



Designing for diversity: Strategies for building cross-cultural competence in modern design education

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Abstract

This study aims to define the foundational ethical paradigms and essential competencies required for cross-cultural product designers in the volatile, uncertain, complex, and ambiguous (VUCA) global environment and to propose a differentiated pedagogical framework for master's and doctoral-level design education. A sequential explanatory mixed-methods approach was utilized. The quantitative phase involved a survey of 438 stakeholders (aspirants, organizational executives, and academics), categorized by master's and doctoral groups, to define competency priorities. The qualitative phase consisted of 30 in-depth, semi-structured interviews, with data analysis enhanced by Natural Language Processing (NLP), used to interpret and triangulate the findings. Stakeholder consensus confirms a new competency framework built on knowledge/skills, personal attributes, and ethics. The paramount ethical paradigm is respect for societal and cultural norms (97.98% demand) across all groups. Competencies are strongly differentiated. The master's focus emphasizes design execution (97.36%) and creative thinking (97.99%), positioning graduates for market-ready application. Doctoral focus prioritizes solving complex problems (95.52%) and visionary design creation, emphasizing systemic leadership. Crucially, adding value to cultural heritage/capital was highly prioritized across both levels, validating cultural integrity as a core competitive competency. Preparing the global designer requires a curriculum that strategically integrates cultural intelligence as a core ethical and practical competency. The proposed differentiated pedagogical framework must pivot the master's level toward execution and professionalization and the doctoral level toward systemic transformation and visionary leadership to effectively align product creation with cultural identity and technological imperatives.

Keywords: Cross-cultural competence, Design education, Pedagogical framework, Cultural intelligence, Global designer

Introduction

In the volatile, uncertain, intricate, and ambiguous (VUCA) global landscape, product designers must adeptly address complicated difficulties, reconciling swift technological integration with significant cultural awareness. This necessity is especially pressing for cross-cultural designers, who must balance global business requirements with the safeguarding of cultural legacy and ethical accountability.

Cultural variety significantly complicates the design process, requiring the cultivation of cultural intelligence to understand differences in aesthetic ideals, usefulness, and ethics [1-2]. The incorporation of future technologies, including AI and IoT, necessitates that designers confront algorithmic biases, data privacy concerns, and the possible diminishment of conventional craftsmanship [3]. Cross-cultural designers are essential in connecting technological innovation with cultural significance.

This study examines the skills and teaching methodologies necessary for equipping advanced design students to fulfill these requirements. This

analysis examines emerging paradigms that delineate the global designer's role, identifies essential competencies, and explores effective techniques for incorporating these components into graduate and doctoral design education frameworks. This study aims to tackle the challenges and opportunities in advanced design pedagogy through the following research objectives: (1) to delineate the foundational requirements by identifying new ethical paradigms and the essential knowledge, skills, and personal attributes requisite for effective cross-cultural design practice and cultural intelligence, (2) to establish a pragmatic framework by developing effective pedagogical strategies for the integration of these identified competencies, new paradigms, and ethics into graduate (Master's and Doctoral) design curricula, and (3) to propose a future-oriented educational model that adequately prepares advanced design students to navigate the complexities of the global market and drive product development that strategically aligns cultural identity with technological imperatives.

The current academic literature robustly supports that modern design education functions within a framework of widespread global upheaval

increased need for ethical, culturally relevant practice. This review delineates the existing knowledge base while elucidating the significant gaps this study intends to fill.

The context of global disruption in design

Contemporary design practice is influenced by global disruptions and the intricacies of the VUCA environment (Volatile, Uncertain, Complex, Ambiguous). Studies [4-5] assert that designers currently function within incessant rapid change, characterized by geopolitical shifts [6] and technology convergence [7,34]. A study [8] characterizes this disturbance as the "new normal," emphasizing the critical necessity for adaptability and resilience in professional training.

Technological breakthroughs, especially the emergence of AI and digital systems, have generated considerable ethical complexity [9] and have challenged conventional ethical frameworks [4]. This disruption is perceived as a catalyst for "creative destruction" [10], fostering prospects for innovative methodologies propelled by small, nimble teams [11].

Cultural and ethical imperatives in design

The essence of successful global design resides in cultural knowledge and ethical consciousness.

Cultural Intelligence (CQ): This skill is seen as crucial for effective individual interactions in global markets. Research [13-14] underscores the imperative for designers to incorporate cultural knowledge and heritage preservation into product development, recognizing that cultural factors profoundly affect consumer preferences. Moreover, successful market strategies depend on inclusive and culturally attuned marketing [15] and an awareness of how customers reconcile traditional values with global openness [16]. A study [17,32] advocates for the essentiality of cultural intelligence (CQ) for designers in a globalized context.

Ethical responsibility: Ethical awareness is defined as the obligation to tackle "wicked problems" intricate, systemic societal issues [18-19]. A study [20] asserted that design education should include social and environmental welfare rather than solely focusing on commercial profit. This viewpoint corresponds with the contemporary focus on

sustainable development-oriented design [21] and the transformation in consumer behavior towards ethical consumerism [22-23], compelling designers to account for societal and environmental implications in addition to functionality.

The role of advanced education

Higher education serves as the principal catalyst for cultivating essential multidisciplinary and adaptable competencies [5, 24]. Advanced-level training aims to develop leaders proficient in comprehensive strategic thinking [25], facilitating change [26], and exhibiting emotional intelligence for successful collaboration [27-31].

Research gaps

Notwithstanding the extensive literature highlighting the necessity for culturally astute and ethically conscious designers, certain deficiencies persist in the practical application of advanced design education:

Absence of a comprehensive cross-cultural

Competency Framework [17]: Although individual studies highlight ethical reasoning [4] and technical skills [5], there is a deficiency of an integrated, holistic competency framework specifically designed to address the unique requirements of cross-cultural design practice within the perpetually disrupted VUCA environment. The domain is devoid of a conclusive framework that integrates creative, technological, cultural, and ethical criteria into a singular, quantifiable benchmark for advanced design professionals.

Lack of advanced pedagogical strategies

The existing research fails to delineate effective, actionable pedagogical strategies for the implementation of these integrated competences at the master's and doctoral levels. The primary emphasis continues to be on fundamental principles of undergraduate education. This paper contends that advanced education, which prepares future leaders, necessitates specific approaches (e.g., research emphasis, systemic analysis, and strategic vision) for comprehensive integration:

- The application of a study's [9,33] ethical

- principles
- to practical design research falls under the category of Ethics and Technology.
- Cross-Cultural Principles (e.g., advancing beyond Hofstede's dimensions to applied product synthesis, as indicated by a study [1]).

This research directly tackles these deficiencies by employing stakeholder consensus to build a customized competency model and targeted training tactics for advanced design programs, thereby equipping graduates to instigate revolutionary, globally conscious change with the research questions in the next section.

Research questions

What are the emerging ethical frameworks and the requisite knowledge, abilities, and personal qualities necessary for fostering cultural intelligence and proficient cross-cultural design practice in the modern global landscape?

1. What effective instructional methodologies should be developed to include the indicated competencies, ethical frameworks, and transdisciplinary requirements into advanced graduate (master's and doctoral) design curricula?
2. How can advanced design education be organized to establish a future-oriented framework that adequately equips students to manage global market intricacies and strategically link product development with cultural identity and technical demands?

Methods

Research design

This study utilizes a sequential explanatory mixed-methods approach to develop a curriculum framework for cross-cultural designers. The

methodology integrates quantitative data with subsequent qualitative research to achieve a comprehensive understanding of the requisite paradigms and competencies.

The study sequence included an extensive literature review to establish the conceptual framework of global disruption, emerging design paradigms, and necessary competencies. A quantitative study was conducted to thoroughly assess stakeholder expectations regarding essential competencies for cross-cultural product designers. Qualitative semi-structured interviews provide a profound understanding of the rationale behind survey results, highlighting social change, lifestyle modifications, and emerging professional challenges.

Comparative study to assess cross-regional design techniques, identifying best practices, challenges, and opportunities in meeting diverse global market demands. Data triangulation and synthesis to establish the conclusive competency framework and educational strategies.

Participants and sampling

A purposive sampling technique was utilized, emphasizing key stakeholders according to their influence and knowledge (e.g., employing a Power-Interest Grid framework) to guarantee a diverse and representative sample. Participants comprised prospective master's and doctoral candidates, organizational executives, educational administrators, and design scholars. A total of 416 stakeholders engaged in the quantitative survey. Table 1 below presents stakeholder demographics and data collection objectives for the quantitative survey. Thirty prominent personalities were chosen for comprehensive, semi-structured interviews. This cohort comprised scholars, businesspeople, and administrators, emphasizing participation from Thailand and China to enable a cross-cultural analysis of viewpoints.

Table 1. Stakeholder demographics and data collection objectives for quantitative survey

Participant Group	Number of Survey Participants	Data-Oriented Objectives
Prospective Master's & Doctoral Students	318	Determine expectations for curriculum and crucial career competencies.
Organizational Executives	26	Ascertain essential organizational competencies and criteria for assessing graduate quality.

Educational Administrators	62	Inform strategies for curriculum development and program design at an advanced level.
Design Academics	10	Analyze competencies required for designers in a disrupted context and insights on integrating cross-cultural skills.
Total	416	-

Data analysis

The survey's quantitative data underwent regular statistical analysis. The qualitative data obtained from the interviews was analyzed by Natural Language Processing (NLP) to increase speed, minimize bias, and promote systematic analysis. Prominent NLP applications included sentiment analysis to evaluate stakeholder perspectives on issues and critical competencies. This study employed topic modeling to identify fundamental themes, including cultural intelligence, ethical integration, and sustainable design. The amalgamation of quantitative findings with themes discerned by NLP enabled the formulation of a robust conceptual framework.

Reliability and validity

Various measures were employed to guarantee the legitimacy, consistency, and reliability of the research findings:

- **Triangulation:** Data was thoroughly corroborated from three independent sources—surveys, interviews, and an extensive literature review—to validate consistent trends and ensure a comprehensive understanding.
- **Inter-Coder Reliability:** A group of researchers separately analyzed the qualitative data. The calculation of Cohen's Kappa Coefficient resulted in a value of 0.77, signifying a substantial degree of agreement and confirming consistency in thematic identification.

- **Member Checking:** Interview participants validated the transcripts or summaries of their contributions, enhancing the analysis to appropriately represent their experiences and perspectives.

- **Peer Debriefing:** The study team conducted regular meetings to review techniques and preliminary findings, thereby reducing potential bias and guaranteeing methodological rigor.

Results

This part integrates the quantitative findings from stakeholder surveys (N=438) to develop a differentiated competency framework for master's- and doctoral-level designers, directly responding to the three study objectives. The analysis of data was conducted according to the expectations of two primary groups: aspirants (N=350) and leaders (N=88), comprising organizational executives and academic administrators.

New ethical paradigms, knowledge, skills, and attributes (RQ1)

The findings delineate the fundamental prerequisites for the global designer, including ethical principles, technological competencies, and vital personal characteristics.

Foundational ethical paradigm

The novel ethical framework for cross-cultural design is characterized by cultural respect and accountability.

Table 2. Prioritized ethical paradigms for advanced design education: stakeholder consensus

Ethical Domain	Aspirant Demand (Table 5)	Master's Demand (Table 8)	Doctoral Demand (Table 8)	Leader Interpretation
Respect for societal and cultural norms	97.98%		97.98%	Cultural respect is the non-negotiable ethical foundation for global design practice, required at all advanced levels.
Accountability/Justice	Integrity and Honesty (96.37%)		Honesty and Integrity (97.37%)	Ethics must emphasize transparency and responsibility toward the community at the leadership level.

Essential knowledge, skills, and attributes (Differentiated by Level)

The requisite competences delineate a distinct

functional differentiation between the execution emphasis for master's graduates and the strategic leadership emphasis for doctoral graduates.

Table 3. Differentiated competency framework for advanced design graduates: skills and attributes by educational level

Competency Dimension	Master's Level Focus (Leaders, Table 9)	Doctoral Level Focus (Leaders, Table 10)	Top Personal Attribute (Aspirants)
Core Skills	Creative Thinking (97.99%), Design Execution (97.36%)	Solving Complex Problems (95.52%), Development of Design Knowledge (96.64%)	Master's: Flexibility and Adaptability (95.41%)
Cultural Intelligence	Value Addition to Cultural Heritage (91.94%)	Adding Value to Cultural Capital (94.43%), Understanding User Emotions (94.34%)	Doctoral: Creative Problem-Solving (93.75%)
Strategic/Leadership	Digital Technology Skills (96.47%), Teamwork (96.22%)	Holistic Analysis for Design (95.47%), Visionary Design Creation (94.50%)	

The significant need for value-added cultural heritage at both levels indicates that cultural intelligence is not a supplementary ability but an essential, market-critical competency.

Pedagogical strategies and future-ready model (RQ2 & RQ3)

The results from RQ1 informed the development of tailored pedagogical strategies (RQ2) designed to

establish a future-oriented educational framework (RQ3) that equips students to adeptly integrate cultural identity with technological demands.

The most effective technique discovered is differentiated curriculum design tailored to the requisite career trajectory—a master's for market-ready execution and a doctorate for systemic leadership.

Table 4. Differentiated pedagogical strategies and outcomes for advanced design curricula

Educational Level	Strategic Focus	Effective Pedagogical Strategies (RQ2)	Future-Ready Preparation Outcome (RQ3)
Master's Program	Execution and Professionalization	Focus on applied studios, business modules (IP Law, Commercialization), and cross-cultural teamwork simulations.	Prepares students for market readiness and effective technical execution that balances cultural and technological needs in industry.
Doctoral Program	Systemic Transformation and Vision	Emphasis on advanced research methodologies, systems thinking, cultural theory, and Holistic Analysis.	Prepares students for global design leadership and the creation of new knowledge that integrates cultural, ethical, and technological imperatives to solve complex global challenges.

This distinct methodology guarantees that the novel paradigm of transformative leadership, substantiated by the necessity for visionary design creation and the conversion of crises into opportunities, is predominantly developed within the doctoral curriculum, whereas essential technical and cultural integration is attained at the graduate level.

Discussion: Advancing Cross-Cultural Design Education for the VUCA Era

This study's findings empirically validate the need to restructure advanced design education to align with the strategic requirements of a volatile, unpredictable, complex, and ambiguous (VUCA)

global environment. This research synthesizes the expectations of prospective students and industry/academic leaders to present a differentiated, effective competency and pedagogical framework, transcending general requests for cultural awareness.

Defining the global designer: ethical and strategic imperatives

The findings highlight a notable transformation in the requisite characteristics of the advanced designer, corroborating and expanding upon existing literature:

Enhancing cultural respect as the ethical foundation: The near-unanimous designation of respect for societal and cultural norms (97.98%) as the paramount ethical commandment substantiates the arguments of studies advocating for the prioritization of social and ethical well-being [4-20]. This finding affirms that Cultural Intelligence (CQ) is no longer an ancillary skill for market access, as indicated by a study [17], but is the indispensable ethical foundation upon which all global design decisions must be established. The significant demand for value additions to cultural heritage reinforces a study's focus on using cultural knowledge for economic feasibility [1].

The paradigm of transformative leadership: The significant demand from leaders for doctoral graduates skilled in solving complex problems (95.52%), holistic analysis, and visionary design creation underscores the imperative of educating designers for systemic leadership. This viewpoint clearly corresponds with the studies' imperative for designers to address "wicked problems" [18-19] and the vision of leaders adept at managing disruption [5].

The clear expectation to transform crises into opportunities indicates that advanced schools must equip graduates to be proactive change agents in the VUCA environment, translating the notion of creative destruction into practical design strategy [10].

Design focus - integration of uxd/uid with psychological practices

The assessment verified that UXD and UID principles were successfully integrated into the prototype

framework. Experts emphasized that incremental disclosure diminished cognitive load, the soothing color scheme facilitated mood management, and adaptive prompts promoted behavioral engagement. The design decisions were perceived as directly implementing evidence-based psychological methods (e.g., self-monitoring, guided reflection) into user-friendly digital interactions.

Addressing the research gaps through pedagogical differentiation

This study effectively addresses the stated deficiency in a complete, differentiated educational approach for graduate-level design education:

Master's concentration: Implementation and Market Preparedness: The emphasis on design execution (97.36%), digital technology skills, and intellectual property law in master's degrees substantiates the policy of prioritizing immediate professional applicability at this level. This educational decision establishes the master's designer as a financially astute, digitally adept professional vital asset in addressing contemporary market needs and incorporating ethical considerations such as sustainable development-oriented design into concrete goods [22].

Doctoral concentration: Research and Systemic Transformation: The pronounced focus on the advancement of design knowledge and comprehensive analysis establishes the framework for the doctoral curriculum. This technique emphasizes the cultivation of abilities essential for research and theoretical development, hence establishing the specialized procedures identified as absent in literature study. Consequently, doctoral education serves as the catalyst for producing innovative cultural and ethical theories essential for tackling technological and societal complexities [3, 24].

Conclusion on the future-ready model

The suggested differentiated curriculum model embodies the future-oriented educational framework promoted in this study. It systematically integrates cultural identity (through cultural capital/heritage competences) and technological need (via digital technology skills and complex problem-solving) by designating specific yet complementary functions to

the two tiers of advanced study. This strategy guarantees that advanced design education is not merely a continuation of undergraduate study but a purposeful conduit for cultivating skilled cross-cultural practitioners and innovative global design leaders.

Future study should concentrate on the qualitative evaluation of pilot programs employing this differentiated framework to ascertain the efficacy of the proposed instructional methodologies in fostering cultural intelligence in practical cross-cultural design initiatives.

Conclusion

This study effectively established a distinct competency framework and proposed an associated pedagogical model for advanced (master's and doctoral) cross-cultural product design education. The results, based on the agreement of aspirants and leaders, affirm that the modern global designer must evolve from a purely technical role to a morally principled, strategically informed global leader.

Key findings and contributions

The study's conclusions directly address the research questions:

Novel ethical framework and competencies (rq1)

The ethical mandate establishes a foundational ethical paradigm characterized by an unequivocal imperative for respect for societal and cultural norms (97.98%), positioning cultural intelligence as an essential ethical obligation rather than merely a practical necessity. Competitiveness is distinctly delineated: a master's necessitates expertise in creative thinking (97.99%) and design execution (97.36%), emphasizing market-ready deliverables. Doctoral programs must foster systemic leadership, as demonstrated by the significant demand for complex problem solving (95.52%) and holistic analysis.

Efficient educational approaches and future-prepared framework (RQ2 & RQ3)

The most efficacious method is the implementation of a differentiated curriculum. The master's program

must prioritize execution and professionalization, including the incorporation of intellectual property law and commercialization, to prepare students for the market. The PhD program must prioritize systemic transformation and vision, incorporating research methodologies and cultural theory to prepare students for global design leadership.

The resulting model is a forward-looking training framework that prepares designers to effectively navigate VUCA complexity by methodically integrating value enhancements to cultural heritage/capital, an essential strategic requirement, in conjunction with technical demands and ethical responsibility.

Implication

The advanced design program must transcend mere aesthetic and technical training to intentionally incorporate cultural intelligence as the core discipline focus. By highlighting this cultural-ethical foundation, design education can proficiently develop future leaders capable of generating new goods while simultaneously fostering social, environmental, and cultural value in a linked society.

Limitations of the study

The study offers a comprehensive, data-driven paradigm for advanced cross-cultural design education; nevertheless, its conclusions and scope are constrained by the following limitations:

Geographic and cultural scope of stakeholders

- **Aspirant Concentration:** The bulk of surveyed prospective students (N=350) were primarily from China and Thailand. Although this offers insight into the ambitions of two significant high-growth economies with substantial cultural legacies, it restricts the applicability of the aspiring viewpoint to other essential design centers in Europe, North America, South Asia, or Africa.
- **Leader Representation:** The viewpoints of the leaders (N=88)—though varied in function (organizational, academic)—may exhibit geographical concentration or bias towards the regions where the key aspirant and academic institutions are situated. This may result in an

overfocus on certain market trends or cultural norms, thereby neglecting the distinct design requirements of specialized or emerging global markets.

Methodological constraints

- **Dependence on Stated Preferences:** The principal quantitative phase of the study depended on surveys that document stated preferences (what participants articulate as valuable or necessary) instead of revealed behavior (what they genuinely do or prioritize in actual professional contexts). The practical use and prioritizing of competences such as "respect for societal and cultural norms" in a dynamic commercial setting may vary from the elevated ratings shown in the survey.
- **Defining "Cross-Cultural":** Respondents may interpret the operational concept of "cross-cultural competence" in a broad manner. The study's framework, albeit robust, depends on aggregated survey scores and fails to adequately reflect the intricate, daily obstacles of cross-cultural collaboration that qualitative data could reveal.

Focus on competency and strategy

Exclusion of implementation challenges: The study effectively presents a differentiated pedagogical framework; nonetheless, it neglects to consider the practical obstacles of implementation. This encompasses finance prerequisites, faculty development necessities (i.e., whether existing professors have the requisite cultural and systemic analytical proficiency), administrative obstacles for curriculum reform, and the essential transformation in institutional culture to facilitate systemic change.

Validation of effectiveness: This fundamental study establishes the framework for a future-ready approach. The suggested master's (execution) and doctoral (transformation) differentiation in cultivating the intended global design leaders is now theoretical and requires further longitudinal investigations for empirical substantiation.

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