

Integrating Culture in the Design of ICTs

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Abstract

Nationally and internationally, designers are challenged with meeting the needs of diverse populations, and they are faced with the dilemma of how to integrate culture in the design of information and communication technologies (ICTs). This paper reviews the literature in the fields of human–computer interaction and instructional design to argue that the present methods of integrating culture in design serve a limited scope of what culture can be in the design process. Two conclusions were drawn from this research. First, it is apparent that integrating culture in the design of ICTs serves a broader scope, from the generic or culture-neutral, to the specialised or culture-specific. Second, this review indicates that design has not caught up with technology and that to create for diverse audiences the process must be deliberate.

Introduction

The global technological marketplace has brought with it the need to address international and local target audiences. To remain competitive, companies have begun to address the needs of the many and the few. This shift is less apparent but should be considered in the design of information and communication technologies (ICTs). This change in focus is significant for designers of ICTs as their role moves to a diversification of design. The problem with diversifying design is knowing how to go about it, what steps to take and what roads should never be travelled. This task is often left up to the design team or designer. Either way, culture is at the core of the design process.

Human–computer interaction (HCI) and instructional design (ID) are two fields that have considered the integration of culture in the design of ICTs. For almost 20 years, researchers and designers in HCI have been examining the cultural differences that

inhibit and support the design process (Aykin, 2005; Hall & Hudson, 1997; Taylor, 1992). These differences are sharply apparent in the 2006 Internet world statistics that estimates over 1 billion people are accessing the Internet and are communicating in at least 10 major languages (Internet World Stats: Usage Population Statistics, 2006). Therefore, it is apparent that meeting the technological needs of foreign and domestic markets can be a challenging task and that there needs to be specific frameworks or guidelines to enable product development. The internationalisation and localisation of products have aided in defining the design of user interfaces. Internationalisation seeks to eliminate culture, thus making the product one that can be used by all or a universal design. Localisation tailors products to the needs of a target audience (Horton, 2005). ID, over the last 20 years, has seen more of a focus on educating learners and a sprinkling of papers on factors related to integrating culture in ID (Subramony, 2004). The literature in ID has focused on culture through the application of theories and methods such as cultural diversity, cultural pluralism and cultural sensitivity (Scheel & Branch, 1993). Cultural diversity broadly refers to the multiplicity of identities within groups and societies (Bennett, 1999). Nieto (1996) defines cultural pluralism as the maintenance of one's language and culture when he or she is living with another culture. Cultural sensitivity is an awareness of cultural similarities and differences and how they might affect beliefs, values, behaviour and learning (Stafford-Robinson, 1999). Therefore, the role of culture in ID has many meanings that inform learners and learning. There are models for the design of instruction in ID; however there is little focus on integrating culture within these models (Gustafson & Branch, 2002). These trends towards internationalisation and localisation in HCI and multiculturalism in ID should have designers rethinking what it means to integrate culture in the design of ICTs and, more important, rediscovering how to do it.

Through an examination of design specifications in HCI and ID, this review argues that the current state of research representing culture in the design of ICTs serves a limited scope of what culture can be in the design process. Designers and researchers need more guidance in the form of models or frameworks to incorporate culture and enhance the design process. HCI and ID are two fields wherein researchers and designers are grappling with the integration of culture in the design process. It seems fitting that the concerns of these disciplines be examined as an interdisciplinary inquiry, because designers in both fields are addressing the same question: what is culture in the design of ICTs?

This article covers literature that focuses on design in the fields HCI and ID, culture and technology. The sequence of this paper begins with definitions of culture as perceived in both disciplines. This is followed by a review of empirical and conceptual papers on HCI and ID, and a concluding statement.

This is not a complete review of literature in HCI and ID but a sampling of what exists. Game design has been excluded because of space requirements; however many of the design issues discussed might be of interest to designers in this area.

Definitions of culture

Throughout history, there have been many definitions of culture hypothesised by theorists and scholars (Giles & Middleton, 1999; Hall, 1996; Kroeber & Kluckhohn, 1966; Williams, 1958). The reproduction of such a complex term has also been adapted in the design of ICTs. Researchers and designers have borrowed definitions of culture to theoretically and practically inform their work. When researchers and designers in HCI seek to define culture, they have in most cases relied upon the work of Geert Hofstede, a cultural anthropologist (Choi, Lee, Kim & Jeon, 2005; Marcus, 2003). Hofstede (1991) poses that 'culture is the collective programming of the mind that distinguishes the members of one human group from those of another. Culture in this sense is a system of collectively held values' (p. 5). This definition of culture in HCI helps designers to qualify the impact of culture on user interface design (Kim & Lee, 2005). In particular, there is a need to understand cross-cultural features such as behaviours, perspectives, values and understanding.

In ID, definitions of culture are much more broadly based to include sociological, anthropological and educational perspectives (Chen, Mashhadi, Ang & Harkrider, 1999; Powell, 1997; Williams-Green, Holmes & Sherman, 1997); thus, the pervasiveness of culture (Scheel & Branch, 1993; Williams *et al*, 1997) is always present. Scheel and Branch (1993) offer a comprehensive definition that encompasses the interdisciplinary perspectives of culture:

...the patterns of behavior and thinking by which members of groups recognize and interact with one another. These patterns are shaped by a group's values, norms, traditions, beliefs, and artifacts. Culture is the manifestation of a group's adaptation to its environment, which includes other cultural groups and as such, is continually changing. Culture is interpreted very broadly here so as to encompass the patterns shaped by ethnicity, religion, socio-economic status, geography, profession, ideology, gender, and lifestyle. Individuals are members of more than one culture, and they embody a subset rather than the totality of cultures identifiable characteristics. (p. 7)

This definition of culture in ID helps designers to consider the many facets of culture while building learning environments. ID seeks to provide a path to learning, and therefore a broad understanding of culture is needed.

Human-computer interaction

Designers in HCI are handling the integration culture in the design of ICTs through the internationalisation and localisation of products and the integration of models of culture. Internationalisation focuses on globalising the design process or making it accessible to cross-cultural target audiences (Aykin, 2005). The point of internationalisation is to eliminate culture (cultural symbols, religious references, etc), making the product one that can be used by all or a universal design (Horton, 2005). Therefore, internationalisation seeks to create a homogenous technological product that is useable across cultures. Localisation seeks to specialise products and/or services, making them acceptable to target groups through 'culture-specific user interface' design (Aykin, 2005; Degen, Lubin, Pedell & Ji, 2005, p. 314). Many of these culture-specific design



Figure 1: Culture based circumference for use when designing information and communication technologies

specifications have been supported by theories from the field of intercultural communication (Marcus, 2005). The argument is that intercultural communication provides analyses of an interpersonal focus or face-to-face communication between groups from various cultures, and these communicative interactions mimic that practised between technology and user (Gould, 2005). Therefore, designers can use these 'models of culture' as guidelines in the design of user interfaces (Hall, 1976; Hofstede, 1980). For example, Hofstede's (1980, 1991) cultural model of five dimensions (power distance, uncertainty avoidance, masculinity–femininity, individualism–collectivism and time orientation) has frequently been mapped as a guide to user interface design.

If the goal of the project is to internationalize, then the design specifications are generic and culture-neutral (Figure 1). Generic features can be generalised across cultures but they are still culture based. If the goal of the project is to localize, then the design specifications are specialised and culture-specific. Specialised features focus on meeting the needs of the target audience and they are also culture based. For designers, this means that culture based design specifications exist within a circumference of the generic to specialised; therefore there is a much broader palette in which to design.

Internationalisation: a generic design

Internationalisation is about the inclusion of culture-neutral design specifications and the creation of a cross-cultural design. This type of design requires understanding of the needs and inclinations of the target audience. This might include knowledge of the target language; product interests; ways of life; religious affiliations; gender

characteristics; signs; symbols (eg, icons); graphic features (eg, colour); morals, values and beliefs; learning styles; content; etc (Aykin, 2005).

Aykin and Milewski (2005) propose more than 50 strategies, guidelines and suggestions that aid web page design. They contend that these guidelines are cross-cultural and provide a better understanding of ways of life. These issues are posed as a list of cultural differences. For example, under the heading of 'writing practices' that can make the translation of a language easier (Aykin & Milewski, 2005), the following guidelines are presented:

- Eliminate culture-specific metaphors.
- Avoid acronyms and abbreviations.
- Avoid jokes, humour and idioms.
- Avoid colloquial language.
- Avoid gender-specific references (Aykin & Milewski, 2005, p. 34).

A focus on cultural differences fails to see culture as an asset in the design process. A more balanced design might include complementary design specifications. That is, integrating culture in the design of ICTs maintains an oppositional dimension of positive and negative forces; therefore, the design process should reflect both differences and similarities (Powell, 1997).

Cultural similarities have been approached in a limited way in the literature. These similarities include suggestions specific to 'use behaviour' or how target audiences use web pages. Use behaviour is related to content, functions, layout and linkages (Degen *et al*, 2005, p. 336). For example, in a study of the design of university websites across cultures, Callahan (2005) found that universities displayed similar technical features such as banners to represent the opening page of the website. The purpose of the websites, as ideological representations of the university, was also similar. University websites emphasised cultural factors that were significant to the target audience such as religion (Malaysia and Ecuador) and the performing arts (Sweden and Denmark). The development of cultural similarities as design specifications suggests other ways of integrating culture in the design of ICTs.

Localisation: a specialised design

Localisation is about the inclusion of culture-specific design specifications and the creation of a specialised design for a target audience. In meeting the needs of the target audience, design specifications must be authentic or true representations. One way of authenticating design is through the use of ethnographic research. Ethnographic research seeks to describe people's ways of life or culture. Ethnography uses research methods such as participant observation, interviewing and data collection (eg, field notes, videotapes, audio tapes, photography, etc) (Fetterman, 1998).

Ethnographic research methods have been implemented successfully by Foucault, Russell and Bell (2004). Foucault *et al* incorporated ethnographic methods in finding out about their target audience, Chinese consumers. The team of designers began with

one goal in mind, ie, trying to build an understanding of the target audience. This is important, as the design team should be knowledgeable about the target audience and should see the target audience's needs as central to product development. The fieldwork consisted of visiting and interacting with the target audience in their country. Then, through 'mediated immersion' the design team gathered non-fiction materials that documented the target audience's history and culture, and they used videography to create video documentaries of the history of the region (Foucault *et al*, 2004, p. 1482). Additional data about the target audience were obtained from local researchers who had been engaged in their own ethnographic data collection of the target country that included field notes, presentations and photographs. Foucault *et al* also enlisted local users of their product to provide concept feedback and consumer information and to be cultural informants. Throughout this study, the collection of cultural objects consisted of books, political objects, religious items and technology. This ethnographic data collection and analysis served to provide a more realistic understanding of the target audience and ultimately aided in authenticating the products design. This suggests that ethnographic methods might provide insights into the target audience not known through basic inquiry, and it offers one way of moving closer to a specialised design.

The use of ethnography in technology design is not new; it has been developing since the 1980s to assist in software design and evaluation. The computer-supported collaborative work community has been employing anthropologists, as part of design teams, to engage in ethnographic work. However, according to Forsythe (1999), many non-ethnographers have been borrowing these ethnographic methods and interpreting them unsuccessfully. Forsythe (1999) argues that non-ethnographers should not engage in ethnographic research because of their lack of formal training as ethnographic researchers, lackadaisical perceptions of the research methods and lack of respect for the ethnographic process. Should anthropologists be a part of all design teams that seek to integrate culture in the design of ICTs? What is clear is that employing ethnographic research methods cannot be the only design specification in authenticating a design.

Instructional design

Designers in ID are handling the integration of culture in the design of ICTs by applying theoretical and methodical perspectives about culture; these applications inform both empirical and conceptual research. There are no formalised models or guidelines pertaining to culture that everyone follows; thereby providing consistency across papers is difficult. There are several culture based models that do exist in ID; however they are not commonly used models (Henderson, 1996; Henderson & Cook, 2007; Lee, 2003; Thomas, Mitchell & Joseph, 2002).

Empirical

Empirically based papers on ID have explored a variety of methods to integrate culture in the design of ICTs. Two examples are cultural variation and cultural research.

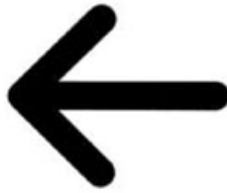


Figure 2: Go left



Figure 3: Native American symbol for water

Cultural variation

Cultural variation is a design specification. Specifically, there is a need to accommodate for variations in learners, characteristics of learners and the tasks for learning. That is, technological designs (ie, web pages) must adapt to learners' instructional needs, learning styles, learning tasks and personal characteristics. Other examples of cultural variations to consider in the design process include content; graphic symbols versus written text; communications; social interactions; and cultural contexts (Chu & Reeves, 2000). Cultural variations can vary from the generic to the specialised. For example, graphic symbols can be generic or specialised. Figure 2 is a generic symbol for turning or going left. Figure 3 is specialised as it is a Native American symbol for water.

Cultural research

Understanding the target audience can begin with a review of cultural research as a design specification. These studies might focus on describing the target audience in terms of learning strategies and contexts for learning. Flear (1989), in her review of empirical research, found that Australian Aborigines exhibited strong abilities in processing spatial and visual information and preferred informal learning strategies such as learning through real-world performances, observations, and trial and error. Flear used the research as a guide in developing design principles that guided the development of software specific to teaching Australian Aborigines. Thereby, the software would accurately represent Aboriginal abilities, knowledge and ideologies, and provide

the content they needed to function in the dominant culture. Flear's design principles focused on making the content familiar; including familiar graphics and text; replicating family life and ideologies; supporting academic strengths; incorporating learning strategies; engaging learner-controlled learning; and a flexible design. Again, the foundation of the design focused on meeting the needs of the target audience through designs that represented the cultural experiences and ideologies of the target audience and fostered educational experiences that prepared the target audience for the world. This example is more specialised than generic.

Conceptual

Conceptual papers on ID provide more explicit recommendations for the integration of culture in the design of ICTs. Specifically, the research suggests that there is a need to focus on the target audience (ie, learners) through cultural demographics and to provide designs that are culturally pluralistic.

Cultural demographics

The cultural demographics of learners can be considered a design specification. Learners' backgrounds influence how they learn, how they respond to what they have learned and how they progress in learning. Therefore, the cultural demographics of learners are considered an asset to the design process. The subject matter content of instruction is contingent upon learner characteristics, such as ability level, skill level and schema. Designers should acknowledge learners as cultural resources in the design of subject matter. Learners can lend a diversity of perspectives to the development of subject matter content, culturally pluralistic instruction, methods and materials of instruction, and instructional practices. Instructional content should be goal oriented and should meet the academic and cultural needs of learners. Designers could also provide ongoing formative assessments and opportunities for feedback to determine learners' concerns (Scheel & Branch, 1993). If all of the design specifications focus on a target audience, then cultural demographics are more specialised than generic.

Culturally pluralistic

Culturally pluralistic design specifications can also aid in integrating culture in the design of ICTs. Research in ID has revealed a broad spectrum of considerations for designers, such as cultural informants, communication, learning environments and cultural sensitivity. Cultural informants are members of the target audience who can assist and inform design decisions. The cultural informant acts as a buffer to inadvertently stereotyping or presenting biased perspectives (Scheel & Branch, 1993), and they ensure the accurate portrayal of traditions, language and other interests of the community (Flear, 1989). Usually, the cultural informant is a member of the community. With the assistance of the cultural informant, designers can foster a social environment where communication and understanding is established between the design team and target audience. Ultimately, designers need to consider the multiple interpretations and perspectives that can influence the design process (Scheel & Branch, 1993). The design of learning environments is also important. Designers have to consider learner preferences; values; cognitive approaches; identity; language; traditions; and social, eco-

conomic and political implications in the design of learning environments (McLoughlin, 1999). This means that designing with culture in mind can be a multi-tiered process that must include a variety of factors. In essence, more attention to details may be required. Finally, culturally sensitive design and designers legitimise, acknowledge and understand other cultures (Powell, 1997). Design focuses on the perspectives of the target audience and uses this perspective as a conduit in which to create. Culturally sensitive designers validate ethnically diverse people through the accurate portrayal of groups; demonstrate dispositions that respect the target audience; and acquire knowledge related to the target audience's political, social and economic histories (Powell, 1997). The designer must engender culturally sensitive qualities to engage culture-based design. The development of a culturally sensitive design indicates the successful integration of technology, culture and design (Branch, 1997; Chen *et al.*, 1999; McLoughlin, 1999). These examples move more towards specialised designs.

Conclusion

The integration of culture in the design of ICTs remains an emerging phenomenon in HCI (Aykin, 2005; Hall & Hudson, 1997; Taylor, 1992) and ID (Subramony, 2004). In particular, the last 20 years in HCI has seen user interface design evolve from DOS prompts to graphical user interfaces that focus on the internationalisation and localisation of design. ID aligned itself with educational trends by providing designs with multicultural perspectives through the infusion of cultural diversity, cultural pluralism and/or cultural sensitivity (Scheel & Branch, 1993). Given this beginning, there is still much to learn about how to integrate culture in the design of technologies.

This review examined some design specifications for HCI and ID to reveal the limited scope of culture in the design process. Additional research might reveal other papers with design specifications; however this paper focused on those specific to culture. This research sought to demonstrate that there is room for improvement in creating culture based designs. Specifically, it is apparent that design has not caught up with technology. When design catches up with technology, designers will have a broad palette of design specifications to work from in the design process. The integration of culture in the design of ICTs will require novel ways of engaging the design process. It may require developing both generic and specialised designs (Aykin, 2005); incorporating cultural variations tailored to learners (Chu & Reeves, 2000); focusing on cultural research specific to learning strategies and contexts (Fleer, 1989); considering the cultural demographics of learners; and accommodating for culturally pluralistic designs (Scheel & Branch, 1993). Additional design specifications might focus on minimising bias (Fleer, 1989); developing multiple products and distinct versions (Horton, 2005); acquiring more finances to assure success (Dray & Siegel, 2005; Mayhew & Bias, 2005); visiting locations of the target audience; engaging in ethnographic data collection; planning extensively (Dray & Siegel, 2005); and studying the target audience comprehensively (Rose, 2005). More design specifications will enable a comprehensive integration of culture in the design of ICTs. However, these design specifications need to be organised in models, frameworks or a set of standardised guidelines.

Emerging research speaks to the need to integrate culture in the design of ICTs (Aykin, 2005; Edmundson, 2007). The future of this integration lies in changing mindsets first and design practices second. This move can enable great innovation in the products and services generated and further meet the technological needs of a globalised world.

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