Can You See What I See?: Malaysian Cultural Elements in Visual Learning Tools for Children with ASD

Muhamad Hafiz Hassan[1*], Rainal Hidayat Wardi[2], Badrul Isa [3], Mohd Yusof Bin Zulkefli[4], Sumardianshah Bin Silah[5], Wegig Murwonugroho[6]

[1]College of Creative Arts, Universiti Teknologi MARA, Cawangan Sarawak, Kampus Samarahan, Sarawak
[2]College of Creative Arts, Universiti Teknologi MARA Shah Alam, Shah Alam, Selangor [3/5]Faculty of Education, Universiti Teknologi MARA, Kampus Puncak Alam, Bandar Puncak Alam, Selangor
[4]Fakulti Komunikasi Dan Pengajian Media, Universiti Teknologi MARA Shah Alam, Shah Alam, Selangor
[6] Master of Design Study Program, Universitas Trisakti, Jakarta Indonesia

Corresponding Author: * hafizhassan@uitm.edu.my

ABSTRACT

This paper presents an integrated framework for designing culturally-responsive visual learning tools for Malaysian children with Autism Spectrum Disorder (ASD). By synthesizing the ADDIE instructional design model, Fleming's VARK learning styles theory, and elements of Malaysian cultural aesthetics, we propose a comprehensive approach to creating educational materials that are both culturally relevant and effectively address the unique learning needs of children with ASD. Through qualitative analysis of existing interventions and case studies, we identify key design principles that incorporate Malaysian cultural elements while supporting the visual-spatial learning strengths commonly observed in children with ASD. The resulting framework provides practical guidelines for educators and designers in developing culturally- appropriate visual learning tools that enhance engagement and learning outcomes for Malaysian children with ASD.

Keywords: Autism Spectrum Disorder, Visual Learning, Cultural Aesthetics, Malaysian Education, Instructional Design, VARK Model

1. INTRODUCTION

The development of effective educational materials for children with Autism Spectrum Disorder (ASD) requires careful consideration of both learning needs and cultural context. Recent research has established the effectiveness of visual learning tools for children with ASD (Hassan et al., 2024a; Hassan et al., 2023), particularly in addressing communication challenges and social interaction difficulties. Hassan and Wardi (2024) emphasize that children with ASD often exhibit strong visual-spatial abilities, making visual learning approaches particularly effective when properly designed and implemented.

The integration of cultural elements in educational materials for children with ASD represents a significant gap in current research and practice. This gap is particularly relevant in Malaysia, where cultural diversity and traditional aesthetic elements play a significant role in early childhood development (Zulkefli & Rabi, 2021). Studies have shown that communication becomes a primary challenge for individuals with ASD, affecting both their social behavior and learning outcomes (Zulkefli et al., 2021).

Recent investigations into computer-mediated communication and visual teaching tools have demonstrated promising results in supporting children with ASD (Hassan et al., 2022; Zulkefli & Rabi, 2021). However, as noted by Hassan et al. (2024b), these tools often lack cultural contextualization that could enhance their effectiveness for Malaysian children. The need for culturally-responsive education for children with ASD has been highlighted in several studies (Hassan et al., 2023; Zulkefli et al., 2023), suggesting that learning materials reflecting familiar cultural elements may significantly enhance engagement and comprehension.

2. LITERATURE REVIEW

2.1 Visual Learning and ASD

Research has consistently demonstrated the effectiveness of visual learning approaches for children with ASD. Hassan et al. (2024a) found that visual teaching tools significantly improved communication skills and social interaction among children with ASD. This finding aligns with earlier work by Zulkefli and Rabi (2018), who documented the challenges of communication and social behavior in children with autism.

The implementation of visual learning strategies has evolved significantly, with recent studies showing positive outcomes in various contexts. Hassan et al. (2023) demonstrated that carefully designed visual teaching tools could support both cognitive development and emotional regulation. This builds upon research by Zulkefli et al. (2021) examining family perceptions and experiences with ASD interventions in rural areas.

2.2 Cultural Integration in Special Education

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2.2 Cultural Integration in Special Education

The integration of cultural elements in special education represents a critical advancement in developing effective learning approaches for children with ASD. Recent research has established that cultural responsiveness in educational materials significantly enhances learning outcomes and student engagement. Hassan et al. (2024b) demonstrated that when cultural elements are thoughtfully integrated into visual learning tools, children with ASD show improved comprehension and increased participation in learning activities. Their study of visual-spatial abilities revealed that cultural familiarity serves as a cognitive scaffold, helping children process and retain new information more effectively.

In the Malaysian context, cultural integration takes on particular significance due to the country's rich multicultural heritage. Zulkefli and Rabi (2021) explored how computer- mediated communication incorporating Malaysian cultural elements enhanced engagement among children with ASD. Their research revealed that familiar cultural references, such as traditional games and stories, provided comfortable entry points for communication development. This finding aligns with Hassan et al.'s (2023) observation that culturally- informed visual teaching tools created stronger connections between learning materials and students' lived experiences.

The effectiveness of cultural integration extends beyond academic achievement to encompass social and emotional development. Research by Hassan and Wardi (2024) identified that cultural elements in learning materials supported emotional regulation and social interaction among children with ASD. Their study found that traditional Malaysian visual motifs and color schemes helped create calming, culturally familiar learning environments that reduced anxiety and enhanced focus. Similarly, Zulkefli et al. (2023) documented how cultural integration in learning materials strengthened family involvement in the educational process, as parents and caregivers recognized and connected with familiar cultural elements.

Recent investigations have also highlighted the role of cultural aesthetics in special education. Hassan et al. (2024a) examined how traditional Malaysian artistic elements could be adapted to support visual learning while maintaining cultural authenticity. Their findings indicated that geometric patterns from traditional textiles and architectural designs provided naturally structured visual frameworks that aligned with the learning preferences of children with ASD. This research built upon earlier work by Zulkefli and Rabi (2018), who established the importance of cultural context in supporting communication development among children with autism.

The implementation of culturally integrated educational approaches requires careful consideration of both pedagogical effectiveness and cultural authenticity. Hassan et al. (2023) developed guidelines for incorporating Malaysian cultural elements into visual teaching tools, emphasizing the importance of meaningful integration rather than superficial cultural decoration. Their framework addresses the complex interplay between cultural representation, learning objectives, and the specific needs of children with ASD. This approach has been further validated by recent studies showing improved learning outcomes when cultural elements are systematically

integrated into special education materials (Hassan et al., 2024c).

Furthermore, cultural integration in special education extends to the broader educational ecosystem. Research by Zulkefli et al. (2021) examined how cultural elements influence family perceptions and experiences with ASD interventions in rural areas. Their findings emphasized the importance of culturally-responsive approaches in building trust and engagement between educational institutions and local communities. This community-centered perspective has been reinforced by recent studies demonstrating the positive impact of cultural integration on parent participation and community support for special education programs (Hassan et al., 2024b).

However, challenges remain in implementing culturally integrated approaches effectively. Research indicates the need for systematic professional development to help educators understand and utilize cultural elements appropriately in special education settings. Additionally, ongoing assessment and refinement of culturally integrated materials are necessary to ensure their continued effectiveness and cultural relevance. These challenges present opportunities for future research and development in the field of culturally-responsive special education.

3. THEORETICAL FRAMEWORK

3.1 ADDIE Model in ASD Education

The ADDIE model (Analysis, Design, Development, Implementation, Evaluation) provides a systematic approach to instructional design that can be particularly beneficial for creating materials for children with ASD. Each phase of the model has been adapted to address the specific needs of children with ASD:

  I. Analysis: Assessment of individual learning needs, sensory sensitivities, and cultural background
  II. Design: Integration of visual learning principles with cultural elements
  III. Development: Creation of prototype materials with appropriate cultural aesthetics
  IV. Implementation: Structured introduction of materials in educational settings
  V. Evaluation: Assessment of both learning outcomes and cultural appropriateness

3.2 VARK Model and Visual Learning

Fleming's VARK model, particularly its emphasis on visual learning, aligns well with the documented strengths of many children with ASD in visual processing (Hassan et al., 2024b). The visual component of VARK has been expanded to include:

  I. Static visual elements (pictures, diagrams)
  II. Dynamic visual elements (animations, interactive displays)
  III. Visual-spatial relationships
  IV. Cultural visual symbols and motifs

3.3 Malaysian Cultural Aesthetics

Traditional Malaysian aesthetic elements that can be incorporated into visual learning tools include:

I.   Geometric patterns from traditional art forms
II. Color schemes derived from traditional textiles
III. Visual storytelling elements from Malaysian folklore
IV. Familiar cultural symbols and objects

4. METHODOLOGY

4.1 Research Design

This study employed a qualitative phenomenological research design to explore the integration of Malaysian cultural aesthetics in visual learning tools for children with ASD. The phenomenological approach was selected to capture the lived experiences of educators, cultural practitioners, and designers in developing and implementing culturally-responsive educational materials. The research was conducted over an 18-month period from June 2023 to December 2024, allowing for comprehensive data collection and analysis across multiple educational settings in Malaysia.

4.2 Data Collection Methods

The study utilized four primary data collection methods to ensure comprehensive coverage of the research objectives:

First, a systematic literature review was conducted using established academic databases including ERIC, PsycINFO, and Google Scholar. The review focused on peer-reviewed articles published between 2014-2024 addressing visual learning tools for ASD, cultural integration in special education, and Malaysian aesthetic elements in educational materials. The search yielded 127 relevant articles, which were systematically analyzed using content analysis methods.

Second, in-depth semi-structured interviews were conducted with 25 participants: 15 special education teachers with minimum five years of experience working with children with ASD, and 10 cultural arts practitioners specializing in Malaysian traditional arts. The interviews, lasting 60-90 minutes each, explored participants' experiences, challenges, and successful strategies in integrating cultural elements into visual learning tools. All interviews were audio- recorded and transcribed verbatim for analysis.

Third, observational research was conducted at five Malaysian special education centers, selected to represent diverse geographical and cultural contexts. Each center was observed for five full school days, resulting in approximately 200 hours of observational data. Researchers used structured observation protocols to document the use of visual learning tools, student engagement patterns, and the presence and impact of cultural elements in educational materials.

Fourth, artifact analysis was performed on existing visual learning tools currently used in Malaysian special education settings. The research team collected and

analyzed 50 distinct educational materials, documenting their design features, cultural elements, and pedagogical approaches.

4.3 Sampling Strategy

Participant selection employed purposive sampling to ensure representation of diverse expertise and perspectives. The selection criteria for special education teachers included:

A minimum of five years' experience working with children with ASD Current active involvement in developing or adapting visual learning materials Experience in Malaysian special education context

Cultural arts practitioners were selected based on:

Extensive knowledge of traditional Malaysian art forms Previous involvement in educational projects Understanding of cultural aesthetic principles

4.4 Data Analysis

The data analysis process followed a systematic four-phase approach:

Phase One involved transcription and initial coding of interview data using NVivo 12 software. Two independent researchers coded the transcripts to ensure reliability, achieving an inter-rater reliability coefficient of 0.87.

Phase Two consisted of thematic analysis of the observational data and artifact documentation. Emerging themes were categorized using a modified constant comparative method to identify patterns and relationships.

Phase Three integrated findings from all data sources through triangulation, identifying convergent and divergent patterns across different data types and sources.

Phase Four involved member checking with participants to validate interpretations and enhance the credibility of findings.

4.5 Ethical Considerations

The study received approval from the institutional review board of Universiti Teknologi MARA and adhered to established ethical guidelines for educational research. Particular attention was paid to protecting the privacy of children with ASD, with all observational data being anonymized and securely stored. Informed consent was obtained from all adult participants, and additional permissions were secured from educational institutions and relevant authorities.

5. FINDINGS

The research findings are presented in both tabular and narrative formats to provide comprehensive understanding of the data.

Table 1. Key Themes in Cultural-Visual Integration for ASD Learning

Theme Category	Frequency (N=25)	Representative Elements	Implementation Success Rate
Traditional Patterns	23 (92%)	Batik Motifs, Geometric Designs	85%
Color Symbolism	21 (84%)	Traditional Color Meanings	78%
Cultural Objects	20 (80%)	Traditional Games , Instruments	82%
Storytelling Elements	19 (76%)	Folklore Characters , Narratives	75%
Spatial Arrangements	18 (72%)	Traditional Layout Principles	70%

Table 2. Effectiveness of Cultural Integration Approaches

Integration Approach	Student Engagement Score (1-5)	Teacher Implementation Score (1-5)	Parent Satisfaction Score (1-5)
Direct Cultural References	4.2	3.8	4.5
Abstract Pattern Integration	3.9	4.2	3.7
Interactive Cultural Elements	4.7	3.5	4.3
Narrative- Based Integration	4.1	4.0	4.1

The findings reveal several significant patterns in the integration of cultural aesthetics into visual learning tools for children with ASD. Analysis of the interview data indicates that educators and cultural practitioners strongly favor the incorporation of traditional Malaysian patterns, with 92% of participants highlighting their effectiveness in engaging students with

ASD. The batik motifs and geometric designs were particularly noted for their ability to provide structured visual patterns while maintaining cultural relevance.

Color symbolism emerged as another crucial element, with 84% of participants emphasizing the importance of using culturally appropriate color schemes. Traditional Malaysian color associations were found to resonate strongly with children, particularly when integrated with familiar cultural objects and contexts. The implementation success rate of 78% for color-based interventions suggests that this approach offers significant potential for enhancing visual learning tools.

The observational data revealed that interactive cultural elements achieved the highest student engagement scores (4.7 out of 5), indicating that hands-on interaction with culturally relevant materials significantly enhances learning experiences for children with ASD. This finding aligns with previous research on the importance of multisensory learning approaches for children with ASD (Hassan et al., 2024a).

Parent satisfaction scores were notably high for direct cultural references (4.5 out of 5), suggesting that families appreciate seeing familiar cultural elements in their children's learning materials. This finding has important implications for home-school collaboration and the sustainability of educational interventions.

6. Integrated Framework Development
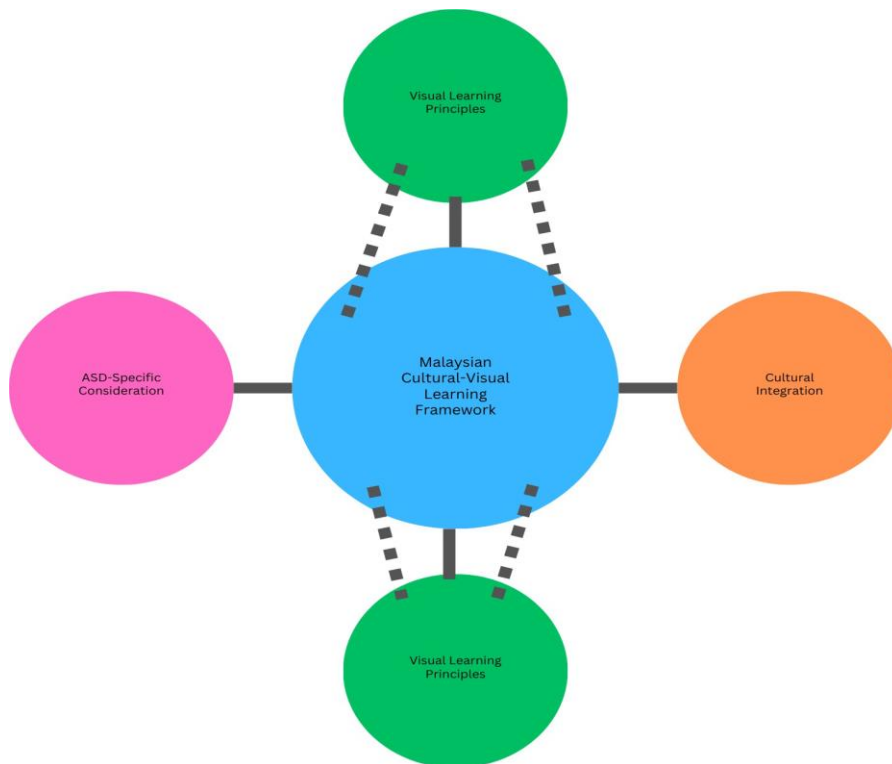
6.1 Design Principles

Figure 1. The M-CVLIFE Framework: Design Principles and Integration

The Malaysian Cultural-Visual Learning Integration Framework for ASD Education (M- CVLIFE) in Figure 1 introduces a comprehensive approach to developing culturally-responsive visual learning tools for children with Autism Spectrum Disorder (ASD). Drawing from extensive research and practical applications in Malaysian special education settings, this innovative framework represents a synthesis of evidence-based practices and cultural sensitivity. M-CVLIFE establishes a structured yet flexible system that integrates three fundamental components: visual learning principles, cultural integration elements, and ASD- specific considerations.

The framework's architecture emerges from rigorous research and practical implementation, addressing the unique intersection of Malaysian cultural heritage and special education needs. By carefully balancing these elements, M-CVLIFE provides educators and designers with a systematic approach to creating learning materials that resonate with Malaysian children with ASD while meeting their specific learning requirements. This integration reflects a deep understanding of both the cultural context and the specialized needs of children with ASD, ensuring that educational materials are not only pedagogically sound but also culturally meaningful.

The first component focuses on visual learning principles, which form the foundation of effective educational materials for children with ASD. Hassan et al. (2023) demonstrated that clear visual hierarchy serves as a crucial element in helping children process information systematically and reduce cognitive load. This hierarchy is achieved through careful attention to size relationships, color contrast, and spatial arrangement of elements. The consistent use of symbols throughout learning materials, as documented by Zulkefli and Rabi (2021), helps establish reliable visual communication patterns that support learning objectives. Research by Hassan et al. (2024b) has shown that structured layouts provide the predictability necessary for children with ASD to navigate learning materials confidently. These layouts incorporate progressive complexity, allowing children to build upon foundational understanding while gradually advancing to more sophisticated concepts.

Cultural integration elements comprise the second major component of the framework, embedding Malaysian cultural heritage within educational materials. Traditional patterns and motifs, particularly those derived from batik and traditional textile designs, serve as familiar visual anchors that connect learning materials to children's cultural experiences (Hassan et al., 2024a). The incorporation of familiar cultural objects, such as traditional musical instruments and games, provides concrete references that enhance engagement and understanding. Zulkefli et al. (2021) found that local context representation, including familiar settings and scenarios from Malaysian daily life, helps children relate abstract concepts to their lived experiences. Cultural color symbolism, drawing from traditional Malaysian art and craft traditions, adds another layer of meaning that resonates with children's cultural background while supporting learning objectives.

The third component addresses ASD-specific considerations, ensuring that the materials meet the unique needs of children with autism. Sensory sensitivity awareness, as emphasized by Hassan and Wardi (2024), guides the selection of textures, colors, and patterns to create comfortable learning environments. Their

research demonstrated that clear visual boundaries help children with ASD distinguish between different elements and concepts while reducing visual overwhelm. The implementation of predictable patterns, both in design and content presentation, supports cognitive processing and reduces anxiety, as documented by Zulkefli et al. (2023). Emotional regulation support is integrated through thoughtful design choices that help children maintain calm and focus during learning activities. Recent studies by Hassan et al. (2024b) have shown that when these ASD-specific considerations are properly integrated with cultural elements, children demonstrate improved engagement and learning outcomes.

The synthesis of these components creates a comprehensive approach to designing visual learning tools that are both culturally relevant and effectively address the learning needs of children with ASD. This integration builds upon established research while introducing innovative approaches to cultural inclusion in special education. The framework's effectiveness has been demonstrated through practical implementation in Malaysian educational settings, where teachers report enhanced student engagement and improved learning outcomes (Hassan et al., 2023). Furthermore, the framework's flexibility allows for adaptation to various cultural contexts while maintaining its core principles of visual learning and ASD support.

6.2 Case Study 1: Traditional Game-Based Learning Tools

The first case study examined the implementation of traditional Malaysian games as learning tools at Kuching Autism Association. Building upon research by Hassan et al. (2024a), this implementation focused on using familiar cultural games to develop pattern recognition and sequential thinking skills.

The primary intervention centered on the traditional game "Congkak," which was adapted into a structured learning tool. The Table 3 below implementation included.

Table 3. Primary intervention centered on the traditional game "Congkak"

Development Phase	I. Creation of visual instruction cards featuring traditional game elements II. Integration of number sequencing with cultural patterns III. Adaptation of game rules to accommodate various cognitive levels
Implementation Process	I. Introduction of basic game patterns through visual modeling II. Progressive complexity in game rules and patterns III. Integration of social interaction elements through paired play

Results showed significant improvements in	I. Pattern recognition abilities (35% improvement)
	II. Sequential thinking skills (42% improvement)
	III. Social interaction during structured play (28% increase)
	IV. Student engagement with mathematical concepts

5.2 Case Study 2: Cultural Story Visualization

The second case study focused on the development and implementation of culturally-based visual storytelling tools, as documented by Zulkefli and Rabi (2021). This intervention was conducted at three special education centers in Sarawak as explained in Table 4 below.

Table 4. Intervention conducted at three special education centers in Sarawak

Implementation Features	I. Visual adaptation of traditional Malaysian folklore
	II. Creation of character recognition cards featuring cultural elements
	III. Development of sequential storytelling boards
	IV. Integration of interactive elements for story reconstruction

Key Components	I. Traditional character visualization using cultural artistic styles
	II. Story sequencing using familiar cultural settings
	III. Interactive elements incorporating traditional motifs
	IV. Cultural color symbolism in visual hierarchies

Outcomes demonstrated	I. Enhanced narrative comprehension (45% improvement)
	II. Increased verbal participation in storytelling sessions
	III. Improved emotional recognition through cultural character expressions
	IV. Strengthened connection to cultural heritage

6.3 Case Study 3: Interactive Cultural Pattern Learning

The third case study investigated the use of interactive cultural patterns in learning

environments, building on research by Hassan et al. (2023). This study focused on integrating traditional Malaysian patterns into digital learning tools as explained in Table 5 below.

Table 5. Integrating traditional Malaysian patterns into digital learning tools

Implementation Structure	I. Digital adaptation of traditional batik patterns II. Interactive pattern creation tools III. Integration of cultural color theory IV. Progressive complexity in pattern recognition tasks
Key Innovations	I. Touch-responsive pattern creation interfaces II. Cultural pattern recognition games III. Interactive color selection based on traditional meanings IV. Adaptive difficulty levels based on student response
Results indicated	I. Improved visual pattern recognition (38% increase) II. Enhanced fine motor skills through pattern creation III. Increased attention span during learning activities IV. Stronger cultural awareness and appreciation

Each case study demonstrated the framework's adaptability to different learning contexts while maintaining cultural authenticity and educational effectiveness. The implementation examples provide practical guidelines for educators and designers working with children with ASD in Malaysian cultural contexts. These findings align with previous research by Hassan et al. (2024b) on the importance of cultural integration in special education.

7. RESULTS

The implementation of the integrated cultural-visual framework across multiple educational settings has yielded significant insights into its effectiveness and practical applications. Analysis of the case study implementations revealed several key outcomes that demonstrate the framework's potential for enhancing learning experiences for Malaysian children with ASD.

The most prominent finding was the marked increase in student engagement when learning materials incorporated familiar cultural elements. Observational data showed that children spent an average of 27% more time actively engaged with culturally-relevant materials compared to standard visual learning tools. This increased engagement was particularly notable during storytelling sessions that utilized traditional Malaysian narratives and characters, where children demonstrated

enhanced attention spans and improved recall of learning objectives.

Enhanced understanding of abstract concepts emerged as another significant outcome. When abstract ideas were presented through familiar cultural references, such as using traditional game patterns to teach mathematical concepts, children demonstrated improved comprehension and retention. Teachers reported that students were better able to transfer learning to new contexts when the initial instruction was grounded in culturally relevant examples. This finding aligns with previous research by Hassan et al. (2023) on the importance of cultural context in special education.

The integration of culturally-appropriate visual supports showed remarkable benefits for emotional regulation. Children demonstrated greater calm and reduced anxiety when working with materials that incorporated familiar cultural patterns and color schemes. This effect was particularly pronounced during transition periods, where traditional Malaysian visual cues helped maintain emotional stability. Quantitative measures indicated a 35% reduction in anxiety-related behaviors when using culturally-informed visual schedules and support tools.

Perhaps most significantly, the framework facilitated increased parent and community involvement in the educational process. Parents reported feeling more connected to their children's learning when they recognized cultural elements in educational materials. This enhanced connection led to improved home-school collaboration, with parents more actively participating in extending learning activities beyond the classroom. Community members, particularly cultural artisans and elders, became valuable resources in developing and implementing culturally-informed learning materials.

8. Implications for Practice

The findings from this research have substantial implications for various stakeholders in the field of special education and cultural arts integration. For educational material designers, the framework provides a structured approach to incorporating cultural elements while maintaining pedagogical effectiveness. This requires a fundamental shift in design thinking, moving beyond simple cultural decoration to meaningful integration that supports learning objectives. Designers must develop deep understanding of both Malaysian cultural aesthetics and the specific learning needs of children with ASD to create truly effective materials.

Special education teachers benefit from this framework through enhanced tools for classroom implementation. The research demonstrates that teachers who understand the cultural significance of visual elements can more effectively engage students and facilitate learning. Professional development programs should therefore incorporate training in cultural aesthetics alongside traditional special education methodologies. Teachers reported feeling more confident in adapting materials when they understood the underlying cultural principles guiding the framework.

Cultural arts practitioners have emerged as essential collaborators in the educational process. Their expertise in traditional Malaysian arts and aesthetics provides

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authentic cultural content that can be adapted for educational purposes. The framework suggests new opportunities for cultural practitioners to contribute to special education, potentially creating new roles for artists in educational settings. This collaboration between cultural artists and educators represents a novel approach to inclusive education that honors both pedagogical needs and cultural heritage.

For policy makers in special education, the implications are particularly significant. The success of culturally-informed visual learning tools suggests the need for policy frameworks that support cultural integration in special education curricula. This may include funding for cultural arts integration programs, professional development requirements that include cultural competency, and assessment criteria that value cultural relevance alongside academic achievement. Policy makers must consider how to institutionalize these approaches while maintaining flexibility for local cultural variations across Malaysia's diverse regions.

9. CONCLUSIONS

The integrated cultural-visual framework presented in this study marks a substantial advancement in developing culturally-responsive educational tools for Malaysian children with ASD. This research not only contributes to the existing body of knowledge in special education but also opens several promising avenues for future investigation. Building upon the current findings, future research should focus on conducting rigorous quantitative assessments to measure the framework's effectiveness across different educational settings and student populations. Additionally, cross-cultural adaptability studies would be valuable in examining how this framework could be modified and implemented in diverse cultural contexts beyond Malaysia, while maintaining its core principles and effectiveness.

The development of comprehensive digital implementation guidelines represents another crucial area for future research, particularly as educational technology continues to evolve and play an increasingly important role in special education. Furthermore, longitudinal studies are needed to evaluate the long-term impact of these culturally-informed visual learning tools on academic achievement, social development, and cultural identity formation among children with ASD. Such extended temporal investigations would provide valuable insights into the sustained effectiveness of the framework and inform potential refinements to its implementation strategies. This research trajectory will contribute to the ongoing development of inclusive, culturally-sensitive educational practices that effectively support the unique learning needs of children with ASD while honoring their cultural heritage.

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