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Application of Fuzzy Delphi Method for Cross-Cultural Corporate Identity Curriculum Model Design Development

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Abstract
This study developed the main components of a cross-cultural corporate identity curriculum model using a quantitative Fuzzy Delphi method with a seven-point Likert scale. Data analysis involved Triangular Fuzzy Numbers and Fuzzy Evaluation. The analysis revealed that the curriculum components had a threshold value of less than 0.2, with expert agreement exceeding 75% and α-max values over 0.5. The results indicated a strong consensus among experts on the curriculum's components, including objectives, content, teaching methods, learning activities, and evaluation. The findings suggest that the main components of the cross-cultural corporate identity curriculum model are applicable in technical and design fields.

Keywords: Curriculum Design; Cross-Culture; Corporate Identity; Fuzzy Delphi

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1.0 Introduction

Integrating Malaysian cross-cultural elements into design production brings new perspectives to the creative industry. However, the effort to incorporate these elements within design production must be further enhanced both in the creative industry and higher education institutions. In line with the demands of 21st-century learning and the creation of an informed, high-quality society, local and international higher education institutions have devised strategies by offering various programmes centred around the use of technology. Strategic planning in curriculum development is essential to foster academic programmes that cultivate creative and innovative talents, as well as mastery of skills aligned with 21st-century learning norms (Jan et al., 2020). The Graphic Design programme, which focuses on technology, is available at many universities locally and internationally. It contributes professional talent to the creative industry. The programme's learning experiences should align with the realities of professional work as a designer (Udris-Borodavko et al., 2021). Graphic design production must be dynamic, employ the latest technology, and reflect cultural and social values to effectively convey information (Engeler, 2017). Integrating local cross-cultural elements into graphic design education, especially in foundational courses like corporate identity, is a step towards including cultural aspects in design production learning.

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Aleshawie (2020) suggests that design production should highlight culture and identity, as designers derive significant inspiration from these ideas.

Although cross-cultural integration is not a new concept in graphic design, it is not widely practised in design production within the creative industry, nor in the teaching and learning of graphic design programmes. Several issues contribute to the limited emphasis on cross-cultural integration in graphic design production and programmes. One reason is that curriculum design focusing on Malaysian cross-cultural elements for graphic design programmes is still underdeveloped, particularly in foundational courses such as corporate identity. As a result, graphic design students have limited exposure to integrating cultural elements into their design production learning. This is supported by Yip et al. (2019), who state that Malaysian graphic design students do not extensively explore local cultural art elements. The study emphasises that a good understanding of local cultural art elements can help graphic designers create compelling visuals that effectively communicate messages.

Designers should embrace and highlight local cultural styles in their work to enhance authenticity and preserve local cultural identities in the face of globalisation. Cross-cultural-based design in the study curriculum could elevate cultural awareness (Lee & Waller, 2016). Knowledge of the importance of cross-cultural elements applied in higher education institutions has been shown to shape one's thinking towards culture (Momir et al., 2015), and it brings many benefits to the production of creative designs. This study aims to achieve expert consensus on the formation of the main components for developing a cross-cultural corporate identity curriculum model for the Graphic Design programme. The Malaysian cross-cultural corporate identity curriculum model developed in this study aligns with Chiang et al.'s (2018) recommendations for innovative enhancements in graphic design education. This model focuses on integrating Malaysian cross-cultural elements to guide cross-culturally oriented design production teaching.

2.0 Literature Review

A model is a simplified representation of a natural system or process used to illustrate the relationships within that system or process. It is also a structured representation of reality, systematically organised, as seen in the context of curriculum design development (Adirika, 2020). In developing a curriculum design model, several key aspects must be identified, including planning, implementation, evaluation, and the relationships between the model's components and elements (Aydın et al., 2017). Curriculum development can be defined as the process of planning, implementing, and evaluating a curriculum, which ultimately results in a curriculum design. Therefore, developing a curriculum model is a challenging and dynamic process, involving systematic planning and requiring significant time to ensure quality assurance. Previous studies related to curriculum models demonstrate that a model serves as a simplified representation that is easy to understand. However, the development of a curriculum model requires systematic processes.

Developing a curriculum for Graphic Design programmes is challenging due to the competition between different academic approaches. Higher education institutions must improve their curricula to meet industry needs and offer valuable learning experiences. Curriculum design refers to organising the components and elements of the curriculum. In this regard, Yazçayır and Selvi (2020) argue that curriculum design involves planning, implementation, evaluation, and development stages. Tseng (2017) elaborates that curriculum design involves several components, including course objectives, content knowledge, syllabus design, course implementation, and evaluation. Curriculum design development is a systematic and dynamic process, as well as a purposeful and progressive one within the field of education (Mohanasundaram, 2018). In developing a curriculum model, designers should examine and incorporate internal and external resources appropriate to the institution or university (Cahapay, 2021). In Malaysian higher education, curriculum design follows systematic planning processes similar to those observed in previous studies.

The development of a cross-cultural corporate identity curriculum is based on two key theories: (1) Vygotsky's (1978) social constructivism theory and (2) Amabile's (1982) theory of creativity. The proposed curriculum emphasises creativity in teaching and learning while integrating aspects of culture, guidance, and projects. Additionally, two supporting models, the Tyler Model and the ASIE Learning Model, were used to form the main components of the cross-cultural corporate identity curriculum model. The Tyler Model is often used as a guide in curriculum development. According to Ornstein and Hunkins (2017), curriculum design includes objectives, content, learning experiences, and assessment methods, all in line with Tyler's principles. The model emphasises student achievement and the importance of learning experiences, making it suitable for developing a Malaysian cross-cultural corporate identity curriculum. The ASIE model aligns with student-centred learning and outcome-based education, making it ideal for guiding curriculum models that meet current needs. The combination of these two models can create a curriculum that enhances understanding of Malaysian cross-cultural dynamics and corporate identity design. This approach fosters creative thinking and supports the mastery of both manual and digital skills, essential for 21st-century learning.

3.0 Methodology

This study employed the Fuzzy Delphi method to measure expert consensus in decision-making, making it suitable for design and development research. A panel of experts, each with insights from their respective fields, was consulted. The Fuzzy Delphi method applies quantitative techniques to translate the consensus of expert groups (Mohd Ridhuan & Nurulrabiah, 2020). This technique was selected to gather expert agreement on the elements required for module development. The experts' views and consensus were pivotal in shaping the core components and elements of the curriculum design. Essential aspects of curriculum design development, such as purpose, teaching methods, content, organisation, and assessment, were incorporated. This study used research and interviews to develop the syllabus, products, processes, and implementation procedures. Questionnaires were also employed to collect data on the curriculum's objective aspects. The use of a 7-point Likert scale is recommended for Fuzzy Delphi analysis, as it

provides accurate and precise responses (Chang et al., 2011; Mohd Ridhuan & Nurulrabiah, 2020). The language and content of the questionnaires were reviewed by expert panels to ensure validity. Four experts verified the validity and suitability of the elements used. The questionnaires were distributed through both face-to-face meetings and email.

3.1 Data Analysis Process

Several steps were followed for data collection and analysis using the Fuzzy Delphi method. These processes are outlined below:

- Step 1: Selection of Experts

In this study, 12 experts were selected based on their specialisations and at least five years of experience. The number of experts chosen aligns with the view of Adler and Ziglio (1996), who suggested that involving 10 to 15 experts is appropriate for Delphi studies. The selection was based on the experts' experience and expertise. Details of the selected experts are provided in Table 1.

Table 1. Information of Experts Involved

Item	Demographic Data	Frequency	Percentage (%)
Race	Malay	9	75
	Chinese	2	16.7
	Indian	1	8.3
Profession	Lecturers in Public Universities	6	50
	Lecturers in Private Universities	4	33.3
	Graphic Designers	2	16.7
Work	5 to 10 years	1	8.3
Experience	11 to 15 years	3	25
	above 16 years	8	66.7
Expertise	Graphic Design	8	66.3
	Curriculum & Pedagogy	2	16.7
	Visual Culture	2	16.7

(Source: Researchers' own data)

- Step 2: Determining Linguistic Variables Based on Triangular Fuzzy Number (Determining Linguistic Scale)

The average value of fuzzy numbers in triangular Fuzzy numbering is represented by m1 (minimum value), m2 (most plausible value), and m3 (maximum value) (Mohd Ridhuan & Nurulrabiah, 2020). Figure 1 illustrates the mean triangle against the triangular value. The data analysis process for the Fuzzy Delphi method involves converting all linguistic variables into triangular Fuzzy numbers.

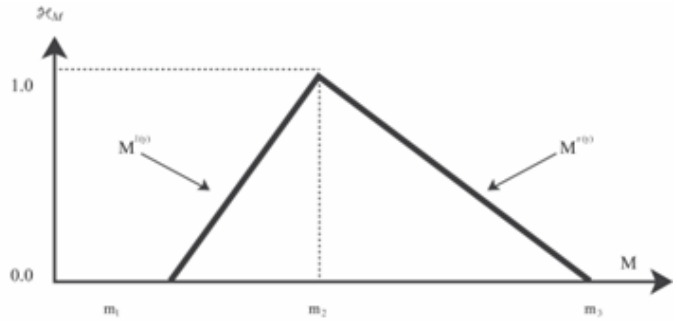

Fig.1: Triangular Fuzzy Number (M1 = Minimum Value; M2 = Medium Value, M3 = Maximum Value)
(Mohd Ridhuan & Nurulrabiah, 2020)

- Step 3: Assigning Linguistic Variables to Triangular Fuzzy Numbering

The expert group converted the Likert scale values from the questionnaires into fuzzy numbers (m1, m2, m3). The fuzzy scale does not rely on a single value. Selecting the appropriate Likert scale is crucial to ensure the reliability of the study. When using the Fuzzy Delphi method (FDM), previous research suggests a 7-point Likert scale over a 5-point scale, as it reduces ambiguity in expert agreement values. Table 2 provides a comparison of the values between the 7-point Likert and Fuzzy scales. This demonstrates the clear difference between the two.

Table 2. 7-point Likert scale values and Fuzzy scale

Scale	Linguistic Variables	*Fuzzy scale*
1	Extremely Disagree	(0.0, 0.0, 0.1)
2	Very Disagree	(0.0, 0.1, 0.3)
3	Disagree	(0.1, 0.3,0.5)
4	Moderately Agree	(0.3,0.5,0.7)
5	Agree	(0.5,0.7,0.9)
6	Very Agree	(0.7,0.9,1.0)
7	Extremely Agree	(0.9, 1.0,1.0)

(Source: Researchers' own data)

- Step 4: Calculating the Threshold Value "d"

In the Fuzzy Delphi method, two key aspects—triangular Fuzzy numbering and Fuzzy evaluation (also known as the Fuzzy score)—are considered. Validation of each item, component, or element depends on the expert group's agreement. Three conditions are essential: 1) The threshold value of each item should be less than or equal to 0.2 (Chen, 2000; Manakandan et al., 2017). 2) The percentage of expert agreement must be at least 75% (Chu & Hwang, 2008; Jamelaa Bibi & Siti Ilyana, 2018). The formula for calculating the threshold value is provided below:

- Step 5: Identifying the Aggregate Alpha Level of the Fuzzy Assessment

The α-cut value, representing the median between the Fuzzy numbers (0-1), is 0.5. If the Fuzzy score (Amax) exceeds 0.5, the component or element is deemed acceptable based on expert agreement. Conversely, if the value falls below 0.5, the component or element is rejected by the experts.

Step 6: Fuzzy Assessment (Defuzzication Process)

The third condition involves the Fuzzy evaluation, where the defuzzification process is based on an α-cut value of at least 0.5 (Tsai et al., 2020). Data analysis for the Fuzzy score is performed using Microsoft Excel and the following formula:

i.) Amax = 1/3* (m1 + m2 + m3)
ii) Amax = 1/4* (m1 + 2m2 + m3)
iil) Amax = 1/6* (m1 + 4m2 + m3)

- Step 7: Ranking Process or Sub-Phase in Curriculum Design

The model's elements are ranked based on their defuzzified values, with the highest-ranked elements being the most important for curriculum design.

4.0 Findings

The Fuzzy Delphi method was used to determine the key components of a cross-cultural corporate identity curriculum based on expert consensus. Table 3 outlines the expert agreement on the main components of this curriculum.

Table 3. Expert Agreement on Key Curriculum Components for Cross-Cultural Corporate Identity Curriculum

No.	Main Component
1	Curriculum Objective
2	Curriculum Content
3	Teaching Methods and Learning Activities
4	Curriculum Evaluation

(Source: Researchers' own data)

The results of the study, shown in Table 4, illustrate the main components of the cross-cultural corporate identity curriculum, based on expert consensus and analysed using the Fuzzy Delphi Method (FDM). The data includes the threshold value (d) and the percentage of agreement among the expert group.

Table 4. Key Components of Cross-Cultural Corporate Identity Model Based on Fuzzy Delphi (FDM) Analysis

NO.	EXPERT	MAIN COMPONENT 1	2	3	4
1	Expert 1	0.038	0.051	0.064	0.064
2	Expert 2	0.038	0.051	0.064	0.064
3	Expert 3	0.038	0.102	0.089	0.089
4	Expert 4	0.038	0.051	0.064	0.064
5	Expert 5	0.115	0.102	0.089	0.089
6	Expert 6	0.038	0.051	0.064	0.064
7	Expert 7	0.038	0.051	0.064	0.064
8	Expert 8	0.115	0.102	0.089	0.089
9	Expert 9	0.115	0.102	0.089	0.089
10	Expert 10	0.038	0.051	0.064	0.064
11	Expert 11	0.038	0.051	0.064	0.064
12	Expert 12	0.038	0.051	0.089	0.089
Threshold Value (d) Of Each Main Component		**0.057**	**0.068**	**0.074**	**0.074**
Percentage of Consensus (%)		**100.0%**	**100.0%**	**100.0%**	**100.0%**
Fuzzy Score (A)		**0.942**	**0.933**	**0.925**	**0.925**

(Source: Researchers' own data)

The threshold value (d) for all significant components averaged 0.068. This indicates that all major components met the Fuzzy Delphi criteria for expert consensus, having achieved a threshold value of less than 0.2. According to Tsai et al. (2020), expert consensus is reached when the threshold value (d) is below 0.2. Additionally, the percentage of expert agreement reached 100%. The Fuzzy Delphi

method involved three conditions for confirming or considering each item, component, or element, which were either accepted or rejected based on expert consensus (Mohd Ridhuan & Nurulrabiah, 2020). This implies that the expert panels unanimously agreed on the main components of the cross-cultural corporate identity curriculum: curriculum objectives, content, teaching methods and learning activities, and evaluation.

Table 5. The Main Components of the Cross-Cultural Corporate Identity Curriculum Model Based on Fuzzy Delphi (FDM) Analysis and Expert Recommendations

		Conditions of Triangular Fuzzy Numbers		Conditions of Defuzzification Process					
Number	**Main Component**	***Threshold Value* (d)**	**Percentage of Expert Consensus**	**m1**	**m2**	**m3**	**Score Fuzzy (A)**	**Expert Consensus**	**Ranking**
1	Curriculum Objective	**0.057**	**100.0%**	0.850	0.975	1.000	0.942	**ACCEPTED**	1
2	Curriculum Content	**0.068**	**100.0%**	0.833	0.967	1.000	0.933	**ACCEPTED**	2
3	Teaching Methods and Learning Activities	**0.074**	**100.0%**	0.817	0.958	1.000	0.925	**ACCEPTED**	3
4	Curriculum Evaluation	**0.074**	**100.0%**	0.817	0.958	1.000	0.925	**ACCEPTED**	3
Suggestions from experts:									
1	None								
	Percentage of expert consensus		**100%**						

(Source: Researchers' own data)

As shown in Table 5, all Fuzzy evaluator values (Alpha-Cut defuzzification) were above 0.5. Previous studies suggest that the alpha cut or Fuzzy score must exceed 0.5 to indicate expert consensus (Eshak et al., 2020). Consequently, all items, based on expert consensus, were accepted. The curriculum's main components met the 0.9 threshold in the Fuzzy Delphi method, demonstrating strong expert consensus. The components were ranked according to expert agreement, with the highest-ranked being curriculum objectives, which scored 0.942. Curriculum content followed in second place with a Fuzzy score of 0.933, while teaching methods and learning activities, alongside curriculum evaluation, ranked third with a Fuzzy score of 0.925. Despite its significance, curriculum evaluation was placed last in terms of appropriateness for curriculum development. Figure 2 illustrates the main components of the developed cross-cultural corporate identity model.

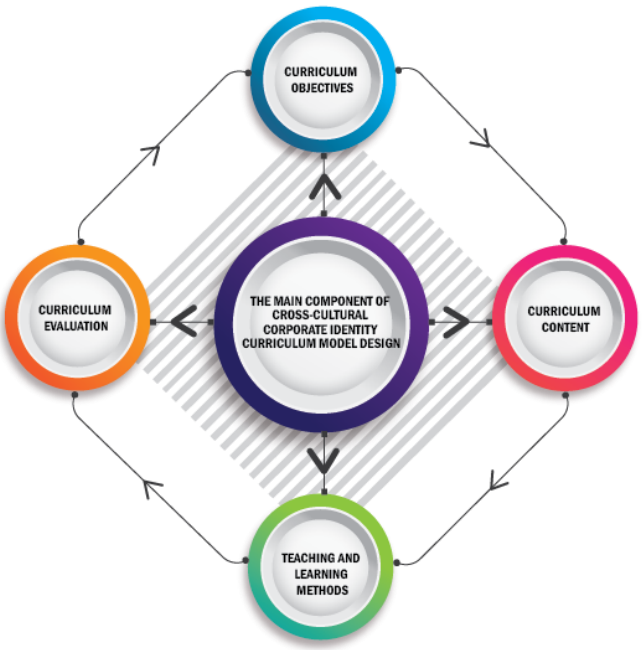

Fig 2: Main Components of the Cross-Cultural Corporate Identity Curriculum Model
(Source: Researchers' own data)

5.0 Discussion

This study aimed to develop the main components of a cross-cultural corporate identity curriculum model aligned with the teaching and learning context of the Graphic Design Programme. The findings indicate that curriculum development for cross-cultural corporate identity occurs in stages. This model promotes cross-cultural appreciation and addresses the lack of cultural diversity within Malaysian higher learning institutions. The curriculum components were ranked based on the Fuzzy Delphi method: curriculum objectives, content, teaching and learning methods, and evaluation. These components align with established curriculum development models, such as Tyler's model, which highlights four fundamental elements: objectives, content, teaching and learning methods, and assessment.

The Fuzzy Delphi method uses three conditions to validate or evaluate items based on expert consensus, resulting in the acceptance or rejection of components (Mohd Ridhuan & Nurulrabiah, 2020). The experts reached consensus on the essential elements for curriculum development, which are interrelated. The curriculum objectives clearly outline the primary goals, which are critical in determining the desired learning outcomes. Once the objectives are defined, the next step is to create appropriate content, focusing on the development of knowledge, manual skills, and digital technology use. After establishing the objectives and content, suitable teaching methods and learning activities must be selected to align with the curriculum's aims. Curriculum evaluation is necessary to measure the achievement of learning outcomes, particularly the mastery of technical skills in cross-cultural corporate identity design.

The four main components of the cross-cultural corporate identity curriculum are essential for teaching and learning. This curriculum is designed to provide valuable learning experiences in creating corporate identity designs with a local cross-cultural focus. It also aims to enhance understanding of cultural diversity, foster creative thinking based on cross-cultural elements, and emphasise both traditional and digital design processes, using technological skills to produce corporate identity designs. These skills will enable future graphic designers to be highly proficient in their work.

6.0 Conclusion & Recommendations

This research highlights the importance of developing a cross-cultural corporate identity curriculum model specifically for the Graphic Design Programme. The model is structured around four key components: curriculum objectives, content, teaching and learning methods, and evaluation, all of which align with the teaching and learning goals of the programme. The study emphasises a staged approach to curriculum development, highlighting the need to promote cross-cultural appreciation and address the lack of cultural diversity in Malaysian higher education. The Fuzzy Delphi method confirmed expert consensus on the essential elements, which are interdependent. The objectives clearly define the primary goals of the curriculum, which are vital in achieving the desired learning outcomes. This cross-cultural corporate identity curriculum model provides enriching learning experiences for designing culturally diverse corporate identities. It aims to improve understanding of cultural diversity, stimulate creative thinking by incorporating cross-cultural elements, and highlight both traditional and digital design processes. This curriculum will equip students with the skills to distinguish and create corporate identities for various products, organisations, or businesses, significantly enhancing their professional competence in graphic design. The development of this cross-cultural curriculum model revitalises the corporate identity curriculum and can be extended to other academic fields, particularly in technical and design education. However, this study focuses solely on the main components of developing the cross-cultural corporate identity curriculum model. Future research should explore deeper into sub-components for each main component, including local cross-cultural elements. A comprehensive curriculum is essential for providing meaningful learning experiences that enhance graduates' skills and appeal to employers within the creative industry.

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Contribution to the Field of Study

This study offers valuable insights for researchers, particularly in curriculum design and development, focusing on the key components of curriculum creation. Curriculum developers, particularly in local public and private universities, may use the findings of this research to inform and adapt their course curricula. This study serves as an essential reference for developing and refining curricula that incorporate cross-cultural integration, offering vital guidance for the design and development process.

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