

The Development of the Buddhist Innovation arts of pattern decoration on Lanna Vihara into digital prints

1. Phra Khru Thirasutapoj, 2. Phisit Kotsupho, 3. Chalongdet Kupanumat,
4. Lipikorn Makaew, 5. Phra Athiwat Ratanavanno (Thammawatsiri),
6. Phra Witawat Pabhassaranano, 7. Chantarap Tapuling, 8. Phacharabot Rittem*

1., 2., 5., 7., 8. Mahachulalongkornrajavidyalaya University

3. Chiang Mai University, 4. Rajamangala University of Technology Lanna

6. Mahamakut Buddhist University

*Corresponding Author Email: phacharabot.rit@mcu.ac.th

Abstract

This research aimed to: (1) examine the creative process of Buddhist innovative art in digital printmaking based on Lanna vihar decorative motifs; (2) develop a learning activity package based on Kolb's Experiential Learning Theory for the course Contemporary Buddhist Art Creation; (3) enhance creative souvenir products derived from Buddhist innovative digital prints; and (4) evaluate learning achievement and the satisfaction of learners and consumers toward the developed products.

This mixed-methods study was conducted at major Lanna vihar sites in Upper Northern Thailand, covering the regional artisan traditions of Chiang Mai, Lampang, Nan, and Phayao. The participants included 30 key informants, 20 digital printmaking co-creators, 20 learners participating in the Kolb-based learning activities, and 20 participants involved in creative product development and evaluation. The research instruments consisted of interview forms, artwork evaluation forms, learning achievement assessment forms, and satisfaction questionnaires. The satisfaction questionnaire demonstrated acceptable reliability, with a Cronbach's alpha coefficient of 0.89. Quantitative data were analyzed using frequency, percentage, mean, and standard deviation, while qualitative data were analyzed through content synthesis and interpretive analysis within a contemporary Buddhist innovative-art framework.

The findings revealed that Buddhist innovative digital printmaking from Lanna vihar motifs referring to Buddhist assembly halls in Northern Thai temple architecture was not a direct reproduction of traditional architectural decoration. Rather, it involved decoding, reinterpretation, and systematic reconfiguration of motifs from sacred architectural surfaces into digital print space while preserving their rhythm, lines, forms, and Buddhist ethical meanings. The study classified motif units into primary motifs, secondary motifs, filler motifs,

and border motifs, which helped maintain design unity, clarify symbolic meaning, support scalable production, and preserve Lanna cultural identity.

The Kolb-based learning activity package effectively guided learners through concrete experience, reflective observation, abstract conceptualization, and active experimentation. It connected knowledge of Lanna motifs and Buddhist principles with digital design practice and tangible production, enabling learners to develop meaningful understanding and transferable creative skills. Creative souvenir products were developed into practical prototypes, including calendars, ceramic mugs, insulated tumblers, tote bags, T-shirts, and framed jigsaw puzzles. Product development emphasized print quality, motif clarity, material durability, cost management, and blended online–offline distribution. The study also proposed extending the motifs into digital files for dissemination and sale through photostock platforms.

Learning achievement was at a very good level, with a mean score of 82.80 out of 100 ($SD = 6.10$). Overall satisfaction among learners and consumers was at the highest level, particularly in the areas of learning process, practical applicability, and product extension. These results indicate that the developed model effectively supports practice-based learning, cultural value creation, and creative product development.

Keywords: 1. Buddhist Innovative Art; 2. Lanna Viharn Motifs; 3. Digital Printmaking

Introduction

Lanna is a region with a long historical and cultural development that has shaped the distinctive identity of the Lanna Kingdom in present-day northern Thailand. This region has been closely connected with ethnic groups, languages, belief systems, and urban networks within major river basins of Southeast Asia. Historical evidence indicates that Lanna expanded through networks of cities and relationships with neighboring states in political, economic, and cultural dimensions. As a result, Lanna became an important repository of artistic heritage, particularly Buddhist art within temples, which served as community centers and sacred spaces for the establishment of Buddhist faith (Poonpol Asanachinda, 1989: 63). Decorative motifs in Lanna art often include mythical animals, deities, and symbolic plants, reflecting the integration of Theravāda Buddhism with local beliefs (Freeman & Stadtner, 2013).

From the perspective of Buddhist art, Lanna art is not merely a matter of formal beauty. Rather, it is a system of meaning that connects Buddhist teachings, symbols, and the worldview of local communities. Buddhist sculpture and architecture in northern Thailand reflect ideas of merit-making, sacred power, and the transformation of religious sites into spiritual spaces accessible through ritual practice and visual perception (Stratton, 2004). Scholars suggest that Lanna art should be interpreted through local contexts and cultural exchanges rather than through a centralized artistic framework alone. This is because local craftsmanship and aesthetic preferences gave Lanna Buddhist art a distinctive character that differs from other regions (Revire, 2014: 128). In addition, Lanna artistic forms reveal

influences from neighboring regions, indicating a long history of cultural exchange and interaction. The craftsmanship of Lanna artisans is evident in wood carvings, mural paintings, and woven textiles used to decorate temples. These forms of Buddhist art function as media for communicating religious teachings, spiritual ideals, and cultural values. They developed alongside the spread of Buddhism across Asia and adapted to local customs and artistic traditions (Rawson, 1990: 73).

Decorative motifs found in viharns and other temple components, such as gables, entrance arches, gilded patterns, wood carvings, and murals, serve as visual languages for storytelling, creating sacred atmospheres, and transmitting Buddhist moral teachings through images and symbols. This is especially evident in symbols related to Buddhist cosmology, acts of worship, and religious practice (Ginsburg, 2000: 56). These images have both educational and spiritual purposes: they communicate moral teachings and enhance the sacred atmosphere within temple spaces (Swearer, 2010). At the symbolic level, key structures such as stupas, or architectural forms associated with stupas, also express ideas of cosmology, remembrance of the Buddha, and the centralization of faith. Therefore, temple art should not be understood merely as decoration, but as a visual language that works in connection with ritual, belief, and the cultural life of the community (Snodgrass, 1985: 102).

At the same time, the preservation and communication of Lanna Buddhist artistic heritage in the contemporary world face several challenges. These include limitations in accessing actual heritage sites, the fragility of materials and environmental conditions, and the perceptual gap among younger generations who increasingly engage with digital media. The development of Lanna Buddhist innovative art therefore requires a careful approach that connects the past with the present. Transforming motifs and artistic elements into printmaking or digital media can expand public access, allowing learners and wider audiences to perceive craftsmanship details and symbolic meanings more clearly. It also creates space for new design approaches and reinterpretation grounded in respect for cultural roots (Paul, 2008: 75). The development of printmaking that integrates traditional processes with digital technology represents a creative approach suited to the digital era. It allows traditional and digital methods to generate new printmaking contexts and enables creative works to be disseminated to the public, helping audiences recognize the value of combining traditional art with digital media (Weeraphat Suteerangkul, 2021: 247).

Digital art, as a contemporary medium, enables artists and designers to manage visual elements with flexibility, including layering, compositional adjustment, spatial arrangement, and experimentation with various printing materials. This corresponds with the view that contemporary digital art has been transformed by the integration of technology, artificial intelligence, digital tools, virtual reality, and augmented reality, which have expanded artistic expression, distribution, and audience engagement in the modern creative landscape (Phra Athiwat Thammawatsiri et al., 2024). This process supports the development of digital printmaking as both a medium for preservation and a means of presenting knowledge in ways that correspond to contemporary modes of communication. When the creative process is grounded in a comprehensive study of the meanings embedded in Lanna art, Buddhist innovative art can simultaneously serve multiple functions: preserving cultural heritage, enhancing learning, and communicating religious and cultural values to contemporary society in a sustainable manner.

Research Objectives

1. To examine the creative process of Buddhist innovative art in the form of digital printmaking by applying Lanna vihar decorative motifs as a basis for design.
2. To develop a Buddhist innovative-art learning activity package in digital printmaking based on Kolb's Experiential Learning Theory for the course Contemporary Buddhist Art Creation, using Lanna vihar decorative motifs as learning materials.
3. To enhance creative souvenir products derived from Buddhist innovative digital printmaking developed from Lanna vihar decorative motifs.
4. To evaluate learning effectiveness and the satisfaction of learners and consumers toward Buddhist innovative-art products in the form of digital printmaking developed from Lanna vihar decorative motifs.

Research Methodology

This study employed a mixed-methods research design, integrating documentary research, quantitative research, qualitative research, and action research. The main research sites were 16 significant Lanna vihar, covering the artisan lineages of Chiang Mai, Lampang, Nan, and Phayao. The extension and application sites included Wat Tharathip Chai Pradit in Mae Taeng District, Chiang Mai Province, related educational institutions, and organizations involved in art and digital pattern design.

The participants were divided into four groups: 30 key informants for in-depth interviews, 20 digital printmaking co-creators, 20 learners participating in the Kolb-based learning activities, and 20 participants involved in creative product development and evaluation. In addition, six experts participated in a focus group discussion to validate and refine the model.

The research instruments included questionnaires, interview forms, focus group discussion forms, and three research practice sets: a digital printmaking activity set based on Lanna vihar decorative motifs, a learning activity set based on Kolb's Experiential Learning Theory, and a creative souvenir product development activity set. The instruments were validated by three experts using the Index of Item-Objective Congruence, with acceptable scores ranging from 0.50 to 1.00, and were revised before implementation.

Data collection was conducted in eight stages: documentary study and field survey, expert interviews, digital print creation, development of Kolb-based learning activities, implementation of the learning activities, creative souvenir product development, dissemination and extension, and final research synthesis.

Data analysis was divided into two parts. Quantitative data were analyzed using frequency, percentage, mean, and standard deviation, together with achievement and practical work assessment based on predetermined criteria. Qualitative data were analyzed through content analysis of documents, interviews, and focus group discussions. The data were categorized, synthesized, and interpreted in accordance with the research objectives.

Research Findings

The findings of the study are presented according to the research objectives as follows:

1. The Creation of Buddhist Innovative Art in Digital Printmaking from Lanna Viharn Decorative Motifs. The study found that Lanna vihar decorative motifs are not merely architectural ornaments. Rather, they function as a sophisticated “system of meaning” embedded within the sacred space of the vihar. These motifs define spatial boundaries, guide visual perception, create an atmosphere of devotion, and communicate Buddhist moral and spiritual values. When systematically decoded, they can be transformed into Buddhist innovative art in the form of digital printmaking while preserving the distinctive identity of Lanna culture.

The field survey of 16 Lanna vihar, covering the artisan lineages of Chiang Mai, Lampang, Nan, and Phayao, revealed a rich diversity of motifs and regional artistic influences. Despite their differences, these vihar shared common characteristics: refined pattern systems, rhythmic composition, and the use of religious and folkloric symbols. Motifs with strong potential for creative development included vine patterns, flowing vegetal motifs, Lanna-style kanok patterns, auspicious animals, Himavanta creatures, sacred geometric forms, lantern motifs, layered octagonal patterns, and architectural elements such as gables, entrance arches, eaves, ventilation panels, carved woodwork, and stucco reliefs.

The study classified motif modules into four main categories: main motifs, secondary motifs, filler motifs, and border motifs. This classification enables digital printmaking to move beyond surface-level imitation. It allows designers to retain the structural logic, symbolic depth, and cultural spirit of Lanna art while creating new contemporary works. Three compositional strategies were also identified: all-over or repeat patterns, band or border compositions, and central or medallion compositions. These formats are suitable for both digital printmaking and creative product development.

In summary, the creation of digital prints from Lanna vihar decorative motifs represents a transformation of cultural heritage from sacred architectural space into a contemporary visual language. Through symbolic interpretation, motif classification, compositional design, and the use of digital technologies such as Adobe Photoshop and Adobe Illustrator, the resulting works become more than aesthetically pleasing images. They embody a form of creative conservation grounded in scholarship, cultural sensitivity, and practical application.

2. The Development of a Kolb-Based Buddhist Innovative-Art Learning Activity Package. The study found that the developed learning activity package successfully enhanced art-based learning by providing a clear structure and practice-oriented direction. Kolb’s Experiential Learning Theory served as the core framework, enabling learners to connect direct experience with theoretical knowledge through a systematic cycle of learning: concrete experience, reflective observation, abstract conceptualization, and active experimentation.

This learning package was not merely a classroom lesson plan. It was developed through a mixed-method and action research process involving documentary study, field surveys of 16 vihar, expert interviews, activity design, implementation, revision, and evaluation. As a result, the package was grounded in both academic evidence and practical experience.

The activity structure consisted of three modules. The first module focused on analyzing and interpreting Lanna vihar decorative motifs from the perspective of Buddhist art, allowing learners to

establish conceptual and symbolic foundations before creating their works. The second module involved digital motif design using Adobe Illustrator, transforming cultural meanings into reproducible visual forms suitable for digital printmaking. The third module introduced digital printmaking techniques in a professional production setting, allowing learners to encounter real-world challenges, practice decision-making, control quality, and solve problems as part of an authentic creative process.

In conclusion, the learning package created a purposeful cycle of practice, reflection, revision, and re-creation. It enhanced learners' artistic skills, conceptual understanding, quality of work, and ability to apply knowledge to real production contexts. The assessment system also emphasized not only final products, but also the learning process and reflective practice.

3. The Enhancement of Creative Souvenir Products. The study found that product enhancement in this context does not simply mean making objects more beautiful or novel. Rather, it refers to transforming cultural capital into marketable products while communicating the value of Buddhist art and Lanna wisdom in a systematic and meaningful way.

Two major dimensions of product enhancement were identified. The first was market and channel development. The study proposed a blended online–offline distribution model to expand accessibility, reduce limitations of physical location, and respond to contemporary consumer behavior. Lanna Buddhist innovative motifs were successfully applied to a variety of products, including desk calendars, Lanna calendars, ceramic mugs, insulated tumblers, tote bags, T-shirts, and framed jigsaw puzzles. However, the process of applying motifs to products requires careful consideration of materials, print clarity, durability, production cost, pricing, and feasibility for actual manufacturing.

The second dimension was knowledge and cultural communication. Product development should not be measured only by sales potential. It should also create public spaces for recognizing the value of Buddhist art. The study therefore proposed dissemination through academic articles, exhibitions, seminars, and continuous communication via social media. These channels can strengthen credibility, build consumer confidence, and support sustainable cultural transmission.

In addition, the study proposed extending tangible products into digital assets. Motifs could be prepared as downloadable design files for sale on photostock-style platforms. This approach would generate new income opportunities, expand cultural accessibility, and encourage appropriate use of digital designs under copyright protection.

4. The Evaluation of Effectiveness and Satisfaction. The evaluation involved 20 participants. Most respondents were female, accounting for 60.00 percent, while 75.00 percent were under 25 years old. All respondents were students. The major challenges identified during the activities included limited working time, insufficient or low-performance computers and equipment, limited proficiency in design software, relatively high production and printing costs, and errors in file preparation and resolution before printing.

Overall satisfaction was at the highest level, with a mean score of 4.56 and a standard deviation of 0.42. The highest-rated aspect was practical application and product development, with a mean score of 4.64. This was followed by the Kolb-based activity process, with a mean score of 4.60; content and the connection between Buddhist meanings and Lanna motifs, with a mean score of 4.52; and media, tools, and learning resources, with a mean score of 4.48.

Learning achievement and the quality of creative works were also rated at a very good level, with an overall mean score of 82.80 out of 100 and a standard deviation of 6.10. The average score for

knowledge and understanding of Lanna decorative motifs was 48.60 out of 60. The average score for digital printmaking works was 16.80 out of 20, while the average score for creative souvenir product development was 17.40 out of 20.

These results demonstrate that the developed learning and creative process effectively generated measurable outcomes in knowledge, artistic skill, creative thinking, and product-based application. More importantly, the project shows that Lanna Buddhist artistic heritage can be meaningfully revitalized through digital technology, experiential learning, and creative product development, transforming traditional motifs into living cultural assets for contemporary society.

Discussion

1. The Creation of Buddhist Innovative Art in Digital Printmaking from Lanna Viharn Decorative Motifs. The findings confirm that the creation of digital printmaking from Lanna viharn decorative motifs is a process of translating architectural prototypes into a contemporary visual language while preserving the Buddhist values, cultural identity, and embedded narratives within the motifs. This finding is consistent with the view that gilded and decorative motifs are not merely ornamental forms, but visual representations of belief, faith, way of life, and cultural prosperity closely connected with sacred architecture (Witthaya Phonwithun, 2019).

The extraction and reconfiguration of motif units in digital media, therefore, is not a superficial act of copying traditional patterns. Rather, it is a creative engagement with the “system of meaning” embedded in the motifs. This process enables the essence of Buddhist innovative art to remain alive within contemporary media. The finding that digital creation requires a systematic organization of components such as main motifs, secondary motifs, filler motifs, and border motifs also reflects the dynamic character of Lanna art as a culture that has continuously absorbed, transformed, and adapted to social and historical conditions. This corresponds with Chaiwat Pasuna’s (2021) discussion of political relations and external influences that shaped Lanna, or the Payap region, as a living and evolving cultural space.

In relation to the viharn gable, the study found that extracting architectural components and reorganizing them as visual units aligns with the idea that gable forms are closely related to social, political, and cultural contexts (Woralanchak Bunyasurat, 1992). Thus, transforming motifs from gables and pediments into digital printmaking is a meaningful act of bringing traditional contexts into contemporary visual media.

Technically, the use of motif modules, grid-based composition, repetition, and layering helps create unity and structural clarity in the artwork. This is consistent with contemporary digital printmaking approaches that require systematic analysis so that concept, form, and technique operate together logically (Weeraphat Suteerangkul, 2020). However, this study differs from art-historical studies that classify Buddhist art into conventional categories such as sculpture, painting, and architecture (Suwin Makdai, 2018). Instead, it focuses on interpretation, motif systematization, and creative transformation through digital printmaking.

2. The Development of a Buddhist Innovative-Art Learning Activity Package Based on Kolb’s Experiential Learning Theory. The findings show that the activity package designed according to Kolb’s

learning cycle enabled learners to engage in hands-on practice, reflective thinking, conceptualization, and active experimentation. This resulted in high learning achievement and satisfaction. The finding supports previous research indicating that art activities based on experiential learning can significantly improve post-learning achievement (Thanaporn Thepraksa, 2021).

This suggests that Experiential Learning Theory is highly suitable for art education, as technical skills and creative thinking cannot be developed through passive knowledge transfer alone. They require direct experience, experimentation, reflection, and continuous refinement. Reflection and discussion encouraged learners to recognize their strengths, identify areas for improvement, and enhance their creative works. This aligns with the concept of experiential learning and critical reflection, which can transform learners' attitudes, beliefs, and confidence (Naina Dorman et al., 2020).

The high levels of satisfaction and achievement also correspond with studies by Sujitra Tirattanakul (2019) and Saowapa Wichadee (2011), which suggest that experiential activities promote motivation, mindset development, and learning that respects individual differences. Although learners may have different backgrounds, a clearly structured activity that allows real experimentation and shared reflection enables them to develop skills, understanding, and confidence in creative practice. Furthermore, recent studies on AI Art Generators suggest that future art education should integrate traditional artistic techniques with prompt engineering, AI ethics, and digital copyright awareness, enabling learners to act as creative directors who guide digital systems while preserving human interpretation and cultural meaning (Phra Athiwat Thammawatsiri et al., 2025).

Compared with studies that apply the CIPPA Model to printmaking instruction (Samaporn Klaiwichian, 2002), this study shares an emphasis on learner-centered practice and active participation. However, the use of Kolb's framework makes the learning process more cyclical and comprehensive, moving from direct experience to practical application, rather than focusing primarily on instructional techniques.

3. The Enhancement of Creative Souvenir Products. The findings suggest that the enhancement of Buddhist innovative-art souvenir products should integrate two dimensions: meaning-based design and market-access strategy. This includes online and offline distribution, as well as the expansion into digital products and downloadable motif files for legitimate use. This approach corresponds with studies showing a positive relationship between innovation, product planning, product development processes, and market success (Supatsorn Unsiri, Jindarat Peemanee, & Phongsathorn Tantrabandit, 2020).

In this sense, the research does not stop at making motifs visually attractive. It extends into product systems, distribution channels, and value communication, which are central to the creative economy. The proposal to modernize motifs also aligns with Naruedon Jitsakul's (2018) finding that consumers tend to prefer contemporary patterns and that product forms should be continuously developed to preserve and disseminate local wisdom.

Digital printmaking functions as a “shared visual language” that transforms decorative motifs from sacred temple spaces into accessible products capable of communicating cultural meaning more clearly to contemporary consumers. Moreover, the use of color, product personality, and visual identity gives the products a stronger aesthetic and marketing dimension. This corresponds with studies emphasizing that color and visual identity influence product positioning, point-of-sale communication, and purchasing decisions (Watcharathorn Pensasitorn et al., 2021; Phongsathorn Sihawong et al., 2020).

However, compared with studies that use material innovation as the core of souvenir development, such as the creation of women’s accessories from Lanna glass (Suchira Phongsai et al., 2020), this study begins from a different foundation. It uses digital design and digital printmaking as the main driver before extending the designs to various materials and product forms. It can therefore be described as a digital-design-driven approach rather than a material-driven approach.

4. The Evaluation of Effectiveness and Satisfaction among Learners and Consumers. The findings that learners achieved a very good level of performance and expressed the highest level of satisfaction, particularly in practical application and product development, support the idea that action-based and experiential learning can enhance achievement, attitude, and applied competency. When learners produce real works in a context that connects cultural capital with digital skills, learning outcomes move beyond theoretical understanding toward practical application and value creation.

The high level of satisfaction also reflects the appropriateness of using digital technology to enrich both learning experiences and product experiences. This is consistent with Waraporn Manthung and Thanawat Thawornkul (2022), who found that digital media and technology can enhance user experience when designed with clear structure and meaningful content. Although the present study focuses on digital printmaking rather than augmented reality, the findings point in the same direction: technology can serve as a bridge connecting art, culture, and contemporary audiences.

Nevertheless, limitations related to time, resources, equipment, and software skills remain important issues in real teaching contexts. Although the overall results were highly positive, systemic constraints may affect the quality of learners’ experiences if the complexity of tasks, availability of tools, and preparation of digital skills are not properly managed. This aligns with Suriya Chayacharoen’s (2021) observation that advanced artistic and design interpretation requires sufficient practice time, appropriate tools, and deep conceptual engagement.

Therefore, future implementation should include careful planning of time, equipment, and digital-skill preparation. Such preparation would improve the quality of creative learning, reduce operational constraints, and strengthen the potential of Buddhist innovative art as knowledge, creative practice, and culturally meaningful products for contemporary society.

Conclusion

The study concludes that developing digital prints from Lanna vihar decorative motifs is a process of translating architectural heritage into contemporary media while preserving Buddhist values, Lanna identity, and cultural narratives. Through motif extraction and systematic composition main motifs, secondary motifs, filler motifs, and border motifs the resulting digital prints achieved visual unity, clear meaning, and practical potential for further application.

The Kolb-based experiential learning activity package enabled learners to engage in hands-on practice, reflection, conceptualization, and active experimentation. This process deepened their understanding of Buddhist innovative art and strengthened their digital printmaking skills in a systematic way.

The enhancement of creative souvenir products should integrate meaning-based design with market-oriented strategies. Diverse product prototypes, online and offline distribution, and digital product development can expand accessibility and increase practical use.

The evaluation showed that learners achieved a very good level of performance and reported the highest level of satisfaction, especially in practical application and product development. However, key limitations included time, equipment, and digital software skills. Future implementation should therefore provide stronger resource support and additional digital-skill training.

Recommendations

Policy Recommendations

1. Establish a Lanna Motif Repository at the institutional or provincial level, including original images, decoded motif modules, Buddhist meanings, and standard digital files, with clear rules for usage rights and source attribution.

2. Promote a Buddhist art-based creative economy through collaboration among temples, universities, communities, and entrepreneurs to support product development, market testing, and online–offline distribution while preserving cultural value.

Research Recommendations

1. Future studies should evaluate the products with real consumers and actual markets, including tourists, online buyers, entrepreneurs, and souvenir shops, focusing on satisfaction, purchase intention, perceived value, price, and material quality.

2. Future research should test various printing materials and technologies, such as fabric, ceramic, wood, and metal, as well as digital products and media such as AR or QR Story, to develop suitable production standards for long-term use.

References

- Chaiwat Pasuna. (2021). *British colonial regimes in Burma and the Malay Peninsula and the administration of Siam's Payap Monthon, 1894–1933*. Chulalongkorn University.
- Naina Dorman, et al. (2020). Experiential learning and critical reflection. *Journal of Psychology, Kasem Bundit University*, 10, 20–28.
- Naruedon Jitsakul. (2018). *Guidelines for the development of contemporary graphic patterns for Mo Hom fabric*. Phrae Provincial Cultural Office, Ministry of Culture.
- Phongsathorn Sihawong, et al. (2020). *Watercolor paintings of Khun Kha Luang under Phra Vimadather, Krom Phra Suddhasininat Piyamaharajapadivarada*. Suan Sunandha Rajabhat University.
- Phra Athiwat Thammawatsiri, Phisit Kotsupho, Phatcharabot Ritttem, Phra Witawat Kochakan, Taviz Tatnormjit, & Lipikorn Makaew. (2024). *The digital arts creation in the modern world's innovation*. *Lanna Journal of Buddhist Studies and Cultures*, 6(1), 906–926.
- Phra Athiwat Thammawatsiri, Phisit Kotsupho, Boonchuay Doojai, Phatcharabot Ritttem, & Phra Witawat Kochakan. (2025). *Creating digital art by AI art generators*. *Lanna Journal of Buddhist Studies and Cultures*, 7(1), 1–14.
- Poonpol Asanachinda. (1989). *Lanna*. Department of History, Academic Division, Chulachomklao Royal Military Academy.

- Saowapa Wichadee. (2011). The development of an English reading instructional model to enhance language ability and self-directed learning characteristics for fine arts students at Bangkok University. *Kasetsart Journal: Social Sciences*, 32(2), 252–264.
- Samaporn Klaiwichian. (2002). *The effects of teaching basic printmaking using the CIPPA model on learning achievement* [Research report]. Chulalongkorn University.
- Suchira Phongsai, et al. (2020). The creation of adjustable women’s jewelry Using Lanna glass. *Journal of Home Economics Technology, Rajamangala University of Technology Phra Nakhon*, 2(1), 53–67.
- Sujitra Trirattanukul. (2019). *Development of experiential learning activities to promote intellectual mindset among vocational students*. Suan Sunandha Rajabhat University.
- Supatsorn Unsiri, Jindarat Peemane, & Phongsathorn Tantrabandit. (2020). The relationship between new product development capability and marketing success of beverage businesses in Thailand. *Journal of Accountancy and Management, Mahasarakham University*, 12(1), 77–87.
- Suriya Chayacharoen. (2021). Principles of analysis and interpretation of advanced art and design knowledge. In *Proceedings of the 6th Academic Conference on Research and Creative Works in Fine Arts and Architecture: When Architecture Meets Art*. Faculty of Architecture, Art and Design, Naresuan University.
- Suwin Makdai. (2018). *An analytical study of Lanna Buddhist art as appeared in the Jinakalamali scripture*. Mahachulalongkornrajavidyalaya University.
- Thanaporn Thepraksa. (2021). *Development of an art activity package based on Kolb’s experiential learning theory for learning Lanna art history through sculpture processes*. Srinakharinwirot University.
- Waraporn Manthung, & Thanawat Thawornkul. (2022). The creation of digital mural painting media using augmented reality technology. *Journal of Interdisciplinary Research and Educational Innovation*, 1(1), 114–126.
- Watcharathorn Pensasitorn, et al. (2021). Packaging design elements on virtual stores affecting purchasing decisions of Generation Y consumers. *Journal of Fine and Applied Arts, Chulalongkorn University*, 8(1), 173–189.
- Weeraphat Suteerangkul. (2020). *The creation of contemporary digital printmaking art from Thai cultural concepts*. Sripatum University.
- Weeraphat Suteerangkul. (2021). *Print design*. Sripatum University.
- Witthaya Phonwithun. (2019). *Lai Kham Chang Ko: Patterns of Lanna identity* (2nd ed., revised). Hong Hian Suebsan Phumpanya Lanna.
- Woralanchak Bunyasurat. (1992). *A study of Lanna vihar gables in Chiang Mai Province*. Silpakorn University.
- Freeman, M., & Stadtner, D. (2013). *Lanna: Thailand's Northern Kingdom*. River Books.
- Ginsburg, H. (2000). *Thai art and culture: Historic manuscripts from Western collections*. University of Hawai'i Press.
- Paul, C. (2008). *Digital art* (2nd ed.). Thames & Hudson.
- Rawson, P. (1990). *The art of Southeast Asia: Cambodia, Vietnam, Thailand, Laos, Burma, Java, Bali*. Thames & Hudson.

- Revire, N. (2014). Lanna art revisited: A reassessment of Lanna Buddhist artistic traditions. *Journal of Southeast Asian Studies*, 45(1), 128.
- Snodgrass, A. (1985). *The symbolism of the stupa*. Southeast Asia Program, Cornell University.
- Stratton, C. (2004). *Buddhist sculpture of Northern Thailand*. Serindia Publications.
- Swearer, D. K. (2010). *The Buddhist world of Southeast Asia*. State University of New York Press.