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Cultural Variables and Instructional Engineering

Christine Simard
Graduate Student, Télé-Université, University of Quebec in Montreal, Canada

Josianne Basque
Professor, LICEF Research Center, Télé-Université, University of Quebec in Montreal, Canada

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Abstract

This chapter discusses how cultural variables can be taken into account when designing computer-based learning environments (CLEs). Its purpose is to identify concrete recommendations to guide instructional engineering of computer-based learning for diverse cultures through a review of the literature on the subject. First, this chapter describes the background in which such recommendations have emerged and identifies some of the issues underlying instructional design for diverse cultures. Then it introduces models and guidelines on how cultural variables can be taken into account when designing CLEs. Specific recommendations are organized using a method of instructional engineering for CLEs called *MISA* (Paquette, 2003) as a frame of reference. This is followed by a discussion on future trends and future research directions.

Introduction

Corporate providers and educational institutions are competing in the global education and training services market. Computer-based learning environments (CLEs) are becoming a commodity marketed across nations and cultures. Educators at all educational levels and training professionals who design these systems face the challenge of meeting the needs of culturally diverse learners. More than ever, they need sound methodologies and guidelines for developing CLEs that address cultural diversity issues and meet learners' requirements.

The goal of this chapter is to report recommendations to guide instructional engineering for diverse cultures, which are suggested by diverse authors in the field of educational technology. The frame of reference used to synthesize and organize these recommendations is based on a method of instructional engineering for CLEs called *MISA*[1] (Paquette, 2003).

This chapter is divided into four sections, followed by a conclusion. In the first section, we describe the methodology used to search and select the documents reviewed. We also examine the context in which the culturally sensitive instructional design recommendations are emerging and identify some underlying issues. In the second section, we introduce some models and guidelines intended to assist the instructional designer in addressing cultural variables. Then, we use the six phases and the four axis of MISA as a framework to report specific instructional design recommendations found in the literature. The third section identifies future trends that may influence the instructional design of culturally sensitive CLEs. The fourth section identifies future research directions. In conclusion, we synthesize recommendation highlights.

Background

Scope and Limitations

This literature review focuses on documents published over the last decade and comprises theoretical essays, research papers, case studies, promotional materials originating from both corporate and institutional education providers, etc. We searched on web engines such as Copernic and Google, as well as educational literature databases (e.g. ERIC) and specialized bibliographical databases available through university libraries. Our search descriptors included French and English keywords such as culture, learning, instructional design, etc.

[1] *MISA* is a French acronym for *Méthode d'ingénierie d'un système d'apprentissage*, which could be translated into "Engineering Method for Instructional Systems". This method was developed at the LICEF (*Laboratoire en informatique cognitive et environnements de formation*) Research Center of the Télé-Université of the University of Quebec in Montreal, Canada (TÉLUQ). The LICEF is dedicated to research in the field of cognitive informatics and training environments.

About 300 documents identified during that initial step were reviewed and helped focus the research on specific researchers, organizations and conferences. Helpful resources included sites such as the:

- Institute of Educational Technology (IET) at Open University,
- Australasian Society for Computers in Learning in Tertiary Education,
- Center for Enhancing Learning and Teaching at Charles Sturt University and,
- Department of Educational Technologies at Twente University.

The following criteria were used to select about 60 documents for detailed analysis: (a) the document attempts to answer the question of how cultural variables can guide the instructional engineering of computer-based learning, (b) the author or organization is recognized in the field, (c) the document focuses on adult education issues, (d) the document provides a variety of perspectives and viewpoints.

Computer-based learning is defined here very broadly, as any electronically mediated learning, either web-based or not, and distant or not. Collis and Remmers (in McLoughlin & Oliver, 2000) define two categories of websites that have cross-cultural implications: 1) sites designed to address one context and culture, but visited by other cultures; and 2) sites designed specifically for cross-cultural participation. We suggest that CLEs can be classified similarly and both categories have been considered in our review.

So far, very little has been written about emerging models or guidelines to address cultural diversity in instructional design. Even fewer attempts have been made to organize recommendations within a specific framework or method.

Context

In 2000, the Australian Flexible Learning Framework was established to meet the rapidly increasing demand for flexible learning and e-learning from industry, enterprise and clients. Funded by the Australian Government and all States and Territories, it has provided direct funding and support to more than 20,000 vocational education and training (VET) practitioners. The Framework stresses the importance of considering culture. "Cultural considerations are important in any teaching design. Teaching across cultures from one place to another, or to different cultures in one setting or dispersed across different geographical locations, presents particular challenges" (Backroad Connections, 2004a, p. 2). Many authors also argue that cultural variables must be considered when designing CLEs (Conner, 2000; Goodear, 2001; Backroad Connections Pty Ltd 2002, 2004a; Downey, Cordova-Wentling, Wentling, & Wadsworth, 2004; Henderson, 2006; Wang & Reeves, 2006; Dunn & Marinetti, 2006; Sabin & Ahern, 2002; Subramony, 2004).

The issue of cultural influence on instructional systems is becoming one of the most important challenges faced by developers of e-learning products (Dunn & Marinetti,

2006). How to address it, however, is a relatively new field of research. Concerns about the neglect of culture by providers of educational products appeared in the literature in the 1990s (Gayol & Schied, 1997; Gunawardena, Lowe & Anderson, 1997; McIsaac & Gunawardera, 1996; Bates, 1999; Henderson, 1996). Years later, many researchers still deplore the scarcity of research on the subject (Moore, Shattuck & Al-Harti, 2006; Taylor, 2005), particularly the "few personal accounts and scant empirical research, especially in the field of e-learning" (Edmunston, 2006, p. IX) and the "paucity of reseach that systematically analyzes culture-related variables to suggest design guidelines for culture-related, flexible, on-line learning environments" (Seufert, 2002, p. 412).

Nevertheless, some recommendations on how to design culturally sensitive CLEs began to appear in the educational technology literature in the last years. Before reporting these recommendations, we assess the context in which they emerge with the following questions: Why the interest now? Who is interested? What is the literature about?

Why is interest in integrating cultural variables into instructional engineering on the rise?

Two main reasons seem to explain the current rise in the interest in integrating cultural variables into the instructional engineering of CLEs. First, CLE providers are concerned about the instructional effectiveness of their products in global markets. Thomas, Mitchell, & Joseph (2002) argue that the consequences of not directly addressing culture in the design of instruction include the production of ineffective instructional products, the underuse of potentially effective products, culturally insensitive products, and products that are deemed overtly culturally offensive by some members of certain populations. Dunn and Marinetti (2003a) also claim that "the lack of cultural adaptation is a leading reason why e-learning fails to work for a globally distributed audience" (p. 1).

Second, the CLE providers that currently dominate the international market want to avoid the potential financial consequences of not adequately serving emerging markets, such as Asia. A larger proportion of corporate learning is being delivered via technology to more and more countries (Dunn & Marinetti, 2003a), and tertiary education providers are moving into the international realm to increase revenues (Bates, 1999; Mannan, 2005). The design of CLEs is highly dominated by a few Western and English-speaking countries comprising Britain, Australia and North America (United States and Canada), which we shall refer to as BANA. The domination of BANA is challenged, particularly in the Indian and Chinese markets. Asia holds 56 % of the world population; it represents 36 % of current users of Internet, with a 245 % growth since the year 2000. That is just the tip of the iceberg, since only 10 % of Asians currently have access to the Internet (*Internet Usage in Asia*, n.d.). Concerns with the needs of learners from Asia (Chen, Mashhadi, Ang, & Harkrider, 1999; McCarty, 2006; Backroad Connections, 2004b; Wong & Trinidad, 2004; Chan, 2002) can best be understood in light of those numbers. As Internet use in Asia continues to grow exponentially, so too will the potential market for web-based education in Asian countries.

Who is interested in culturally-based instructional engineering of CLEs?

The bulk of the literature reviewed originates from BANA. The United States is the number one producer of CLEs. The demographic and linguistic composition of population in this country is changing rapidly, with Hispanics now comprising 20 % of the total population, outnumbering Afro-Americans as the largest minority group. Literature on cultural variables addresses: (a) concerns with minority populations; and (b) marketing of American postsecondary educational products to other countries. Many American-based private sector providers who thrived in the unilingual English e-training market now promote solutions that take cultural variables into account (McBrien, 2005; Marcus & Gould, 2001; Conner, 2000) – opening offices in diverse countries and using local experts as spokespeople.

Australia's fourth most important export is education (Goodear, 2001). The country occupies a unique geo-political position: English-speaking and built on Anglo-Saxon traditions, it is surrounded by Asian countries. Australian policy makers are proactive, with initiatives such as the Australian Quality Training Framework of the Australian National Training Authority, which requires training to be equitable to all persons, taking into account cultural and linguistic needs (Goodear, 2001). Australia's objective is to become the world leader in designing and facilitating flexible vocational training that is sensitive to the cultural needs of the global e-learning market (Goodear, 2001).

Britain's Open University was the first university dedicated to distance education. Other universities worldwide have modeled themselves on this successful stronghold of the Anglo-Saxon tradition in education. Not surprinsigly, several instructional designers associated with Open University have discussed linguistic and cultural issues surrounding the teaching and assessment of students who are distributed globally. Mayor and Swann (2002) focus on the problems and possibilities of using English for the design of teaching and assessment materials. Goodfellow, Lea, Gonzalez and Mason (2001) investigate how cultural and linguistic differences manifest themselves in global online learning environments.

Canada is officially bilingual and can target international English-speaking as well as French-speaking markets. Translation and adaptation of materials from one official language to the other are current practices. Canadian universities' involvement in global education often takes the form of collaborative projects, such as the Masters in Education Technology program partnership between the University of British Columbia and Mexico's Monterrey Institute of Technology (Bates, 1999). Canadian West coast institutions are targeting the Asian educational market.

What is the literature concerning cultural variables and the instructional engineering of CLEs about?

Literature concerning cultural variables and the instructional engineering of CLEs includes discussions about definitions of culture and models of cultural variables, learning styles based on culture, power relationships associated with cultural issues,

learning theories and instructional approaches, world citizenship and cultural awareness, language and the culture of the designer**.**

Definition of culture and models of cultural variables. Such discussions usually precede the examination of the influence of cultural variables on learner's behaviour or the identification of recommendations on ways to address them. The three models of national cultural characteristics most often referred to are Holfstede's (1980/2001), Trompenaars's (1993), and Hall's and Hall's (1990). Holfstede's model (1980/2001) identifies five national cultural dimensions: (1) power distance – how different societies handle inequalities in areas such as prestige, wealth and power; (2) individualism versus collectivism; (3) masculinity versus feminity; (4) long- versus short-term orientation – how different societies deal with persistence and thrift to personal stability and respect for traditions; and (5) uncertainty avoidance – how different societies cope with the uncertainty of the future through the domains of technology, law and religion. Trompenaars (1993, 2004) introduces a seven-dimension model of culture: (1) universalism-particularism – do people tend to follow standardized rules or do they prefer a flexible approach to unique situations? (2) individualism-communitarianism, (3) specific-diffuse – do people have a low or high degree of involvement in personal relationships? (4) neutral-affective – do people control their emotions or display them overtly? (5) achievement-ascription – are peoples' status and power based on performance or more likely to be determined by the school they went to, their age, gender, and family background? (6) sequential-synchronic – do people organize their time by doing one task at a time, or by multitasking? and (7) internal-external control. In Hall's and Hall's (1990) model of culture, cultures of the world can be compared on a scale from high to low context. In high-context cultures (Japanese, Arabic and Mediterranean), people have extensive information networks and interaction between people does not require much background information. Conversely, in low-context cultures (North American, Northern European, etc.), interaction requires detailed background information, since many aspects of life are compartmentalized. Holfstede's model is the most frequently mentioned framework (Wang & Reeves, 2006).

Limitations of learning styles based on culture. Goodfellow and Hewling (2005) argue that generalizations about cultural learning styles are of limited value because: (1) individual members of national groups do not necessarily exhibit the characteristics of the collective; (2) there is a danger of conceptualizing culture as a normative dimension, and (3) identifying the locus of cultural difference in learners who are in some way marked as 'other' with respect to an assumed norm risks causing the very problem that it is intended to address. Indeed, many researchers caution against the danger of stereotyping learners (Henderson, 2006; McLoughlin, 2006; Marcus & Gould, 2001; Subramony, 2004).

Power relationships associated with cultural issues. Some discussions focus on issues of global cultural domination and cultural post-colonianism (Gayol and Schied, 1997; Edwards, 2002; Mannan, 2005; Kinuthia, 2006). For example, Mannan (2005) argues that globalization "facilitates the reproduction of cultural capital of the dominant

nations that are exporting knowledge and skills and threatens and sometimes destroys the identities and values of cultures and traditions of recipient nations" (p. 1).

Learning theories and instructional approaches. Discussions focus here on the issue of whether learning theories derived from American and European culture implemented in learning environments conflict with the values of the growing number of learners from different cultures (Moore, Shattuck & Al-Harti, 2006; Catterick, 2006). While many remain convinced that constructivist design principles and instructional methods best address issues of cultural variables in instructional design (McLoughlin & Oliver, 2000; McCarty, 2006), others question their universal relevance (Moore, Shattuck & Al-Harti, 2006; Catterick, 2006; Henderson, 2006). Catterick (2006) identifies three possible responses to cultural diversity: 1) non-accommodation response, based on the notion that BANA's teaching approaches and educational philosophies have been developed for "sound" reasons and need not be modified to accommodate differences in the educational culture; 2) intervention response, which is quite similar to non-accomodation response, except that differences in the educational culture are acknowledged and partly addressed; or 3) modification response, based on the notion that the educational philosophies that inform teaching appoaches in BANA countries need to be re-evaluated and possibly modified.

World citizenship and cultural awareness. Discussions around CLEs designed for intercultural participation sometimes include implicit or explicit goals, such as preparing individuals for global economy and world citizenship by developing cultural awareness and sensitivity (Palaiologou, 2006; Goodear, 2001; Bates, 1999; Cifuentes & Murphy, 2000; Olaniran, 2006). Some maintain that cultural diversity enriches the co-construction of knowledge, as it enhances the level of divergence amongst learners (Cifuentes & Murphy, 2000; Eberle & Childress, 2006; Coulibaly, 2005). Multicultural education (Gorski, 2005) seems to have influenced the discourse surrounding intercultural participation in CLEs.

Language. The issue of language appears frequently in the literature, as the international delivery of distance education is dominated by the English language (Bates, 1999). Language differences are important and disadvantage students working in another language when they have to contribute in collaborative assignments or discussion forums (Bates, 1999; Morse, 2003). "Given that computed-mediated communication is a textual (electronic) rather than a visual (face-to-face) medium, meaning must be carried by the language itself rather than relying on the environmental context as the means of communication and/or interpretation" (Morse, 2003, p. 41). Since 92 % of the world population does not speak English (Conner, 2000), and 57 % of Internet users are native speakers of a language other than English, language issues are not likely to disappear.

Culture of the designer. Instructional systems are shaped by the culture in which they are developed (Dunn & Marinetti, 2006; Mcloughlin & Oliver, 2000). When the schemata of the learner and of the instructional designer do not correspond, the result is what Wilson termed "cultural discontinuities" (Goodear, 2001).

Much of the literature concerning cultural variables and the instructional engineering of CLEs focuses on the above subjects. Existing literature yields few if any specific recommendations on how to address cultural variables. However, as we shall see in the next section, some resources are becoming available.

Cultural Variables and Instructional Engineering

Overview of Models and Guidelines

Although models and guidelines are emerging to assist the instructional designer in addressing cultural variables, they are often built on opposing underlying assumptions. The question that arises is: Should models guiding the development of CLEs be tailored to address specific cultural variables or, on the contrary, be designed to cater to most learners' cultural needs? We shall use that distinction to introduce the models and guidelines documents that we reviewed.

Approaches in which materials are produced in ways which encourage and/or facilitate local adaptation

Eight models or guidelines documents using this more popular approach were identified. Following is a brief description of each of them.

Hendersons's theoretical "Multiple Cultural Model of Instructional design" aims at providing the rationale and strategies for creating and adapting e-learning resources for local, national, and international e-learning (1996, 2006).

Collis (1999) proposes design guidelines to adapt web-based, course-support sites to different expectations and learners preferences, especially those related to culture.

In their "Model of Flexible Learning in a Web-Based Environment", McLoughlin and Oliver (2000) and McLoughlin and Gower (2000) propose design guidelines for flexible and culturally responsive web design. Their work is based on the analysis of a project using Henderson's model for developing culturally appropriate online courses for Indigenous learners in Australia.

Goodear's "Framework of Review" (2001) describes issues to consider in developing culturally sensitive flexible learning models (FLM), particularly for online learning. Goodear recommends the use of Khan's (2000) web-based learning framework.

Zahedi, Van Pelt and Song (2001) propose a conceptual framework exploring differences in how people from diverse cultural backgrounds and with diverse individual characteristics might perceive and use web documents. The conceptual framework is based on Holftede's model.

First published in 2003 (2003a, 2003b), Dunn and Marinetti's "Guideline for the Selection for Adaptation Strategies and Decision Support Tool" aims at assisting the instructional designer to select an appropriate adaptation strategy: (a) translation only; (b) localization – translation and some content adaptation (such as context and examples); (c) modularization – more content adaptation (some of which may be modular) and adaptation of instructional strategy (such as reordering of material, using alternative media, etc.); or (d) origination – a significant proportion of the content and of the instructional strategy is unique to the culture in which the CLE is used and may require an alternative course architecture.

Recently, Dunn & Marinetti (2006) proposed a tool to support the selection of specific learning strategies, based on understanding of cultural values. It uses Reigeluth's and Moore's framework for comparing and selecting instructional strategies by mapping the identified learning-related norms and preferences of specific cultures against specific learning strategies and theories.

Burn's and Thongprasert's (2005) "Strategic Framework for Successful VED (Virtual Education Delivery) Implementation" is used to determine the specific factors that influence online learning environments in other cultural contexts. It is based on the authors' study examining critical factors for implementing VED in Thailand.

Finally, Edmunston (2006) provides guidelines for evaluating existing e-learning courses and for matching them to the cultural profiles of targeted learners. The author's "Cultural Adapation Process (CAP) Model" has nine dimensions and integrates Marinetti and Dunn's guidelines, Holfstede's cultural dimensions and Henderson's multiple cultural model.

Approaches in which materials are produced so that they can be used in any context

At the other end of the spectrum, fewer models were identified, most of which are very recent. Here is a brief description of the six models and guidelines associated with this approach found in the literature review.

Slay's (2002) "Theoretical Framework for Designing Learning for Multicultural Settings" examines human activity within a learning environment as a system and uses a systematic approach (guided by the application of Kline's (1995) systems theory[2]) to analyze the role of culture within it.

[2] Kline (1995) identifies three foundational perspectives that are helpful in considering a complex system: 1) a synoptic view, which is an overview with a top-down approach; 2) a piecewise view, which identifies and examines the smallest portions of a system; and 3) a structural view, which provides details on how each piece fits together within a particular system.

Sabin's and Ahern's (2002) approach is based on the work of Samovar, Porter and Stefani (1998), and aims at integrating cultural differences within traditional instructional design methodologies, such as Gagné's nine events of instruction.

In their "Universal Design for Learning (UDL)", Eberle and Childress (2006) provide a guide for designing and delivering UDL-based online learning for culturally-diverse learners. It uses Rose's and Meyer's (2000, 2002) recommendations for various instructional techniques and teaching strategies, based upon brain networking theory.

McLouglin's (2006) "Cross-Cultural Teaching Ladder" is a three-level model or holistic framework for the development of collaborative e-learning environments appropriate for culturally diverse learners. It links activity design, learner needs and pedagogy.

Gunawardena, Wilson and Nolla (2003) propose a two parts design framework: the first part describes the institutional context, and the second part describes issues related to online course design. It uses the amoeba as a metaphor for an adaptive, meaningful, organic, environmental-based architecture for culturally relevant course design. The framework takes into consideration the works of Collis (1999), Marcus and Gould (2001), and Chen et al. (1999).

Finally, in their conceptual model, Moore, Shattuck and Al-Harti (2006) deal with overlapping systems of cultures in an online learning environment. It combines 1) Holliday's (1994) concept of layers of culture in education; 2) Fay's and Hill's (2003) application of that model to an e-learning environment; and 3) Saba's (1994, 2003) model of hierarchical interacting distance education subsystems.

Overview of MISA (Engineering Method for Instructional Systems)

MISA is an instructional engineering method particularly useful for the design of CLEs. It was designed by Paquette (2003) at the LICEF Research Center at Tele-Universite in Montreal. MISA incorporates aspects of systems theory, instructional design, software engineering and knowledge engineering. "The main goal of the method is to provide an operational base for the cognitivist and constructivist theories of learning" (Paquette, 2003, p. 115). As such, it may not be free from bias.

MISA divides the instructional engineering process in six main phases, which are quite similar to the phases of the classical ADDIE instructional design model (Analysis, Design, Development, Implementation and Evaluation). The first phase (Analysis) is divided into two phases in MISA, called "Problem Definition" (Phase 1) and "Preliminary Analysis" (Phase 2). The Design phase is also subdivided into two MISA phases, called "Architecture design" (Phase 3, which corresponds to the macro-design of CLEs) and "Learning Material Design" (Phase 4, which corresponds to the micro-design of each learning material integrated into CLEs: text, audio, video, graphics, etc.). The fifth phase of MISA combines the Development and Validation phases of the ADDIE model, because those processes are usually iterative. However, since MISA was developed exclusively for instructional designers, this fifth phase includes only the

planning of the development and validation processes. The sixth and final phase of MISA (called Delivery Plan) is also limited to the planning of the implementation process, and does not include this process itself.

Thus, Paquette (2002) did not consider the operationalization of the development, implementation and delivery of CLEs as being instructional designers' tasks. Instead, other actors (media specialists, technologists, learning environment managers, etc.) complete this work, although an individual may carry out the instructional design "role" and these other roles. In other words, the MISA process stops where the learning system delivery begins.

One main point of originality of MISA is that it suggests progressive and parallel elaboration of four main "axis" of the CLE during the instructional engineering process (see Table 1): the *Knowledge* Axis, the *Instructional* Axis, the *Media* Axis and the *Delivery* Axis. The Knowledge Axis refers to the identification of the targeted knowledge of different types (*concepts, procedures, principles and facts*) and the specification of competencies that learners will develop when interacting with the CLE. The Instructional Axis refers to the elaboration of the learning scenario that the learners will follow in the CLE and the associated teaching scenario that the instructor will implement. The Media Axis concerns the format of the CLE interface and the different learning resources integrated in the CLE. Finally, the Delivery Axis refers to the description of the technological and organizational infrastructure needed to implement the CLE and the different actors' roles during the actual implementation (or delivery) phase.

When progressing along the phases of the MISA, and at the crossroads of the six phases and the four axis, the instructional designer produces a series of "documentation elements" (DEs). Examples of DEs include "Target Audiences", "Target Competencies", "Knowledge Model", "Instructional Scenarios", etc. For complex CLEs, the instructional designer could produce up to 35 DEs, but for simple CLEs, a smaller number of core DEs would be produced. As illustrated in Table 1, when communicating the results of the instructional design process, the instructional designer can group the DEs produced either by phases or by axis.

To develop each axis, the instructional designer is invited to use a methodology based on a graphical object-typed modeling technique (Paquette, 2002), borrowed and adapted both from knowledge representation techniques used in artifical intelligence and from concept mapping technique.

Table 1. ***Phases, Axis and Documentation Elements[3] of the MISA (Adapted from Paquette, 2003)***

Phase 1 Training Problem Definition		Phase 2 Preliminary Solution	Phase 3 Design of the Instructional Architecture	Phase 4 Design of Learning Materials	Phase 5 Production and Validation of Learning Materials	Phase 6 Planning of the Learning System Delivery	
100 Training Framework of the Organization 102 Objectives of the Project 104 Target Audiences 106 Current Context 108 Documented Resources	**Knowledge Axis**	210 Knowledge Orientation Principles 212 – Knowledge Model 214 Target Competencies	310 Learning Unit Content	410 Content of Learning Instruments		610 Knowledge and Competency Management	Knowledge Model
	Instructional Axis	220 Instructional Orientation Principles 222 Learning Event Network (LEN) 224 Learning Unit (LU) Properties	320 Instructional Scenarios 322 Propreties of Learning Activities	420 Propreties of Learning Instruments and Guides		620 Actors and Group Management	Instructional Model
	Media Axis	230 Material Orientation Principles	330 Development Infrastructure	430 List of Learning Materials 432 Learning Material Models 434 Media Elements 436 Source Documents		630 Learning System and Resources Management	Media Model
	Delivery Axis	240 Delivery Orientation Principles 242 Cost -Benefit Analysis	340 Delivery Planning	440 Delivery Model 442 Actors and Materials Packages 444 Tools and Means of Communication 446 Delivery Services and Locations	540 Assessment Planning for the Learning System 542 Revision Log	640 Maintenance and Quality Management	Delivery Model
Problem Definition Report		Preliminary Analysis Report	Architecture Report	Design BluePrint	Production and Validation Plan	Delivery Plan	

[3] The number of the DE is composed of three digits. The first one refers to the phase. The second one refers to the axis ("0" for the first phase, as it is not related to any axis). The third digit is an even number attributed to the ED as a unique identifier.

Recommendations Found in the Literature

This section uses the six phases and the four axis of MISA as a frame of reference to organize recommendations concerning cultural variables that may guide instructional designers in their role as defined by MISA. Our purpose is to contribute to the identification of concrete recommendations to guide instructional engineering of CLEs for diverse cultures by providing an overview of those currently found in the literature. We did not include recommendations that touch upon aspects addressed through standard use of MISA (and most ID methods), but rather focused on those recommendations specifically aimed at addressing cultural variables. We neither support nor reject these recommendations, and we are fully aware that some may conflict with others. Contradictions are the common lot of new, ill-defined knowledge domains.

MISA Phase 1: Define the Training Problem

- Assess market size (Burn & Thongprasert, 2005) and determine if the CLE will be internationalized (McBrien, 2005).

- Decide whether to use a model such as Trompenaar's (1993), Hall's and Hall's (1990), or Holfstede's (1980/2001) to guide the analysis of the target population.

- Determine what kind of learning environment is most familiar to target populations (McLoughlin & Gower, 2000; Mannan, 2005; Olaniran 2006), assess the value of education in the culture (Wang & Reeves, 2006; Eberle & Childress, 2006), particularly the attitude towards virtual education delivery (Burn & Thongprasert, 2005).

- Determine who uses computers in that society (Slay, 2002) as well as the technical infrastructure available to the learner and location: work, home or cybercafe (Wang & Reeves, 2006; Treuhaft, 2000; Conner, 2000; McIsaaac & Gunawardera, 1996; Olaniran, 2006; Mannan, 2005).

- Identify etiquette customs and traditions (Henderson, 2006).

- Identify cultural practices associated with gender issues in the target population society (Henderson, 2006; Slay, 2002; Eberle & Childress, 2006).

- Determine learner's view of time (McLoughlin & Gower, 2000; Coulibayi, 2005) and assess the amount of time available for learning (Conner, 2000; Coulibayi, 2005).

- Assess expectations regarding the role of the teacher and teacher-student relationship (McLoughlin & Gower, 2000; Bates, 1999; Wang & Reeves, 2006; Olaniran, 2006; McIsaaac & Gunawardera, 1996; Downey & al., 2004).

- Determine which language(s) are spoken, as well as the skill level for each of them in the target population (McBrien, 2005). Clarify the level of language skills

required to use the CLE (Bentley, Vawn Tinney & Howe Chia, 2005; Treuhaft, 2000) and identify the need for translation (Eberle & Childress, 2006).

- Assess staff competencies in the area of intercultural communication and address their training needs (Goodear, 2001; Cifuentes & Murphy, 2000; Holzl, 1999; McIsaaac & Gunawardera, 1996).

- Identify educational partners from the local culture (Bates, 1999; Goodear, 2001; Cifuentes & Murphy, 2000) and if required, recommend training of local experts to research, design and implement the learning system (McIsaaac & Gunawardera, 1996).

- Decide whether to use an approach in which materials are produced in ways that encourage and/or facilitate local adaptation or one in which materials are produced so that they can be used in any context. If using an adaptation approach, consider defining strategy using Dunn's and Marinetti's (2006) "Guideline for the Selection for Adaptation Strategies".

- Decide which models and guidelines described earlier in the chapter will best assist in addressing cultural variables through the ID process.

- Adopt one of Catterick's (2006) three possible responses to cultural diversity: 1) Non-accommodation response, 2) Intervention response, or 3) Modification response.

- Determine whether the use of learning objects[4] would be an appropriate solution to address cultural variables, as they may allow for reusability from one cultural group to another, as long as they share cultural variables (Dunn & Marinetti, 2003a, 2003b, 2006; Goodear, 2001).

MISA Phase 2: Propose a Preliminary Solution:

Instructional axis

- Create opportunities for the cultural diversity of the participants to be explored (Goodear, 2001; Eberle & Childress, 2006), such as enabling learners to create resources and to add culturally relevant sources of information (McLoughlin & Oliver, 2000; Holzl, 1999).

[4] Wiley (2002) defines a learning object as "any digital resource that can be reused to support learning" (p. 7). It includes "anything that can be delivered across the network on demand, be it large or small. Examples of smaller reusable digital resources include digital images or photos, live data feeds (like stock tickers), live or prerecorded video or audio snippets, small bits of text, animations, and smaller web-delivered applications, like a Java calculator. Examples of larger reusable digital resources include entire web pages that combine text, images and other media or applications to deliver complete experiences, such as a complete instructional event." (p. 7)

- Design authentic learning activities and tasks aligned with the learners' existing skills and the values of their communities (McLoughlin & Oliver, 2000; Wang & Reeves, 2006).

- Pay attention to differences in instructional methods, which may vary from country to country (see example in McBrien, 2005).

- Include examples from indigenous and ethnic minorities as regular content (Henderson, 2006).

- Do not include examples that refer to alcohol, sex, religion, politics, the human body, or animals (McBrien, 2005).

- If learners are "low context" (Hall & Hall, 1990), inform learner of objectives, including information that may seem obvious; gain attention with possible loud, flashy methods; stimulate recall of prior knowledge by continually raising past discussion items and topics; present material so users have the option of reading through all of it; enhance retention and transfer by providing few examples, and review what has been learned in the instruction (Sabin & Ahern, 2002).

- If learners are "high context" (Hall & Hall, 1990), briefly discuss objectives; gain attention in subtle ways, e.g. startling facts; stimulate recall by asking questions and including intermediate quiz type assignments; present materials so users can skim for key concepts; provide concrete examples of how the information can be applied to actual work (Sabin & Ahern, 2002).

- Create multiple channels for communication between learners and teachers, some of which should be private (McLoughlin & Oliver, 2000; Cifuentes & Murphy, 2000; Holzl, 1999; Eberle & Childress, 2006) and in-between learners (Goodear, 2001; Collis, 1999; Wang & Reeves, 2006), including discussion forums in local language (Bates, 1999).

Media axis

- Select the instructional medium carefully (Ali, 2006; Mannan, 2005), particularly because of the costs associated with modifications. Eberle and Childress (2006) caution against the cost of modifying videos.

- Provide a wide range of media, which can include face-to-face and paper-based support (Goodear, 2001), even when assigned readings are provided in electronic formats (Morse, 2003).

MISA Phase 3: Design the Instructional Architecture

Instructional axis

- Provide a teacher's guide, which may be different depending on countries, languages, and culture types (Olaniran, 2006).

- Provide a learner's guide with specific guidelines for assignments that clearly communicate the aims, objectives and requirements (McLoughlin & Oliver, 2000). The guide should also include a guide for online communication (Goodear, 2001) and explicitly describe the educational values embedded in the course design, examples and strategies (Bentley et al., 2005).

- Include a self-assessment test on proficiency for the language used in the CLE.

Media axis

- Work with community artists and designers to design the user interface and navigation features (McLoughlin & Gower, 2000). Let cultural variables inform the design of the user interface (see examples in Marcus & Gould, 2001).

- Pay attention to the position of navigation controls: right-hand web navigation for those whose writing systems are right to left (Henderson, 2006).

MISA Phase 4: Design and Deliver Instructional Materials

Knowledge axis

- Use simple sentences, particularly if the CLE is written in the learners' second language (Wang & Reeves, 2006; Bentley et al., 2005; Treuhaft, 2000; McBrien, 2005; Eberle & Childress, 2006), use the active voice (McBrien, 2005) and avoid colloquialism, humour or jargon (Goodear, 2001; McBrien, 2005; Conner, 2000; Bentley et al., 2005).

Media axis

- Ensure high quality translation (Henderson, 2006) and use comments to provide context for translators (McBrien, 2005).

- Avoid using pictures of people from specific cultures (Eberle & Childress, 2006).

- Replace simple visual materials such as icons, sounds and menus with localized words or symbols (Olaniran, 2006), or use signs and symbols to facilitate mediation with, and integration of, knowledge (Gannon Cook & Crawford, 2006), or keep icons generic (McBrien, 2005; Eberle & Childress, 2006).

- Provide technological tools to encourage 'multi-vocality', for example: machine translators, international keyboards and virtual teachers (Goodear, 2001).

MISA Phase 5: Build and Validate Materials

Delivery axis

- Include representatives of the target population(s) in the test team (McBrien, 2005).

MISA Phase 6: Plan the Learning System Delivery

Instructional axis

- Respect various e-learners' traditions and customs (Eberle & Childress, 2006) by not scheduling assignment dates during religious observances (Henderson, 2006).

Delivery axis

- Emphasize human mediation, such as ensuring quality facilitation of computer-mediated communication. In some CLEs, this may include providing onsite course facilitators of the same culture as learners to take care of technical matters, assist students in communication and course organization, and explain content (Facey, 2001; Ali, 2006). If direct human mediation is unavailable because learners interact in a virtual meeting place, use a computerized social agent to play the role of host and provide "ongoing, in-context help in forming social relationships and building common ground between visitors" (Nakanishi, Isbister, Ishida, & Nass, 2004).

We were able to associate a significant number of recommendations from the literature with each of the six phases of MISA. This process highlighted the importance of considering culture, especially during the initial analysis, at Phase 1. We also noticed that some recommendations could not be integrated into the existing "documentation elements" (DEs) usually produced during MISA, indicating a need to make some modifications to the method if we want to make it more culturally sensitive.

Future Trends

The identification of concrete recommendations to guide instructional engineering for diverse cultures is a new field of concern, in which many research issues are emerging. Which of them will most influence the instructional design of CLEs over the next decade? Following is an analysis of emerging and future trends and issues to watch for.

Emerging instructional engineering expertise in non-BANA countries. Will instructional designers, particularly in Asia and Africa, raise issues and contribute through their practice to changes in the field of instructional engineering?

Culture of the instructional designer? To deal with the affect the designer's culture may have on the instructional engineering process, Bates (1999) suggests the development of ID training that focuses on design issues for programs being delivered internationally. In an experiment conducted by Faiola and Matei (2005), users performed

information-seeking faster when using web content created by designers from their own culture. This area of research raises the issue of who should design what for whom… Are local instructional designers better suited to develop culturally relevant CLEs? If so, what are the implications for BANA producers?

Cost and development time issues. The strongest belief around e-learning is that it does save money, while addressing cultural diversity in the initial stage of a project is perceived as being very expensive (Conner, 2000). Will enough CLEs be built, considering cultural variables from the start, to provide a basis for comparison in cost and development time? Most e-learning is currently developed using the adaptation strategy called localization. Will that change? At what cost?

Dominant approach to culturally sensitive instructional engineering. Which emerging model or guideline will be most influential? Will new ones be developed? Will adaptation or generalised approaches (Backroad Connections Pty Ltd 2002, 2004a) dominate? Which of Catterick's (2006) three possible responses to cultural diversity will impose itself? Non-accommodation response, intervention response, or modification response?

Future Research Directions

Methodological shortcomings. We agree with Bannan-Riltand (2003) that more sound design-based research studies are needed to build the foundation of a robust framework to guide instructional design. Current methodological shortcomings should be addressed particularly in regards to subject sampling. Therefore, we recommend that future research addresses the following:

- Absence of a control group;
- Absence of reciprocity (for example, numerous studies of Asian learners using Western CLEs, but none about Western learners using Eastern CLEs);
- Small size of samples (some studies rely on a sample smaller than 10!);
- Over-representation of ESL (English as a Second Language) students and indigeneous learners as subjects;
- Lack of distinction between students living in different cultures, in different countries, and students from different cultures, living in the same country. For example, in Faiola's and Matei's experiment (2005), Chinese students living in the U.S. are treated as if they were living in their homeland.

Information sources. Instructional engineering should also be informed by sources other than the actual three models of national cultural characteristics. Sources could include research conducted with adult learners in multicultural classrooms, multicultural education (Gorski, 2005), and ethnocomputing, which is the study of the design,

implementation and evaluation of human-computer interactions that are targeted towards a specific cultural demographic (for examples, see the Institute for African-American Electronic Culture (IAAEC) at www.iaaec.com and Hall, 2006). Another potentially relevant source of information is the research done by Katagiri, Nass and Takeuchi (2001), which suggests that people treat computers using the norms for treating people within their culture. Human-Computer Interaction (HCI) research may also provide some guidance, including a study by Kamppuri, Tedre and Tukiainen (2006) on the meaning of culture in interface design, the interplay of culture and technology and methods of cross-cultural design.

Learning object approaches. Dunn's and Marinetti's (2003a, 2003b, 2006) methodolody, which incorporates cultural orientation theories, has already been adopted by the Australian Flexible Learning Framework (Goodear, 2001). Could learning objects, as Palaiologou (2006) maintains, have the potential to make culturally–acceptable information accessible to all students, regardless of their ethnocultural background?

Conclusion

Research into cultural variables and the instructional engineering of computer-based learning is a relatively new and emerging field. Whether they be corporations, institutions or entire countries, current and aspiring education and training services providers are concerned with both the effectiveness of learning and the financial consequences of not meeting the needs of learners from diverse cultures. The tremenduous potential of a globalized educational market, particularly in Asia, fuels the interest in cultural variables and learning.

Literature on the subject is often based on models of national cultural characteristics, such as those developed by Holfstede (1980/2001), Trompenaar (1993) and Hall and Hall (1990). Issues discussed in the literature include power relationships, relevance of learning theories and instructional approaches, underlying agendas of world citizenship and cultural awareness, language differences, and the impact of the designer's culture. Most of the literature to date comes from BANA countries.

So far, no framework to guide instructional design has demonstrated its adequacy to meet pedagogical, cost and development goals. However, some models and guidelines are emerging to assist instructional designers, which we described briefly. We have used a method of engineering for instructional systems called MISA to organize recommendations found in the literature. We conclude with the following summary:

- Know your learners and their context and culture;
- Consider cultural diversity from the start;
- Be aware of your own cultural biases;
- Use culturally-informed instructional strategy;

- Use human mediation (facilitation of computer-mediated communication and/or onsite facilitation) to ensure cultural inclusivity;
- Favor partnerhips and transfer of know-how. Involve your partners (learners, teachers and other local stakeholders) from the start and at every phase;
- Provide many different forms of support to teachers and learners: guides, communication tools, etc.
- Be aware and use recommendations coming from culturally-informed HCI research;
- Be aware and use recommendations coming from developers' experience;
- Plan for changes in people and technology.

Although not specifically designed for this purpose, MISA provides a means of organizing recommendations related to cultural variables throughout the instructional engineering process. In the process, we noticed that some recommendations for Phase 1 could not be integrated into the usual "documentation elements" (DEs) produced during that phase. Therefore, to ensure that issues related to cultural variables are fully considered during Phase 1, a new DE should be added. Areas for which recommendations could not be found may also indicate a need for further research. Hopefully, this effort will contribute to the identification of concrete recommendations to guide the instructional engineering of computer-based learning for diverse cultures and provide insights into the constant transformation of the social aspects of technology and culture.

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Terms and Definitions

BANA	Refers to the group of countries comprising Britain, Australia and North America (United States and Canada).
CLE	Acronym for Computer-based Learning Environment
HCI	Acronym for Human-Computer Interaction. "Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them." (Hewett et al., 1996).
Intercultural	Heterogeneity in participants world view, normative patterns of belief and overt beliefs, verbal and non-verbal code system, and perceived relation and intent (Cifuentes & Murphy, 2000).
Instructional Engineering (IE)	Refers to the entire life cycle of a learning system, from preliminary analysis of the instructional problem to the implementation and evaluation of the system. In general, it is used as an equivalent term for "instructional design", although some authors (Paquette, 2003) exclude the development, implementation and evaluation phases of a learning system in the instructional engineering process.
Learning Event Network (LEN)	In MISA, part of the Pedagogical Model that describes the learning events, learning activities and resources, and their interactions.
Learning Unit (LU)	In MISA, learning units are the smallest units of the Pedagogical Model. Learning units are contained within learning activities, and learning activities are contained within learning events, which are part of the LEN (see above).
Localization	Adaptation strategy whereby a piece of e-learning originating in one culture and based on that culture's values is then exported to, and adapted for, other cultures (Dunn & Marinetti, 2006).
MISA	French acronym for *Méthode d'ingénierie d'un système d'apprentissage*, which could be translated into "Engineering Method for Instructional Systems". This method was developed at the LICEF (*Laboratoire en informatique cognitive et environnements de formation*) Research Centre of the Télé-Université of the University of Quebec in Montreal, Canada (TÉLUQ).

Multicultural education	Approach for progressively transforming education based on a process for understanding, critiquing, and eliminating current shortcomings, discriminatory practices and inequities in schools (Gorski, 2005).