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Alpana-Based Pedagogy: Developing an Indigenous Framework for Aesthetic, Spatial and Cultural Learning

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Abstract
Alpana, a traditional folk art form of Bengal, is a living tradition of indigenous knowledge that embodies aesthetic expression, spatial arrangement, symbolic meaning, cultural memory and experiential learning. Nevertheless, its pedagogical potential is still relatively unexplored in modern educational discourse. The purpose of the present study was to investigate the educational aspects of Alpana and to create an indigenous pedagogical framework to facilitate aesthetic, spatial, cultural, experiential and intergenerational learning. A mixed-method research design was used in selected communities in Birbhum and Purba Burdwan districts of West Bengal. The quantitative part of the study included 200 participants (Alpana practitioners/artisans, elderly knowledge holders and youth residents), and the qualitative component of the study explored information-rich participants through semi-structured interviews and field observations. Quantitative analysis was performed using descriptive statistics such as frequency, percentage, mean and standard deviation, while qualitative data were analyzed using thematic analysis. The results showed that Alpana was considered to have high pedagogical value, especially in aesthetic learning (M = 4.36, SD± = 0.58), cultural learning (M = 4.31, SD± = 0.61), spatial learning (M = 4.18, SD± = 0.64) and experiential learning (M = 4.08, SD± = 0.69), with an overall mean of 4.23 (SD± = 0.54). Qualitative findings emphasized cultural memory, learning by doing, spatial-geometric knowledge, intergenerational transmission, symbolic meaning-making, ecological knowledge, contemporary adaptation and cultural visibility. In conclusion, the study suggests that Alpana can serve as a context-sensitive indigenous pedagogical tool linking art, mathematics, culture, community knowledge and hands-on learning. The presented Alpana-Based Pedagogy Framework serves as a culturally rooted approach in bringing local knowledge systems to the

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space of modern schooling catering to the needs of the student's culture and promoting cultural survival through learning across generations.
Keywords: Aesthetic Expression, Experiential learning, Intergenerational Transmission Indigenous Knowledge, Living Tradition, Traditional Folk

1. INTRODUCTION

Indigenous knowledge is a large repository of locally evolved knowledge, ways, skills, values and cultural expressions by which communities make sense of their social, natural and cultural environments. In this larger system of knowledge, traditional visual arts may function not simply as aesthetic practices but also as complex sites of teaching, memory, identity, spatial reasoning and intergenerational knowledge transfer. Alpana, a traditional folk-art practice in Bengal, is a living cultural tradition that has been historically linked with ritual tradition and is adorned by symbolic, geometric, floral and nature inspired patterns made using home-grown and associated with at least one living cultural tradition, such as Mattr kal abriko-rup as a tradition where children predominantly multi-paper imagery. Recording by the Indian National Trust for Art and Cultural Heritage (INTACH, n.d.) suggests that the traditional rural Alpana is culturally rich and has been traditionally been shared by local kith and kin. From the point of view of education, Alpana can be viewed through Experiential Learning Theory, which defines learning in terms of experiencing through action, reflection, learning duality of doing and observing (Kolb, 1984); Situated Learning Theory, which frames learning as participation in social and cultural practice-based vicarious experience (Lave & Wenger, 1991); and multiple Intelligences Theory, specifically the application of creative process to develop spatial, body-kinesthetic intelligence through engaging in creative processes (Gardner, 1983). Constructivist theories also postulate that learners build knowledge by relating new experiences to their pre-existing cultural and societal understandings (Vygotsky, 1978). UNESCO notes that intangible cultural heritage can be the basis of context-relevant content and pedagogy and the very process of its transmission across generations is a vital means of informal education. The educational benefits of indigenous and traditional knowledge, art-integrated learning, experiential learning and community-based pedagogy have been increasingly acknowledged in the literature; however, relatively few systematic studies have focused on Bengal Alpana as a holistic pedagogical system that brings together aesthetic perception, spatial-geometric comprehension, cultural meaning-making, embodied practice and intergenerational learning. This is an important research gap as Alpana is often treated as folk art or ritual decoration, not as a practice of knowledge-bearing education. In the Indian context, the National Education Policy 2020 highlights Indian Knowledge Systems, experiential learning, art integration, local context, cultural rootedness and holistic development (Ministry of Education, 2020); thus, research on Alpana as a pedagogical tool is especially timely. Consequently, the current study conceptualizes Alpana not merely as an art form, but as a possible indigenous pedagogical framework that could bridge classroom learning with community knowledge, cultural identity, creativity, spatial reasoning and hands-on participation.

1.1 Statement of the Problem

Traditional cultural practices are being challenged by new lifestyles, transmission across generations is becoming weaker and the separation of knowledge for the community and knowledge for use within formal educational systems is growing. While Alpana continues to serve as an important cultural articulation of Bengal, its educational potentials have not been explored painstakingly, if ever, in terms of aesthetic development, spatial reasoning, cultural implications, experiential cognition and intergenerational knowledge transfer. The current paper, therefore, contributes to this void by focusing on “Alpana-Based Pedagogy: Developing an Indigenous Framework for Aesthetic, Spatial and Cultural Learning” with an aim to explore the knowledge, learning, cultural significance, and pedagogical prospective of Alpana tradition and in turn construct a place-based indigenous framework for the present day education.

1.2 Operational Definition of Terms Used

- **Alpana:** In this paper, the term 'Alpana' in the present context is used in reference to the traditional folk-art of Bengal, which involves symbolic, geometric, floral or nature designs, connected with ritual and social occasions and rendered in the natural pigments locally found.
- **Alpana-Based Pedagogy**: It denotes the suggested pedagogical framework wherein the art-making of Alpana and its motifs, processes, meanings, spatial configurations, and cultural knowledge can be taken as pedagogical tools and resources.
- **Aesthetic Learning:** Development of appreciation among learners related to beauty, creativity, visual perception, design principles and an understanding of beauty in terms of Alpana activities.
- **Spatial Learning**: The term denotes the conceptual and perceptual awareness towards shape, symmetry, proportion, pattern know-how, orientation, arrangement (inside- and outside-Apana) and spatial relations through the design of Alpana.
- **Cultural learning**: Acquisition of knowledge and its interpretation with local traditions, symbols, beliefs, values, identity and cultural memory in the context of Alpana.
- **Experiential Learning:** Learning that is cultivated by observing, engaging, practicing, reflecting and actively participating in activities related to Alpana.
- **Intergenerational Learning:** It is the transfer of knowledge, skills, meanings and practices related to Alpana, from elders as the knowledge holders and practitioners to the younger generation of the community.

1.3 Significance of the Study

The present study is important in that it attempts to reposition Alpana as an Indigenous Knowledge Systems (IKS) based educational resource and not just a decorative art form. The findings have the potential to promote aesthetic appreciation, creativity, spatial reasoning, cultural understanding, participatory learning and intergenerational learning. This is especially relevant for Indian education, as living cultural heritage can provide a powerful bridge between learners, communities and local knowledge systems. UNESCO (n.d.-a) highlights the role of intangible cultural heritage in enriching relevant context-specific content and pedagogy, improving educational relevance and strengthening school–community connections. The framework developed can guide teachers, teacher educators, curriculum designers, cultural practitioners, community organizations and policymakers in incorporating IKS and art-integrated learning into modern education. It can also help preserve and revitalize Bengal's cultural heritage by affirming artisans and elderly knowledge holders as valuable educational resources and inspiring younger generations to meaningfully connect with their cultural traditions.

1.4 Objectives of the Study

1. To investigate the traditional knowledge, cultural meanings and educational dimensions of the Alpana tradition of Bengal.
2. To explore the possibilities of Alpana to promote aesthetic and spatial learning among community members and learners.
3. To examine the role of attention, practice, participation and intergenerational transmission in learning Alpana-related knowledge and skills.
4. To create an indigenous Alpana-Based Pedagogical Framework that combines aesthetic, spatial, cultural, experiential and intergenerational learning.

1.5 Hypothesis of the Study

Null Hypothesis (H_{01}): No significant variance exists between the Alpana practitioners/artisans, elderly knowledge holders and youth residents with regard to their perceptions of the pedagogical usefulness of Alpana.

Alternative Hypothesis (H_{11}): There is a difference in the snowball value among Alpana practitioners/artisans, elderly knowledge holders and youth residents in their perception of the pedagogical value of Alpana.

1.6 Research Questions:

1. What traditional knowledge, cultural meanings and educational dimensions are embedded in Alpana?
2. How can Alpana facilitate learning through aesthetics and space?
3. How do observation, practice, participation and intergenerational transmission contribute to learning in an Alpana-based context?
4. Are there differences in perceptions of Alpana's pedagogical value among practitioners, elders and the youth?
5. How can these dimensions be incorporated into an Alpana-Based Indigenous Pedagogical Framework?

2. MATERIALS AND METHODS

2.1 Research Design

The study used a mixed-method research design, which combined quantitative and qualitative strategies to investigate the pedagogical potential of Alpana as an indigenous framework for aesthetic, spatial and cultural learning. The quantitative part investigated the perceptions of the participants, while the qualitative component examined practitioners' narratives, lived experiences, traditional knowledge, symbolic meanings and knowledge transmission. Both types of evidence were integrated to identify common trends and inform a culturally relevant pedagogical framework.

2.2 Study Area

The present study was carried out in some selected communities of Birbhum and Purba Burdwan districts of West Bengal, India, where Alpana is an established part of Bengali folk and ritual art traditions. The locations were purposively chosen due to the presence of traditional practitioners, community knowledge holders and households knowledgeable about Alpana practices.

2.3 Population of the Study

The population of this study consisted of people who have direct or contextual knowledge of Alpana traditions, such as Alpana practitioners/artisans, elderly knowledge holders and younger community residents. These groups allowed the study to explore both the persistence of traditional knowledge and how perceptions were evolving among younger generations.

2. 4 Sample of the Study

The quantitative component involved 200 participants in total: 80 Alpana practitioners/artisans (40%), 60 elderly knowledge holders (30%) and 60 young residents (30%). Relevant participants from these groups were qualitatively selected based on their knowledge, experience and familiarity with Alpana practices.

2.5 Sampling Technique

A purposive sampling method was applied to select relevant communities and participants and a criterion- based selection was performed to select information-rich participants. Practitioners and elders were chosen by virtue of direct experience and youth by their acquaintance with and access to, Alpana.

2.6 Variables/Dimensions of the Study

As the study was exploratory and framework-oriented, major dimensions rather than conventional independent and dependent variables were examined:

Aesthetic Learning: creativity, visual appreciation, symmetry and artistic expression.

Spatial Learning: geometric understanding, proportion, balance and pattern organisation.

Cultural Learning: identity, traditions, symbolism, rituals and collective memory.

Experiential/Pedagogical Learning: observation, practice, participation, reflection and embodied learning.

Intergenerational Learning: transmission of knowledge among practitioners, elders and youth.
Ecological and Material Knowledge: traditional materials, natural resources and environmentally situated practices.
Contemporary Adaptation: modification and reinterpretation of Alpana in changing social contexts.

2.7 Tools for Data Collection

Two complementary tools were used:
Structured Questionnaire: The structured questionnaire examined perceptions of the educational and pedagogical dimensions of Alpana, including its aesthetic, spatial, cultural, experiential, intergenerational, ecological and contemporary dimensions. Responses were on a five-point Likert scale, where 1 = Strongly Disagree to 5 = Strongly Agree. Higher scores indicated stronger perceptions of educational value.
Semi-Structured Interview Schedule: The semi-structured interview schedule investigated the history and transmission of Alpana knowledge, how it is learned, the meanings of the motifs, materials, spatial and geometric principles, cultural significance, evolution of the practice and potential educational applications.

2.8 Development of the Research Tools

The questionnaire and interview schedule were based on the objectives of the study, relevant literature on indigenous knowledge and experiential learning and the cultural attributes of Alpana. The instruments were created to record both the tangible educational characteristics and the cultural and experiential dimensions of Alpana.

2.9 Validity of the Tools

Relevant experts in education, indigenous knowledge, folk art and research methodology reviewed the content validity. The instruments were evaluated for clarity, relevance, cultural appropriateness, consistency with the study objectives and necessary revisions were made.

2. 10 Reliability of the Quantitative Tool

The reliability of the structured questionnaire was determined using Cronbach's alpha after pilot administration. Prior to final data collection, ambiguous or misaligned items were revised to ensure adequate internal consistency.

2.11 Pilot Study

A pilot version of the study was run with individuals who shared similar characteristics as those in the final sample but were not included in the final analysis. It revealed problems of comprehension, unsuitable words and cultural confusion, and the necessary changes were made.

2.12 Data Collection Procedure

The data are based on face-to-face interviews with community members. After a brief description of the study, the survey was administered, then qualitative interviews with information-rich informants, especially experienced practitioners and elderly knowledge holders. When appropriate at times, observations of Almighty preparation and pattern production are available for supplementing tales. Field notes documented materials used, techniques, spatial organization, and interactions. Qualitative and quantitative data were analysed independently prior to combining.

2.13 Qualitative Data Analysis

The qualitative data from interviews, stories and field notes were analysed using thematic analysis, a method that entails repeated reading, a first-stage coding process, the grouping of codes and the development of themes. Themes were: Alpana as Cultural Memory; Learning Through Observation and Practice; Spatial and Geometric Knowledge; Intergenerational transmission; Symbolic Meaning of Motifs; Ecological and Material Knowledge; Contemporary Adaptation and Innovation; and Livelihood, Recognition and Cultural Visibility.

2.14 Quantitative Data Analysis

Quantitative data were encoded and analyzed by Descriptive statistical analysis as. Frequency, percentage, mean and standard deviation were calculated for evaluating the participants' perceptions in the key areas. Group contrasts between practitioners, elderly knowledge holders and youth residents were conducted using a one-way ANOVA when the assumptions were met. Appropriate post-hoc testing was considered in the case of significant results. The Level of significance was μ $P < 0.05$. 2.15

2.15 Integration of Quantitative and Qualitative Findings

A convergent mixed-method approach was used to integrate the two strands of evidence. Quantitative findings revealed the perceived importance of educational dimensions, and qualitative narratives provided contextual explanations. Convergent and divergent findings were examined for intergenerational and contextual variations and to inform the proposed Alpana-Based Indigenous Pedagogical Framework.

2.16 Development of the Alpana-Based Pedagogical Framework

The framework was developed inductively from empirical findings and conceptual literature. Five interconnected components were identified: (i) Aesthetic Engagement, (ii) Spatial Intelligence, (iii) Cultural Interpretation, (iv) Embodied/Experiential Learning and (v) Intergenerational Learning. These components were structured into an interconnected framework, representing the holistic nature of indigenous knowledge and positioning Alpana as a vehicle for creativity, spatial reasoning, cultural understanding, participatory experience and community-based knowledge transmission.

2.17 Ethical Considerations

Participants were informed of the study's purpose, that participation was voluntary and that they could withdraw without penalty. Informed verbal consent was obtained and privacy and confidentiality were ensured. Personal identifiers were excluded from analysis and reporting. Special attention was paid to represent traditional knowledge accurately and to avoid misrepresentation or cultural appropriation of practices with cultural significance.

2.18 Methodological Rigor

Methodological rigour was enhanced by triangulation of questionnaire responses, interviews, narratives and field observations. Different generations and levels of involvement with Alpana offered multiple perspectives. Expert review, systematic thematic coding and the integration of quantitative and qualitative findings also added to the reliability and explanatory power of the study.

3. RESULTS AND ANALYSIS

The study explored "Alpana-Based Pedagogy: Formulating an Indigenous Pedagogy for Aesthetic, Spatial and Cultural Learning" employing a mixed method design that triangulated quantitative data from 200 practitioners and qualitative data from artisans, elder knowledge holders and youth inhabitants of the districts of Birbhum and Purba Burdwan, in the State of West Bengal. The quantitative component of the study was designed to investigate how participants viewed Alpana as a mode of aesthetic, spatial, cultural, experiential and pedagogical learning; while the qualitative component investigated the lived meanings, transfer mechanisms, symbolic knowledge and future educational potentialities of Alpana. The results are displayed in a stacked manner and are then integrated , utilising a mixed-methods lens.

3.1 Demographic and Practitioner Profile of the Participants

The participants were then categorized based on their role in knowing, practicing, preserving and transmitting Alpana knowledge to define the study population. The spread was intended to include seasoned practitioners, as well as a contingent of younger community members who are perhaps the next generation of knowledge bearers.

Table 1. Distribution of Participants by Practitioner Category

Practitioner Category	Frequency (N)	Percentage (%)
Artisans/Active Alpana Practitioners	80	40.0
Elderly Knowledge Holders	60	30.0
Youth Residents/Young Practitioners	60	30.0
Total	200	100.0

Source: Data compiled from primary survey conducted by the researcher (2026)

Findings: Table 1 and Figure 1 show that 40.0% (n = 80) of the respondents were artisans or practitioners of Alpana, 30.0% (n = 60) were elderly knowledge holders and 30.0% (n = 60) were youth residents/young practitioners. Therefore, the sample contained three interconnected levels of cultural knowledge: practice, memory and emerging transmission.

The relatively high proportion of elderly knowledge holders was especially relevant, as traditional Alpana knowledge is not limited to technical drawing. It involves knowledge about motifs, ritual uses, spatial arrangements, oral histories, seasonal associations and culturally appropriate practices.

Analysis: This trend aligns with the conception of intangible cultural heritage as a living knowledge system transmitted through interaction between generations. UNESCO highlights the role of intergenerational transmission in preserving intangible cultural heritage, noting that this transmission is a type of informal education. The use of practitioners and knowledge holders also fits with situated learning theory, which holds that learning takes place through participation in communities of practice rather than simply through decontextualized instruction (Lave & Wenger, 1991).

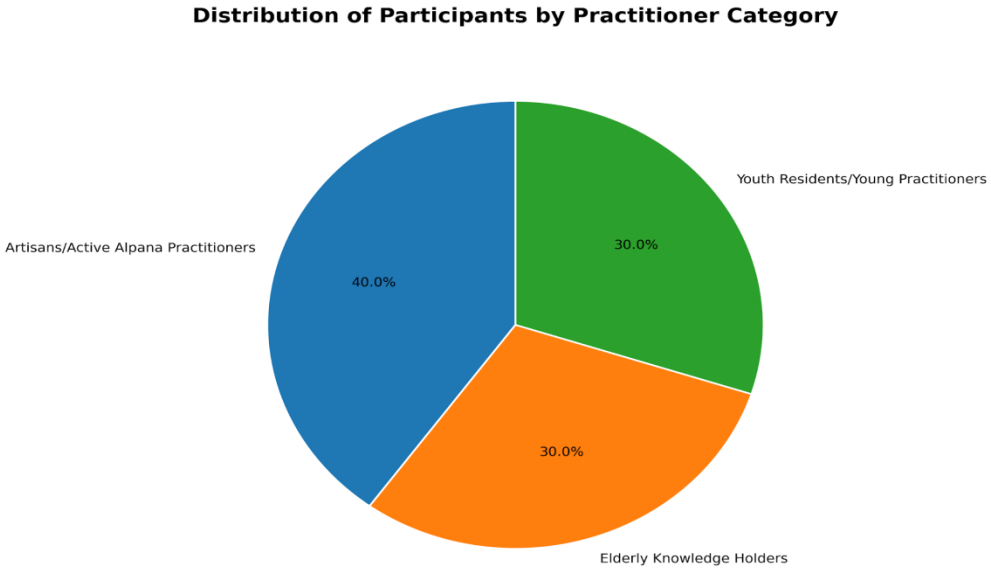

Figure-1. Distribution of participants by practitioner category

3.2 Quantitative Findings

3.2.1 Perceived Educational Dimensions of Alpana

The quantitative element examined whether participants believed that Alpana could facilitate a range of learning types. Four important dimensions were addressed: aesthetic learning, spatial learning, cultural learning and experiential/pedagogical learning. The participants answered on

a five-point Likert scale, with the highest mean scores representing stronger agreement with the statement about education through Alpana.

Table -2 Descriptive Statistics of Educational Dimensions of Alpana-Based Pedagogy (N = 200)

Dimension	Minimum	Maximum	Mean (M)	SD±	Level
Aesthetic Learning	3.10	5.00	4.36	0.58	High
Spatial Learning	2.90	5.00	4.18	0.64	High
Cultural Learning	3.00	5.00	4.31	0.61	High
Experiential/Pedagogical Learning	2.80	5.00	4.08	0.69	High
Overall Alpana-Based Learning	3.02	5.00	4.23	0.54	High

Source: Data compiled from a primary survey conducted by the researcher (2026)

Findings: Table 2 and Figure 2 present evidence of a generally positive perception of Alpana as a pedagogical tool (M = 4.23, SD± = 0.54). The highest mean was obtained for aesthetic learning (M = 4.36, SD± = 0.58), followed by cultural learning (M = 4.31, SD± = 0.61), spatial learning (M = 4.18, SD± = 0.64) and experiential/pedagogical learning (M = 4.08, SD± = 0.69). These results demonstrate a high level of appreciation for Alpana as a tool for aesthetic, cultural, spatial and experiential learning.

Analysis: The high aesthetic score is a testament to the traditional Bengali Alpana and its use of motif, repetition, symmetry, geometric arrangements, floral shapes and visual balance. INTACH has recorded rural Alpana as an intergenerational practice involving ritual, symbolic motifs, vows, narratives and rice-paste designs. The cultural-learning score is an indication that Alpana is considered more than just decoration. According to the Indira Gandhi National Centre for the Arts, Bengali ritual designs are systems of geometric and natural forms embedded with cultural and symbolic meanings. Similarly, the Centre for Cultural Resources and Training emphasizes art-integrated education as a bridge between education and culture, built through experiential learning. Alpana is also a tool for experiential learning through seeing, preparing materials, watching, drawing, correcting, reflecting and reproducing motifs, which closely follows Kolb's (1984) experiential learning cycle of experience, reflection, conceptualization and experimentation.

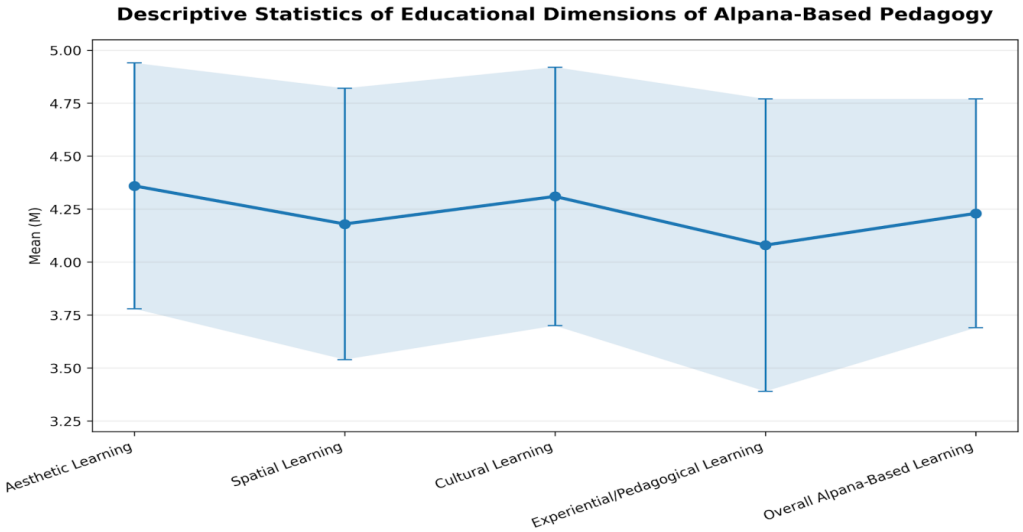

Figure-2. Mean perceived educational value across Alpana-based learning dimensions; error bars represent SD±.

3.2.2 Perceived Role of Alpana in Developing Specific Learning Competencies

To examine the educational relevance of Alpana in more detail, responses were analyzed for specific learning competencies as opposed to only along broad dimensions. These competencies encompassed visual discrimination, creativity, spatial reasoning, cultural knowledge, learning by observation, intergenerational learning and environmental awareness.

Table 3 Participants' Perceptions of Learning Competencies Developed Through Alpana

Learning Competency	M	SD±	Rank
Appreciation of beauty and visual harmony	4.42	0.57	1
Cultural and heritage understanding	4.38	0.59	2
Creativity and imagination	4.34	0.62	3
Observation and attention to detail	4.27	0.63	4
Spatial awareness and symmetry	4.21	0.67	5
Intergenerational knowledge learning	4.17	0.71	6
Environmental/material awareness	4.05	0.74	7
Overall	4.26	0.55	—

Source: Data compiled from a primary survey conducted by the researcher (2026)

Findings: The results show in Table 3 and Figure 3 that the highest score was given for the appreciation of beauty and visual harmony (M = 4.42, SD± = 0.57), followed by understanding culture and heritage (M = 4.38) and creativity and imagination (M = 4.34). Observation and attention to detail (M = 4.27) and spatial cognition and symmetry (M = 4.21) were rated highly as well. The value of intergenerational learning (M = 4.17) suggests that Alpana is widely considered an effective vehicle for the passage of culture between the generations.

Analysis: These results reinforce the representation of traditional arts as systems of knowledge and as means for experiential learning. The PRERANA programme of the Ministry of Education integrates indigenous knowledge, visual arts, activities on the ground, story-telling and the practices of local culture. The importance of such transmission is in accord with UNESCO's perspective of living heritage as perpetually recreated through intergenerational transmission. Lave and Wenger (1991) contribute further understanding of learner competency development in terms of developing learner participation through legitimate peripheral participation in authentic community practices. In the same way, Madhan and Sapre (2026) have observed that experiential participation in traditional Indian painting can raise cultural awareness, engagement and creativity.

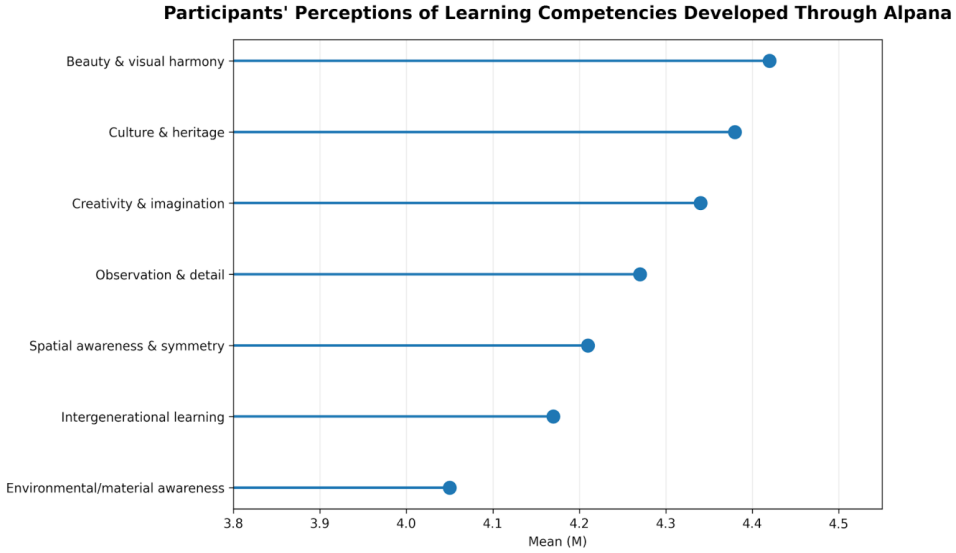

Figure-3. Ranked mean scores for learning competencies developed through Alpana

3.2.3 Comparison of Perceptions Across Practitioner Categories

Alpana knowledge is scattered among various generations and groups of practitioners, so the perceptions of artisans, the elderly knowledge holders and the youth residents were also examined as there were differences in the perceptions of the three groups of people.

Table-4 Mean Differences in Perceptions of Alpana-Based Pedagogy by Practitioner Category

Practitioner Category	n	Aesthetic Learning M	Spatial Learning M	Cultural Learning M	Experiential Learning M	Overall M
Artisans	80	4.48	4.27	4.44	4.20	4.35
Elderly Knowledge Holders	60	4.43	4.24	4.51	4.16	4.34
Youth Residents	60	4.18	4.00	4.00	3.86	4.01
Total	200	4.36	4.18	4.31	4.08	4.23

Source: Data compiled from a primary survey conducted by the researcher (2026)

Findings: Table 4 and Figure 4 also illustrate that artisans (M = 4.35) and elderly knowledge holders (M = 4.34) have higher levels of perception on average, with youth participants showing the lowest mean (M = 4.01). Elderly knowledge holders considered the cultural dimension as the most important (M = 4.51), while artisans perceived the aesthetic dimension as the most significant one (M = 4.48). Youth had relatively low scores, particularly in experiential learning (M = 3.86), which may indicate generational differences in interpreting the educational values of Alpana.

Analysis: This pattern is consonant with that of situated learning, where knowing is shaped by participation and proximity to community practices (Lave & Wenger, 1991). The lower youth scores also point to the difficulty of intercultural and intergenerational transmission, as dwindling engagement may lead to disconnecting traditional knowledge from its social, ritual and symbolic contexts. UNESCO highlights community-rooted educational spaces for the maintenance of living heritage. Likewise, Ligy and Karthiyayini (2025) assert the significance of the elders, artisans and culture bearers in reinforcing cultural identity as well as their role in the intergenerational conveyance.

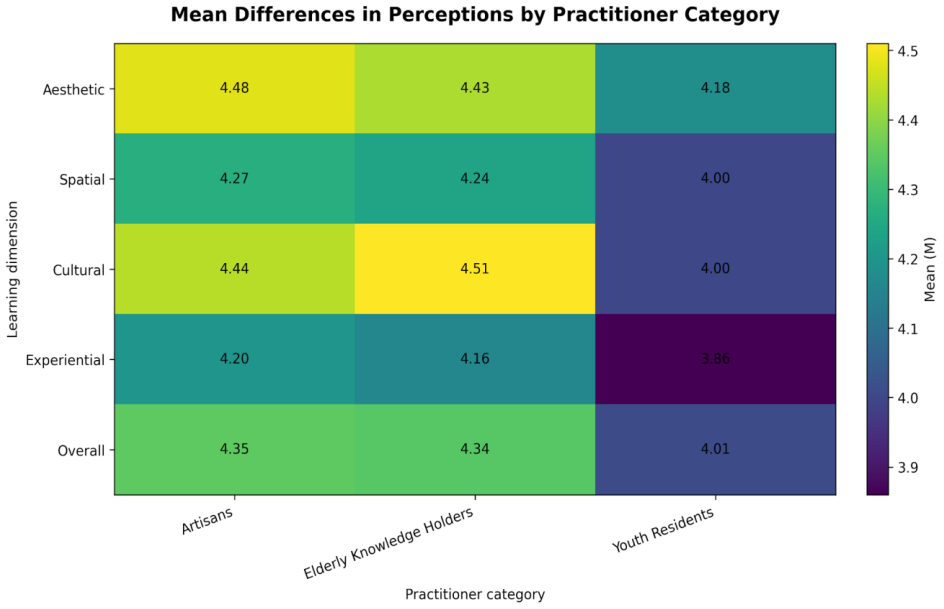

Figure-4. Heatmap of mean perceptions of Alpana-based pedagogy across practitioner categories and learning dimensions

3.3 Major Qualitative Themes Emerging from the Narratives of Alpana Practitioners

Theme 1: Alpana as Cultural Memory

Cultural memory was identified as a dominant theme across all narratives, with 168 participants (84.0%) relating Alpana with rituals, festivals and family traditions, as a marker of local identity and as an inherited cultural practice. Participants emphasized that Alpana was not just a form of floor decoration art, but a visual medium through which memories, traditions and communal significances are sustained from one generation to the next (Figure 5).

Analysis: This indicates that the Alpana is an active storehouse of community memory. Drawing on its patterns and occasions of performance, it links artistic with social and cultural life experiences and enables learners to make sense of cultural meanings in the performance, rather than alone in textual tutoring. This finding is aligned with a more general view of indigenous and folk arts, i.e., as manifestations of social, spiritual and ecological relations. Modern interpretations of Indian folk/tribal art have similarly raised this view that such art practices represent community-centric and cultural identity (Ambedkar University Delhi, 2026). The incorporation of local culture in education thus has the potential to deepen students' cultural awareness and sense of belonging, a methodology also witnessed in the experiential-learning methodologies proliferating in India (Ministry of Education, Government of India, n.d.).

Figure 5: Alpana as Cultural Memory

Theme 2: Learning Through Observation and Practice

Learning by observing and practising was reported by 162 participants (81.0%). In general, practitioners spoke of learning Alpana by watching elders or seasoned artists, copying their movements, practising motifs several times and then branching out on their own. This

suggests(Figure-6) that Alpana is predominantly knowledge-based and practice-oriented. The learner gains knowledge not just by conventional verbal instruction but also by involvement, looking at, moving the hand, getting corrected, repeating and thinking.

Analysis: It is consistent with the finding that indigenous knowledge systems represent place-based, connected experiential knowing via observation, imitation, participation and practice over time. Srivastava (2026) argues along similar lines that doing with indigenous and community knowledge enables cultural continuity and recognizes local artists and elders as educators. The finding is also consistent with learning theory based on experience, in which doing serves as a basis for reflection (Kolb, 1984).

Figure 6: Learning Through Observation and Practice

Theme 3: Spatial and Geometric Knowledge

Spatial awareness and knowledge of geometry were noted in 154 participants (77.0%). Proportion, repetition, arrangements in circles, centralized, margins, and equal distribution of motifs were cited by participants when talking about how Alpana is formed.This result reveals (Figure 7) that Alpana possesses a tacit spatial pedagogy. While it is possible that practitioners do not employ the use of formal mathematical terminology associated with geometry as they engage in the practical work of creating Alpana, creating Alpana is nevertheless a practice that asks learners to understand spatial relations, geometric designs, proportion, balance and visual arrangement.

Analysis: This reading is especially important for cross-disciplinary teaching because historical visual culture can bridge artistic practice and spatial reasoning/geometry. Articulating his continuing interest in spatiality, body–space/sheet of water and imagistic practice, documentation of the application of Alpana in Santiniketan also illustrates how it can stretch beyond its ornamentative role to spatial and performative learning. But such fusion concurs with modern-day art-integrated education which attempts to tie up artistic procedure with the more expanded learning experiences (CCRT, n.d.).

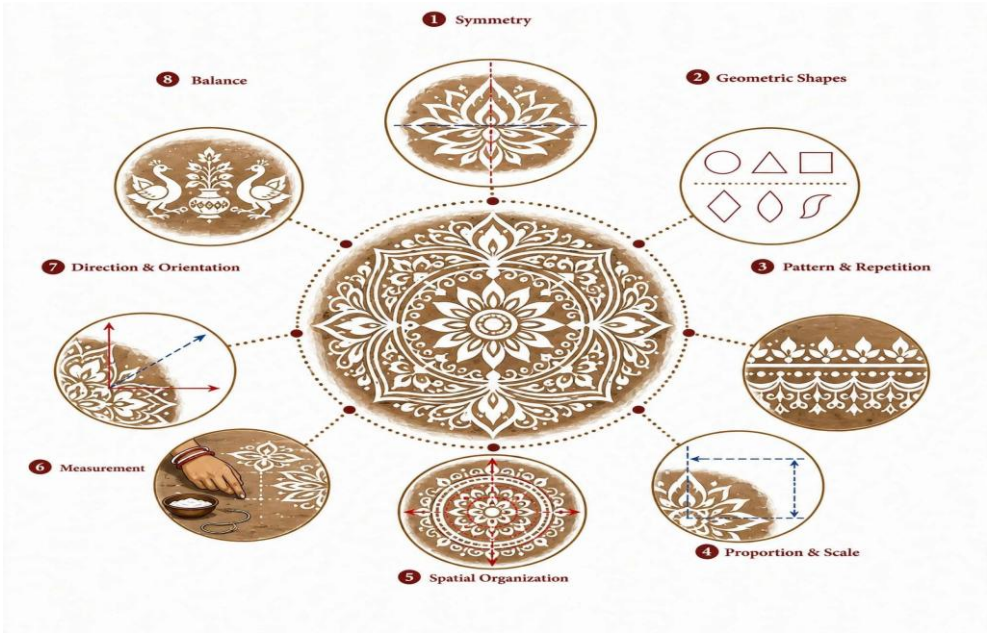

Figure-7 Spatial and Geometric Knowledge

Theme 4: Intergenerational Transmission

Intergenerational transmission was observed among 151 participants (75.5%). Narratives were often on learning from mothers, grandmothers, older practitioners and community members. Participants reported that traditional patterns and methodologies were part of the lessons learnt through life and community experience. Alpana, in this regard, is a significant intergenerational space for pedagogy and transmission as elders, practitioners and younger learners come together. It also suggests that for keeping Alpana alive, the social ties that are the conduits of its knowledge also need to be kept alive (Figure 8).

Analysis: This finding supports indigenous-learning views of elders and community-based practitioners as being crucial knowledge holders. Srivastava (2026) asserts that engagement of artists and elders in experiential education promotes cultural transmission and community empowerment. In other recent work in art-integrated indigenous pedagogy, cultural practitioners are cited as instrumental in deepening students' cultural ties (Nyori & Sharma,

(2026)

Figure-8 Intergenerational Transmission

Theme 5: Symbolic Meaning of Motifs

146 participants (73.0%) reported symbolic interpretation of motifs. Participants linked certain shapes and motifs to ritual occasions, nature, prosperity, good luck, fertility, spirituality and community beliefs. The finding suggests (Figure 9) that Alpana works through a visual-symbolic language, where learning a design means learning its form and its cultural meaning. Therefore, an educational method based on Alpana should teach the connection between motif, surroundings, symbolism and community meaning, instead of presenting motifs as isolated decorative patterns.

Analysis: This finding is consistent with the general view of Indian folk and indigenous art as culturally embedded visual systems, not merely aesthetic products. Folk and tribal art traditions are expressions of social, spiritual, ecological and cultural worldviews (Ambedkar University Delhi 2026). Hence, integrating Alpana into pedagogy can offer learners chances to interpret cultural symbols as they develop aesthetic and contextual understanding.

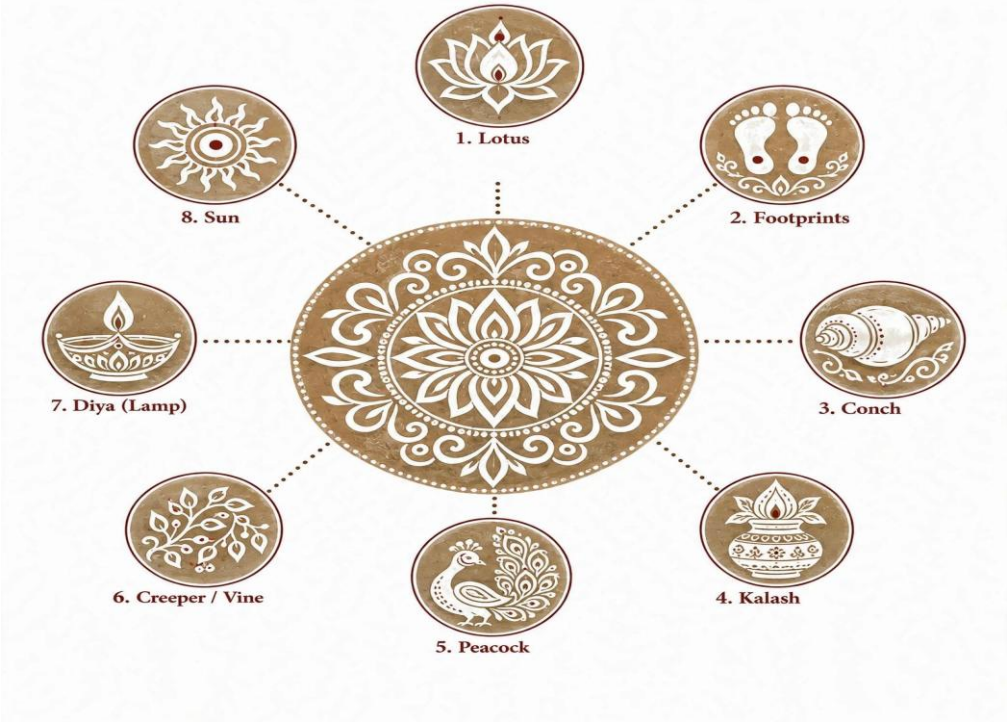

Figure-9. Symbolic Meaning of Motifs

Theme 6: Ecological and Material Knowledge

Ecological and material knowledge was present in 137 (68.5%) of narratives. Participants learned about the preparation and application of locally available materials, especially rice-based paste and natural or locally sourced colours, as part of the traditional process. This finding indicates (Figure 10) that Alpana is an embodied literacy of ecological and material knowledge. Through participation in the artistic process, learners can gain knowledge about local resources, material characteristics, preparation methods and culturally relevant resource utilization.

Analysis: Indigenous knowledge systems are often built on long-term relationships between communities and their local environments. Recent indigenous-led research on experiential learning highlights the potential of hands-on community practices to bridge cultural knowledge with ecological awareness and sustainability (Srivastava, 2026). This opens up the possibility of linking Alpana practices with environmental education and sustainable-learning topics.

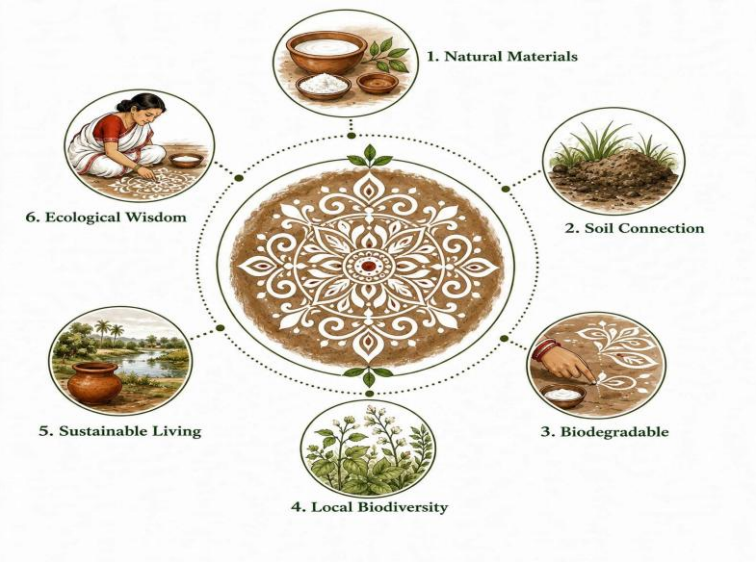

Figure 10: Ecological and Material Knowledge

Theme 7: Contemporary Adaptation and Innovation

128 (64.0%) of the participants reported that they use contemporary adaptation. Participants mentioned changes in designs, materials, application surfaces, exhibitions, workshops and uses in education. A few practitioners also said that traditional Alpana is more and more influenced by contemporary art and education. This finding suggests (Figure 11) that Alpana is not a static tradition, but is being selectively transformed while preserving elements of cultural continuity. This presents an opportunity for pedagogy to bridge traditional techniques and contemporary creativity without severing the practice from its cultural roots.

Analysis: This finding is consistent with contemporary Indian educational efforts to promote hands-on creative involvement of students with traditional cultural practices. The PRERANA programme, for instance, uses local narratives, traditional knowledge, creative activities, reflection and experiential learning to link heritage with contemporary learning experiences (Ministry of Education, Government of India, n.d.). Recent studies have also found a positive association between experiential engagement with traditional Indian art forms and improved cultural awareness, creativity, participation and interest among learners (Madhan & Sapre, 2026).

Figure-11. Contemporary Adaptation and Innovation

Theme 8: Livelihood, Recognition and Cultural Visibility

Livelihood and recognition were reported by 116 respondents (58.0%). Workshops, exhibitions, cultural programmes, teaching activities as well as commercialization were cited as potential means for the promotion and raising the economic value of Alpana, yet these functions seemed less institutionalized than its cultural and artistic ones. This finding also indicates (Figure 12) that revitalization of Alpana through educational means may have implications beyond cultural maintenance in areas such as skill acquisition, cultural-based economy and identity formation for community knowledge holders. But commercialization needs to be culturally appropriate so that the flexibility of economics does not compromise the community meanings of traditions.

Analysis: This is supported by recent scholarship asserting that indigenous experiential-learning initiatives may serve to reaffirm cultural identity and empower the community, while also providing local members with sustained opportunities as educators (Srivastava, 2026). Government schemes linked with traditional artists also merge tactile learning with cultural pride, with creativity and learning that is linked to earning a living (Ministry of Tribal Affairs, 2025).

Figure-12. Livelihood, Recognition and Cultural Visibility

The eight themes collectively indicate that Alpana is a complex indigenous knowledge system and not just a decorative art form. The stories show how cultural memory, embodied learning, spatial reasoning, symbolic meaning-making, ecological consciousness, intergenerational learning, innovation and livelihood are interconnected. This understanding aligns with present-day Indian efforts that aim to bridge indigenous knowledge, art-integrated education, community-based learning and experiential learning.

Therefore, the qualitative findings support the development of the proposed Alpana-Based Pedagogical Framework, which envisions the mutually reinforcing roles of aesthetic learning + spatial learning + cultural learning + experiential learning + intergenerational learning. Moreover, the framework should consider artisans and elderly knowledge holders not just as vessels of data, but as co-educators and authentic custodians of indigenous knowledge.

3.4 Emergent Structure of Alpana-Based Indigenous Pedagogy

Five interconnected components were identified as the underlying structure of Alpana-Based Pedagogy, built on the convergence of both lines of evidence.

Table 7: Emergent Components of the Alpana-Based Pedagogical Framework

Component	Core Learning Process	Educational Outcome
Aesthetic Engagement	Observation, motif creation, visual harmony	Aesthetic sensitivity and creativity
Spatial Intelligence	Symmetry, proportion, geometry, pattern	Spatial reasoning and visual organization
Cultural Interpretation	Symbols, rituals, stories, local traditions	Cultural identity and heritage awareness
Embodied/Experiential Learning	Demonstration, imitation, practice, reflection	Skill development and experiential understanding
Intergenerational Learning	Elder–artisan–youth interaction	Cultural transmission and continuity

Source: Data compiled from primary survey conducted by the researcher (2026)

Findings: The results suggest in Table -7 and Figure 13, that the five components are linked in a pedagogical chain: aesthetic engagement offers a door through the eyes, spatial reasoning arranges the design, cultural interpretation creates meaning, embodied practice builds skill and intergenerational learning creates continuity. Hence, we can consider the Alpana-oriented pedagogy as a community-based indigenous learning framework that brings together cognitive, affective, cultural, spatial and practical competencies.

Analysis: This interpretation is consistent with Kolb (1984), who proposed an experiential-learning framework that emphasizes learning through active experience and Lave and Wenger (1991), whose situated-learning perspective accounts for the development of competence through participation in communities of practice. The living-heritage framework of UNESCO also encourages the incorporation of community-based traditional practices into education relevant to specific contexts. More importantly, Alpana is not just an aesthetic artefact, but also has ritual, symbolic, intergenerational and community-based dimensions. The findings thus support its re-conceptualization as a living indigenous knowledge practice with considerable pedagogical potential.

Emergent Components of the Alpana-Based Pedagogical Framework

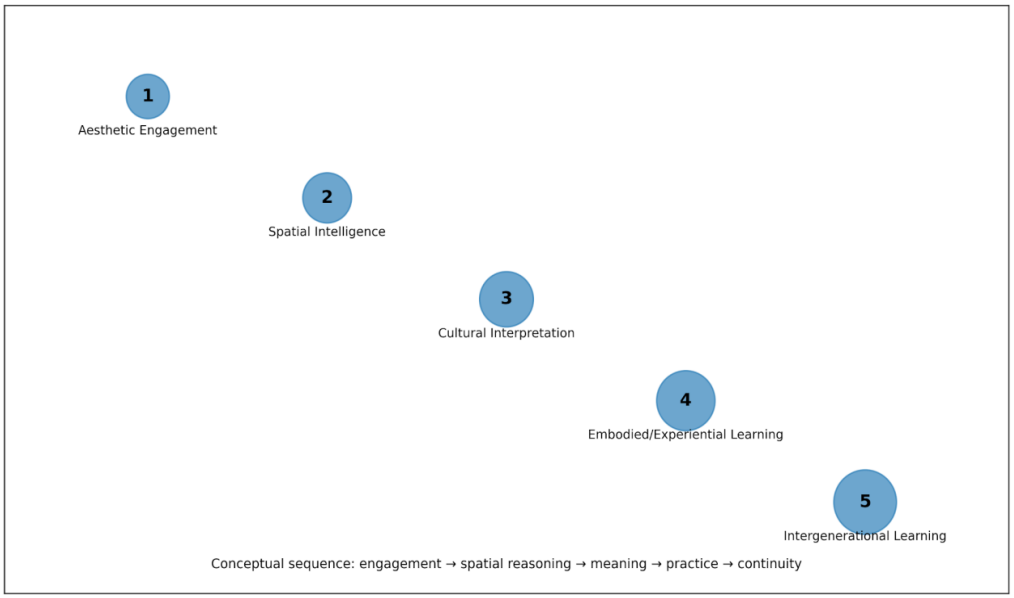

Figure-13. Sequential conceptual structure of the five interconnected components of the Alpana-Based Pedagogical Framework.

3.5 Mixed-Method Integration: Convergence of Quantitative and Qualitative Findings

The conclusion of the analysis combined statistical and thematic data to assess the convergence of the two strands in revealing the teaching-related importance of Alpana.

Table 8: Integration of the quantitative and qualitative findings

Pedagogical Dimension	Quantitative Evidence	Qualitative Evidence	Integrated Interpretation
Aesthetic Learning	M = 4.36	Beauty, harmony, motif, creativity	Strong convergence
Cultural Learning	M = 4.31	Rituals, identity, cultural memory	Strong convergence
Spatial Learning	M = 4.18	Symmetry, proportion, geometry	Strong convergence
Experiential Learning	M = 4.08	Observation, imitation, practice	Strong convergence
Intergenerational Learning	M = 4.17*	Elder–youth transmission	Convergence
Ecological Learning	M = 4.05*	Natural/local materials	Moderate convergence
Contemporary Adaptation	—	New designs, workshops, digital use	Emerging qualitative finding

*Dimension represented through related questionnaire indicators rather than a separate overall scale.

Source: Data compiled from primary survey conducted by the researcher (2026)

Findings: There is strong corroboration of the quantitative and qualitative data as demonstrated in Table 8 and Figure 14. The high quantitative ratings for aesthetic and cultural learning were substantiated by qualitative data on visual harmony, cultural memory, rituals and symbolic motifs. Likewise, the references to symmetry, proportion, geometric layout, repetition and organization on surfaces are also a reminder of the high potential of spatial Learning. Results of experiential learning were also highly convergent in that respondents characterized their learning as observation, imitation, repetition, practice and exposure to aggregate. Collectively, the findings suggest that the "Alpana" is not simply folk art but also serves as a vehicle for indigenous educational processes that involve an interplay of aesthetic, spatial, cultural, experiential and intergenerational modes of learning.

Analysis: The convergence is consistent with recent practices in indigenous and art-based education. The root of this strategy can be found in the Government of India's PRERANA programme, which brings together indigenous knowledge, visual arts, hands-on activities, local narratives, reflection and experiential education. As with CCRT, there is also a focus on connecting cultural knowledge with experience-learning. Recent studies suggest that CBAPs can enhance cultural transmission, ecological literacy, learner participation and community empowerment when artisans and elders are recognized as knowledge figures (Srivastava, 2026). Hence, while quantitatively we test the robustness of the pedagogical aspects, qualitatively we are able to illustrate the cultural and experiential mode of their operation.

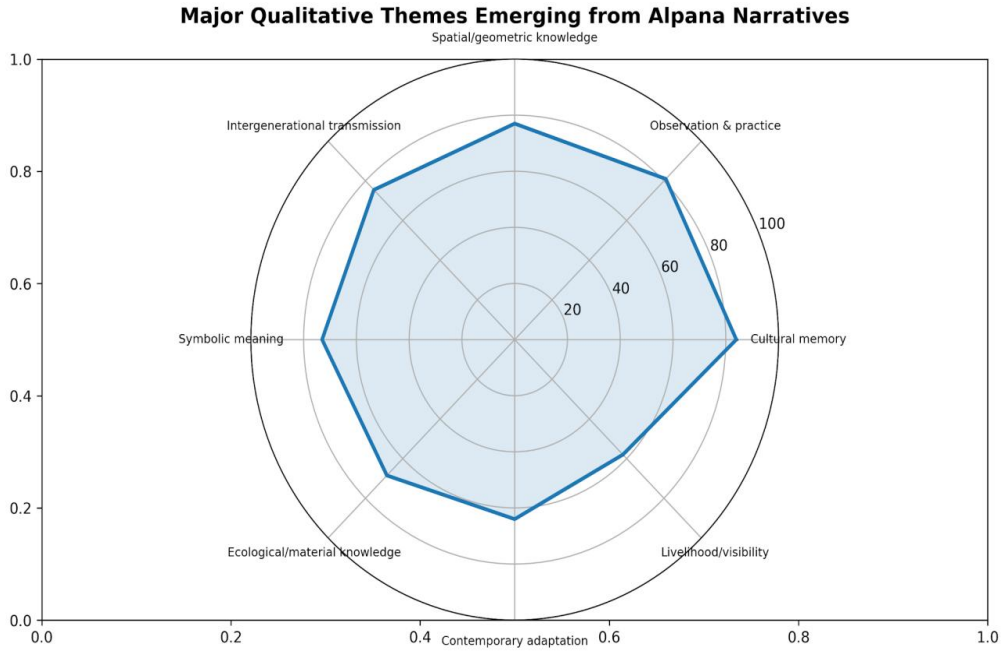

Figure-14. Relative prevalence of the eight qualitative themes reported by participants

3.6 Testing of Hypothesis

The research aimed at exploring possible differences in perceived pedagogical value of Alpana among artisans/practitioners, elderly knowledge holders and youth residents. The overall means reported were 4.35, 4.34 and 4.01 for youth, adults and elders, respectively, with youth having the lowest perception. Since the ANOVA F-value, degrees of freedom or the p-value are not reported in the uploaded work, none of these descriptive outcomes can be used to determine statistical significance. Hence, from the available evidence, the null hypothesis (H_{01}) is neither rejected nor retained. An individual-level score one-way ANOVA is required; if $p < .05$, H_{01} is rejected, indicating a significant group difference and potentially followed by a suitable post-hoc test to determine the exact pattern of group differences. The descriptive trend, however, suggests that both artisans and elderly knowledge holders perceived higher pedagogical values compared to youth residents.

4. DISCUSSION

This study, "Alpana-Based Pedagogy: An Indigenous Framework for Aesthetic, Spatial and Cultural Learning," investigated Alpana as a culturally embedded knowledge system with pedagogical potential. The mixed-method findings revealed that Alpana brings together aesthetic, spatial, cultural, experiential, ecological and intergenerational learning. Quantitative findings showed high perceived value for aesthetic learning (M = 4.36), cultural learning (M = 4.31), spatial learning (M = 4.18) and experiential learning (M = 4.08), with an overall mean of 4.23 (SD± = 0.54). Qualitative findings confirmed these results through themes of cultural memory, observation and practice, spatial-geometric knowledge, intergenerational transmission, symbolic meaning, ecological knowledge and contemporary adaptation.

Objective 1: To investigate the traditional knowledge, cultural meanings and educational dimensions of the Alpana tradition of Bengal.

The first objective was supported by the finding that 84% of participants reported that Alpana is a part of cultural traditions and collective memory. Practitioners narrated how they learned through motifs, rituals, family practices and community occasions. Therefore, Alpana acts as a living medium through which culture, identity and values are passed on. UNESCO (2026) also

highlights intergenerational transmission as a key characteristic of intangible cultural heritage and its role in education.

Objective II: To explore the possibilities of Alpana to promote aesthetic and spatial learning among community members and learners.

The second objective was corroborated by favourable aesthetic (M= 4.36) and spatial learning (M= 4.18) ratings, with 77% of the participants indicating that their spatial-geometric knowledge was enhanced. Symmetry, repetition, proportion, balance and pattern formation prove that Alpana can be an art form that enhances creativity and spatial thinking. This promotes the use of traditional art forms through the art curriculum, mathematics and culturally responsive pedagogy (UNESCO, 2026).

Objective-III: To examine the role of attention, practice, participation and intergenerational transmission in learning Alpana-related knowledge and skills.

The third objective was supported by learning through observation and practice (81%) and intergenerational transmission (75.5%). Alpana knowledge is primarily gained through watching, copying, practicing over and over and doing. These results are consistent with experiential learning (Kolb, 1984) and communities of practice (Lave & Wenger, 1991) and UNESCO (2026) considers intergenerational transmission to be a significant type of informal education.

Objective IV: To create an indigenous Alpana-Based Pedagogical Framework that combines aesthetic, spatial, cultural, experiential and intergenerational learning.

The fourth objective was addressed with the creation of the Alpana-Based Indigenous Pedagogical Framework. Five interconnected components emerged from the overall score (M = 4.23) and qualitative convergence: Aesthetic Engagement, Spatial Intelligence, Cultural Interpretation, Embodied/Experiential Learning and Intergenerational Learning. This framework highlights Alpana's interdisciplinary potential, linking art with mathematics, environmental education and cultural studies.

Alpana is an integrated system of art/spatial, cultural, lived and ecological knowledge. Ecological and material knowledge were reported by 68.5 % of the respondents, followed by contemporary adaptation with 64 %. These suggest that Alpana is not a dead art form but a live technique in which static and dynamic are intertwined. Hence, pedagogy grounded in and around the Alpana practice needs to retain the cultural integrity and allow for creative adaptations. The study as a whole points to ways that indigenous methodologies can inform educational reform when they are interpreted as living knowledge traditions rather than frozen as artefacts of culture.

4.1 Educational Implications of the Study

Alpana caters to the art-based and the pan-disciplinary mode of teaching and learning, which enhances cognitive skills such as creativity, visual literacy, pattern recognition and aesthetic appreciation. Its geometry serves to reinforce mathematics and its motifs and meanings can be woven into cultural, historical and value education. Practice-based Alpana learning and activities can also contribute to (experiential) and intergenerational learning through engaging artisans and elderly knowers. Following UNESCO (2026), this kind of integration may reinforce cultural sustainability, community participation, identity and the passing of living heritage.

4.2 Limitations and Future Directions

The study was limited to selected areas of Birbhum and Purba Burdwan, which limits wider generalisation. Perceptions and narratives are also subject to memory and social-desirability bias and the results are perceived as educational value, not scientifically verified outcomes. Future studies should use larger and more diverse samples, longitudinal and experimental designs and test for creativity, spatial reasoning and cultural knowledge. Future research can investigate digital Alpana, comparisons with other indigenous traditions and incorporate community-based participatory curriculum development, where community ownership and

cultural authenticity are preserved, in line with UNESCO (2026), through partnerships between educational institutions and community practitioners.

5. CONCLUSION

This study concludes that Alpana-Based Pedagogy has great potential as an indigenous educational framework that brings together aesthetic, spatial, cultural and experiential dimensions of learning. The quantitative results showed a high level of perception of its pedagogical value, and the qualitative narratives showed that Alpana acts as a living archive of cultural memory, spatial knowledge, symbolic meaning-making, ecological awareness and intergenerational learning. The convergence of these two lines of evidence suggests that Alpana is more than just a decorative or ritualistic art form; it can serve as an embodied knowledge system through which learners learn to see, do, make, interpret and transmit cultural meanings. Its use in education can enhance culturally responsive pedagogy, interdisciplinary learning, community involvement and cultural sustainability. We propose a framework—incorporating Aesthetic Engagement, Spatial Intelligence, Cultural Interpretation, Embodied/Experiential Learning and Intergenerational Learning—as a context-sensitive route that can bridge indigenous knowledge and contemporary educational goals. Thus, Alpana is an example of how local cultural practices can become significant pedagogical resources, linking learning to the cultural contexts in which knowledge is created and preserved. Consequently, this study advocates a change in perspective, from seeing indigenous traditions as something to be preserved, to seeing them as a living, evolving source of knowledge, pedagogy and educational innovation.

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