media production as the ability to develop and create content, including video, images, and web-casting, to share this content through digital means. Jenkins' definition suggests that production is a communicative practice and necessarily involves engagement with others.

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Similarly, Lybeck, et al. [1] describe these digital media production skills as creative/ critical competencies, emphasizing the technical capacity to use digital tools and the analytical acumen to interpret and shape messages through media.

This connection between expression and interpretation is indispensable to seeing media as a product and process. Vuorikari, et al. [2] takes this technocentric perspective further by examining the technical skills required to produce digital materials and further characterizes digital media production skills as both creative and critical, emphasizing the technical capacity to use digital tools and the analytical acumen to interpret and shape messages through media.

These conceptualizations suggest that digital media production skills cannot be reduced to technical expertise alone. Instead, they encompass broader capabilities, including creative design, communication strategy, and reflective problem-solving. Mastery in this area entails synthesizing aesthetic judgment, tool proficiency, and the capacity to construct meaning across multiple media forms.

Although scholars emphasize different aspects of media production, there is consensus in the literature regarding the key elements that constitute competence in this area. From the literature review, the authors synthesized five interrelated elements [1-3, 22, 23].

First, content analysis consists of the essential ability to engage with media texts critically. It involves identifying bias, evaluating the credibility of sources, or interpreting rhetorical and visual elements. Second, content development refers to the creative activity of producing original digital artifacts. Whether learners are producing a short movie or an infographic, they must get involved in conceptualizing ideas, planning the narrative, and making aesthetic choices.

Moreover, both elements require adequate technical proficiency, tool mastery, and media distribution. Technical proficiency can also be understood as practical digital skills which entails the application of digital tools and mastering digital environments, from purposefully using editing software to modifying visual assets and solving technical issues.

Closely tied to this is tool mastery, which implies delivering a deeper understanding of the characteristics and limitations of specific technologies. Finally, Media distribution is the strategic sharing of content within digital environments. It asks for a deep knowledge of various platforms, audiences, and algorithms to achieve as much reach and successful engagement as possible. Together, these components form the scaffolding of digital media literacy, enabling individuals to participate fully in today's multimedia-driven society.

In addition, developing digital media production skills has salient benefits for educational, professional, and personal applications. On the professional level, Vuorikari, et al. [2] claims digital media production skills are imperative to professional readiness, especially in sectors such as digital marketing, communications, and creative technology, where digital media fluency is often a pre-requisite. Competence in digital production is becoming an essential aspect of 21st-century literacy and an important aspect of professional development in a knowledge economy.

Considered from an education standpoint, the reasons are just as compelling. Potter [23] argued that students who participate in media production develop stronger problem-solving and critical-thinking skills. The students must learn how to use technical software, develop an idea, organize a production process, and collaborate.

Jenkins [3] further builds on the cognitive and psychological benefits, arguing that production, a highly creative process, encourages innovative thinking. He explains that media producers are engaged to the extent that they can think "outside the box." By producing content that is not only expressive but also functional, students engage in higher-order thinking and develop the competency to convey complex ideas in multimodal forms. This synthesis of cognitive, technical, and creative development underscores the transformative potential of digital media education, especially when embedded meaningfully in formal curricula.

A growing body of research has examined how digital media production skills are acquired and applied within educational settings. Dahya [4] for example, conducted an ethnographic study of youth

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digital production in school contexts. Her findings indicate that contextual variables—such as access to technology, curriculum design, teacher facilitation, and peer collaboration—significantly shape learners' engagement with digital content creation. The study illustrates how physical environments, socio-cultural dynamics, and institutional support collectively influence the depth and quality of students' media work.

Vuorikari, et al. [2] also provides valuable insight into the application of digital media production in educational practice. His research highlights the diversity of media formats students engage with, from photography and video to interactive web content. He emphasizes that effective instruction should go beyond simple tool training. Instead, it should foster an integrative learning process that combines technical skill development with conceptual exploration and creative expression.

These studies converge on the understanding that digital media production cultivates technological fluency, cognitive flexibility, self-expression, and communication literacy when effectively implemented in educational contexts. As such, media production represents a vocational skill set and a transformative educational practice.

2.2. Blended Learning (BL)

Blended learning has become a pivotal pedagogical framework in contemporary education. As development in the digital world advances, blended learning combines face-to-face teaching methods and digital technology to create highly dynamic learning environments that enable interaction between learners and educators. Researchers have conceptualized BL through different perspectives, but at its core, BL combines in-person engagement with online delivery to achieve more profound learning outcomes. Therefore, scholars have defined BL as a thoughtful fusion of classroom experiences and digital tools to stimulate cognitive engagement [7].

This definition also fits BL descriptions by Bonk and Graham [5] who present BL as a flexible instructional strategy that enables learners to interact with content, instructors, and peers through synchronous and asynchronous modes. Driscoll [6] further emphasized the multifaceted nature of BL, suggesting that BL encompasses the merging of offline and online processes and pedagogical techniques like PjBL.

The infusion of BL unfolds through pedagogical stages that blend online and face-to-face learning. Drawing on a review of well-known frameworks [5, 7, 24-26] the authors identified four main stages. These included.

1) Initial design and planning of learning experiences.

2) Selection and integration of digital tools.

3) Facilitation of self-directed online learning alongside face-to-face learning.

4) Assessment and evaluation of learning. The stages help to capture a broad picture of the learner's journey in a blended context.

Meanwhile, PjBL has been discussed as a five-stage instructional model [13, 27-30]. They include.

1) Problem definition.

2) Project design.

3) Actualization.

4) Reflection and evaluation during project implementation.

5) Project presentation.

A significant body of evidence contends that BL increases student engagement and improves student performance. This is consistent with Bonk and Graham [5] who early on suggested that BL allows students to access a broader range of multimedia resources. Similarly, Garrison and Vaughan [7] reported that BL promotes deeper learning by allowing students to review course materials on schedule.

Allen and Seaman [25] also noted that learners in BL environments can apply more temporal and spatial flexibility in their coursework engagement. In addition, Means, et al. [24] suggested that BL

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environments allow learners to achieve competency at their own pace and have the ability for students to have differentiated instruction grounded in individual needs.

Other recent empirical evidence supports these theoretical conclusions. Navío-Marco, et al. [8] reported on BL experiences based on business management education in which students, acting as teachers, created instructional videos for their peers. These blended, participatory models increased student satisfaction and engagement and improved conceptual learning and the development of metacognitive strategies. Similarly, Zhang, et al. [9] reported results from a professional development workshop that combined a BL design with apprenticeship-based models. Through participatory observation, interview data, log analysis, and online discussion, the authors illustrated how blended participatory models can support innovation in education and professional development in higher education.

2.3. Project-Based Learning (PjBL)

Project-based learning (PjBL) is a pedagogical strategy that organizes learning around meaningful projects. Unlike traditional content-based models, PjBL prioritizes thinking and discovery by involving students in solving complex problems through real-world projects Pimdee, et al. [31]. Holm [11] also suggested that PjBL is a natural, student-centered approach that allows students to discover meaning and understand knowledge while positioning them for 'exploratory learning.'

Similarly, Nurhidayah, et al. [10] defined the PjBL method of instruction as an approach that triggers students to investigate and explore real-world problems. For this reason, exploring how students think and how learning occurs in PjBL creates a distinctive learning approach from other pedagogical strategies [11]. Moreover, Krajcik and Blumenfeld [12] noted that PjBL projects endorse teamwork and the need for higher-order thinking skills (HOTS). Within the Thai context, Pimdee, et al. [31] and Netrthanon, et al. [32] highlighted the processual element of PjBL, including how learners and/or teachers develop the project theme, including content information.

In digital media education, PjBL has been found to provide profound pedagogical value. Ling, et al. [28] found that engaging learners in real-world digital projects enables learners to build transferable skills and knowledge relevant to the industry, such as working to deadlines and responding to fluctuating client demands. Mustamin [29] found that working collaboratively on projects enables learners to develop soft skills like teamwork and communication, which are increasingly valued by creative industries.

Other recent studies have provided considerable empirical evidence on the influence of PjBL on student outcomes. For instance, Zhao [14] showed that students enrolled in PjBL reported higher degrees of academic achievement, motivation, and creativity, albeit with some implementation-related barriers in place (e.g., instructional design, learner diversity, and curriculum integration). In support of these findings, McKinney [15] showed that PjBL encourages student collaboration, experimentation, and problem-solving across various disciplines. Ramadhan, et al. [13] also designed and validated a hybrid PjBL model incorporating BL components for multimedia and animation students. The authors demonstrated statistically significant student learning performance gains through a quasi-experimental study and expert and peer reviews, confirming the model's effectiveness.

2.4. Artificial Intelligence (AI)

Artificial Intelligence (AI) increasingly influences digital media by applying its abilities for content production, data processing, and human-computer collaboration. One aspect of AI transforming digital media is its potential for content creation through models such as Generative Adversarial Networks (GANs) and large language models (LLMs) [33].

As Khadake [16] and Li, et al. [34] discussed, these technologies can generate accurate, context-appropriate content—such as images and video, as well as text and audio. Furthermore, Park [17] wrote that AI can automate ideation and content production workflows, lowering the creator's cognitive

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load while increasing speed between iterations. Chen, et al. [35] have added that AI-enabled platforms could support and optimize the entire content workflow—from generation to publishing—within a unified system.

In addition to creating content, AI analyzes and disseminates digital content. Park [17] highlighted how machine learning algorithms can detect patterns in large datasets, allowing for data-informed content strategies. These insights can then be developed to optimize distribution across online platforms so that content is more likely to reach its target audience [35].

Another important area of AI in digital media is human-machine collaboration. Xue [36] wrote that AI enhances human creativity and challenges the notion of authorship and artistic production. In human-machine collaboration, AI is a co-creator rather than a tool. Such transformation poses ethical challenges over originality, ownership, and creative intent in AI-assisted products [16].

AIs have made outstanding video and image processing achievements in terms of practical applications. Deep learning makes it possible to imprint video, that is, fill in missing frames, which preserves both temporal coherence and semantic fidelity [18]. With deep learning technology, systems can recognize the object, analyze the scene, and predict the user's intention [37]. Intelligent image recognition facilitates interactions by understanding better the user intentions and beautifying the digital content. The interactivity and aesthetic quality of digital content.

2.5. Synthesis and Research Gap

The preceding sections have established a multifaceted understanding of digital media production skills related to evolving educational practices and technological landscapes. Collectively, the literature affirms the growing centrality of these skills in modern education and underscores their integration within pedagogical frameworks such as project-based learning (PjBL) and blended learning environments. Various scholars have laid the conceptual groundwork for understanding digital media production as a hybrid competency encompassing creativity, critical thinking, and technical proficiency [1-3]. These foundational insights are echoed and expanded upon through studies that examine how learners engage with digital tools in real-world educational settings [4, 22, 23].

Further, the literature on PjBL positions it as a strong pedagogical approach for cultivating digital competencies through active, student-centered learning experiences. Research suggests that when students are empowered to create digital artifacts as part of collaborative projects, they develop more profound engagement with both the medium and the message [12]. When situated within BL environments, these experiences are further enriched while providing flexibility in accessing content. It also fosters opportunities for differentiated instruction, digital collaboration, and multimodal communication [38]. This modality appears especially well-suited for supporting iterative, reflective, and interdisciplinary approaches to media production.

Most recently, there has been significant interest in incorporating artificial intelligence (AI) tools into digital learning – from automated editing programs and generative image platforms to intelligent tutoring systems and content suggestion engines. Such AI tools are broadening the possibilities for the digital production of content and the support of learning [39, 40].

While these technologies offered exciting new affordances, they also posed pedagogical and ethical challenges that have not been sufficiently explored for creative production within blended learning formats. Issues of authorship, creative ownership, cognitive offloading, and equitable access to such AI tools were increasingly prominent yet underexplored in existing empirical work.

Despite this rich and growing body of literature, there remains a significant research gap at the intersection of these themes. Most studies have investigated digital media production, PjBL, or blended learning in isolation without fully exploring how these elements interact when integrated into a single instructional framework. Even fewer studies have examined how AI tools specifically influence the teaching and learning of digital production skills within blended project-based learning environments.

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The pedagogical implications of this convergence—especially concerning student agency, creativity, and the authenticity of digital artifacts—are not yet well understood.

Therefore, this study addresses this critical gap by investigating how students use digital media production in a blended PjBL setting incorporating AI tools. Specifically, it aims to understand how these technologies affect students' creative processes, collaborative dynamics, and overall learning outcomes. In doing so, the research aspires to contribute to theoretical discussions around digital literacy and pedagogy and offer practical guidance for educators navigating this increasingly complex educational terrain.

2.6. Research Objectives (ROs)

RQ1: To develop a blended learning management model integrating project-based learning and artificial intelligence.

RQ2: To examine the effectiveness of this model in digital media creation skills and learning outcomes.

RQ3: To compare students' digital media creation skills after using the model against an 80% proficiency benchmark.

RQ4: To compare students' academic achievement before and after using the model.

3. Methods

This study employed a structured mixed-methods approach to develop and evaluate a blended learning model integrating PjBL and AI for enhancing digital media creation skills [41]. The methodology encompassed two phases: (1) theoretical development, involving systematic literature analysis and expert validation to synthesize instructional frameworks, and (2) empirical implementation, testing the model's efficacy through a quasi-experimental design with 108 first-year IT students.

Data collection tools included validated rubrics, achievement tests, and focus group discussions, analyzed using descriptive and inferential statistics (e.g., t-tests) to assess skill development and academic outcomes. The design prioritized rigor, scalability, and alignment with contemporary educational demands, ensuring theoretical coherence and practical applicability.

3.1. Process 1: Development of a Blended Learning Model Integrating Project-Based Learning and Artificial Intelligence

This process consists of two key stages.

3.1.1. Stage 1: Development of the Learning Model

Data Sources

Documents and research studies (2015–2024) related to instructional design, BL, PJBL, and AI applications in education, sourced from books, journals, theses, and online databases.

Research Tools

- Document analysis and synthesis Form: Used to record and synthesize key findings from the literature, focusing on keywords aligned with the research objectives;
- Content analysis and synthesis: Applied to identify patterns and frameworks from the literature.

Theoretical Synthesis

1) Instructional design frameworks: The model emphasizes four components.

- Rationale and principles.
- Learning objectives.
- Learning activities.
- Assessment and evaluation.

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2) Blended learning framework: Integrated steps resulting in four phases.

- Learning planning.
- Technology and platform integration.
- Self-paced online learning and classroom sessions.
- Evaluation.

3) Project-Based Learning (PjBL) Framework: The synthesized outline used five steps.

- Problem identification.
- Project planning.
- Hands-on development.
- Reflection and feedback.
- Project presentation.

4) AI integration in digital media creation: Based on three AI-driven applications.

- Content generation (text, images, video).
- Automated narration and music production.
- Data analysis and dissemination.

Final Learning Model

The synthesized blended learning model integrating PjBL and AI comprises five stages.

- Project planning.
- Hands-on development.
- AI application.
- Feedback and iteration.
- Final presentation.

3.1.2. Stage 2: Quality Evaluation of the Learning Model

Participants

Seven experts with doctoral qualifications in computer education (3), instructional design (2), curriculum and pedagogy (1), and assessment and evaluation (1).

Sampling Method

Purposive sampling

Research Tools

A 5-Point Likert Scale Questionnaire with 26 items across four dimensions [42] evaluated.

- Usefulness.
- Feasibility.
- Appropriateness.
- Accuracy.

Validity

The Index of Item Congruence (IOC) (0.60–1.00) was used for item validation checking.

Data Collection

Conducted via Zoom focus group discussion on November 22, 2024. 100% response rate (7 completed evaluations).

Data Analysis

Descriptive statistics, including the average mean and standard deviation (SD).

3.2. Process 2: Implementation of the Learning Model

3.2.1. Population and Sample

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The population was 347 undergraduate IT students (Years 1–4) from King Mongkut's University of Technology North Bangkok, Prachinburi Campus, academic year 2024. The final sample comprised 108 first-year IT students selected via simple random sampling (lottery method).

3.2.2. Research Tools

Digital Media Skills Rubric

- Analytical rubric assessing process/procedure.
- Validity: IOC = 1.00.
- Inter-Rater Reliability (IRR): Pearson's correlation coefficient = 0.98.

Digital Media Achievement Test

- 20 multiple-choice questions (Bloom's revised taxonomy: remember, understand, apply).
- Validity: IOC = 0.80–1.00.
- Difficulty (p): 0.47–0.77.
- Discrimination (r): 0.20–0.47.
- Reliability: KR-20 = 0.82.

Implementation

- 12-hour instructional program using the developed model.
- Post-intervention assessment of digital media skills and academic achievement.
- Data Analysis
- Descriptive statistics (mean, SD).
- One-sample t-test: Compare post-intervention digital media skills against an 80% benchmark.
- Dependent samples t-test: Compare pre- and post-test academic achievement.

4. Results

This section presents the findings from developing and implementing a BLM that integrated PjBL and AI. Structured into five stages—project planning, practical development, AI integration, feedback loops, and final presentation—the model was validated through expert evaluation and empirical testing. The study aimed to enhance students' digital media creation skills and academic achievement through an innovative instructional framework. The research was divided into two key phases: the model development phase and the implementation phase, with each phase yielding distinct insights into the effectiveness and applicability of the approach.

4.1. Description of the Learning Model

The proposed BLM, which combines PjBL and AI, comprises four main components: 1) Rationale and Principles; 2) Learning Objectives; 3) Learning Activities; and 4) Assessment and Evaluation.

The learning process is structured into five stages (Figure 1): 1) Project planning; 2) Hands-on project development (practical development; 3) AI Integration into project work; 4) Ongoing feedback and support during project execution (feedback loops); and 5) Final Project Presentations.

These stages aim to provide students with an authentic PjBL experience supported by modern AI tools to stimulate creativity, problem-solving, and digital skill acquisition.

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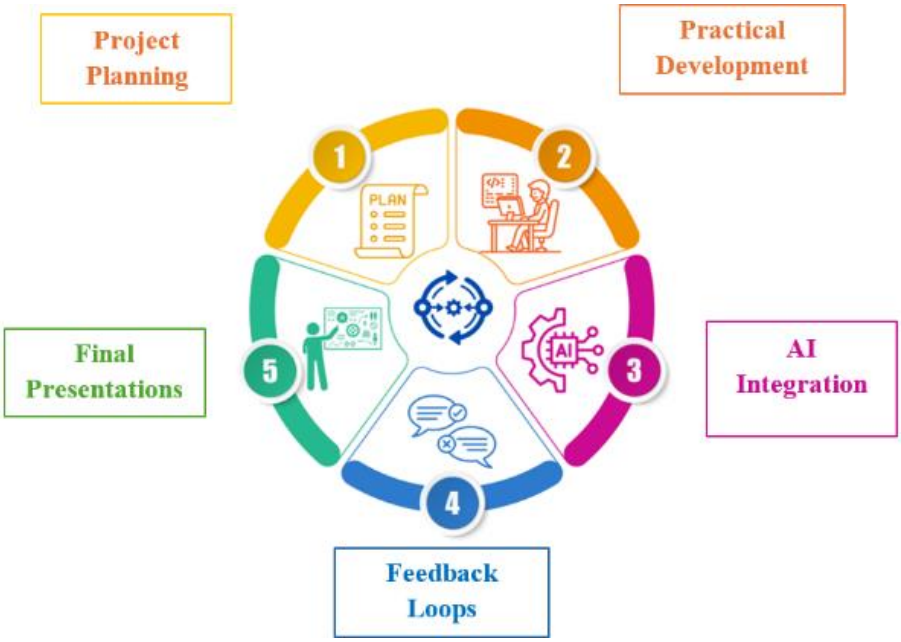

Figure 1.
Blended learning model using PjBL and AI.

4.1.1. Expert Evaluation of the Learning Model

The learning model was evaluated by seven subject matter experts, who rated it on four quality dimensions: feasibility, utility, propriety, and accuracy. Table 1 shows the average scores across these dimensions [42, 43].

Table 1.
Mean scores, standard deviations (SD), and ranking of quality dimensions of the learning model (n=7).

Dimension	Experts (n=7)	Quality Level		Rank
	mean	SD		
Utility	4.35	0.63	High	2
Feasibility	4.41	0.57	High	1
Propriety	4.24	0.52	High	3
Accuracy	4.19	0.67	High	4
Overall	4.30	0.60	High	-

4.2. Results from Developing the Blended Learning Model Integrating Project-Based Learning and Artificial Intelligence

4.2.1. Comparison of Students' Digital Media Creation Skills with Benchmark Criteria

The model was implemented with a sample of 108 undergraduate students. Their performance in digital media creation was assessed after completing the course (Table 2), and the results were compared to a predefined benchmark (80%). The findings show that students' average performance (88.70%) significantly exceeded the benchmark, indicating a statistically significant improvement in digital media skills at the 0.01 level.

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Table 2.
Comparison of students' digital media creation skills post-implementation.

Skills	Full Score	Students (n=108)		%	t-value	P-value
		mean	SD			
Digital Media Creation	30	26.61	2.64	88.70	10.30*	0.00
Criteria	-	24.00	-	80		

Note: *sig.< 0.01.

4.2.2. Comparison of Academic Achievement Before and after Using the Model

In addition to skill acquisition, academic achievement was measured (Table 3) before and after the implementation of the model. Results revealed a significant improvement in academic achievement post-instruction, supporting the model's effectiveness.

Table 3.
Comparison of pre-and post-instruction academic achievement.

Academic achievement	Full score	Students (n=108)		t-value	p-value
		mean	SD		
After Study	20	13.28	2.80	6.55*	0.00
Before Study		11.36	2.91		

Note: *sig.< 0.01.

5. Discussion

Developing a blended learning model integrating PjBL and AI yielded a five-stage framework to enhance digital media creation skills. This model—comprising project planning, practical development, AI application, feedback loops, and final presentations—was rigorously validated by experts, who rated its overall quality and individual components (feasibility, utility, propriety, and accuracy) as high. This success stems from its synthesis of established pedagogical frameworks, including blended learning principles [5, 7, 26, 44] PjBL methodologies [13, 27, 31] and AI-driven content generation strategies [16, 45, 46].

Empirical implementation revealed statistically significant improvements in students' digital media skills and academic achievement ($p < .01$), surpassing the 80% benchmark. These outcomes align with prior studies on blended learning [44, 47] which highlight its capacity to boost engagement and knowledge retention, and PjBL research [14, 15] which underscores its role in fostering critical thinking and collaboration. Furthermore, the integration of generative AI tools, enriched students' creative processes, enabling dynamic content design and iterative refinement [20, 21].

However, this study is not without limitations. Its focus on a single university cohort limits the generalizability of findings, and the short-term intervention period (12 hours) may not fully capture the long-term sustainability of skill retention. Future research should explore longitudinal impacts and diversify participant demographics to validate the model's scalability across educational contexts.

6. Conclusion

This study presented a blended learning model that synergizes PjBL and AI to cultivate digital media competencies. Structured into five stages—project planning, practical development, AI integration, feedback loops, and final presentations—the model was validated through expert evaluation and empirical testing. Experts unanimously endorsed its pedagogical value, while the 108 students demonstrated statistically significant gains in both skill mastery and academic performance ($p < .01$). These findings underscore the efficacy of blending hands-on, collaborative learning with AI-driven tools to meet contemporary educational demands.

While the results are promising, the study's confined scope invites caution. Broader applications across diverse institutions and extended timeframes are necessary to assess the model's universal adaptability. Nevertheless, this framework offers a compelling blueprint for educators seeking to

harmonize technological innovation with student-centered pedagogy, preparing learners to thrive in an increasingly digital world.

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Institutional Review Board Statement:
The study was conducted in accordance with the Declaration of Helsinki. At every step, the anonymity of the participants was considered and ensured, with all interviewees informed that no information concerning their private information would be used without their knowledge and permission.

Transparency:
The author confirms that the manuscript is an honest, accurate and transparent account of the study that no vital features of the study have been omitted and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Competing Interests:
The authors declare that they have no competing interests.

Authors' Contributions:
Oraboot Wuttikamonchai (OW) The author conceived and designed the study, conducted the research, analyzed the data, and wrote the manuscript.

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