Cultural Considerations in Interactive System Design

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Abstract

The authors describe a methodology that provides support to interaction designers faced with the challenge of designing for diverse cultures. Using a review of the literature they argue that the cultural, social and ethnic background of an individual influences many aspects of their behavior and their likely responses to environmental stimuli. It is important for the designer to realize that these responses include the individual's reactions to computer-based interactions and therefore cultural differences affect the success of any interactive learning environment. Depending on the ethnic origin of the individual these reactions may be in complete contrast to those one might expect if they are based on typical western ethnic expectations. Since many of the designers of existing interactive learning environments are from stereotypical western developed cultures it is important that any new systems should respect and if possible involve cross-cultural differences. With an increasingly international market for digital learning systems it is vital that designers are aware of the factors that may determine the success or failure of their products in such a global market. Examples are provided from case studies using the authors methodology showing how simple changes to learning concepts; interface components or interaction methods make major changes to the impact and the effectiveness of the learning system to potential users in diverse cultures. The paper concludes by describing possible ways to develop instructional software for diverse cultures and future directions for workers in this vital and expanding field.

1 Why are Culturally Sensitive Designs Needed?

Over the past 13 years (Morgan, 1992; Morgan 1994; Morgan, 1998; Morgan & Morgan, 1999a; Morgan & Morgan, 1999b; Morgan, 2000; Morgan & Morgan 2000; Morgan & Morgan, 2003) we have addressed the issue of how cultural differences affect the impact of ICT on different user populations. We have shown that the cultural background of a user not only impacts the effectiveness of their use of computer systems (Morgan, 1994) but that use of a culturally sensitive design improves the rated satisfaction (Morgan & Morgan, 1998) and performance of information systems (Morgan & Morgan, 2000; Morgan & Morgan 2003). We have shown this effect in a variety of computer systems but none have a greater impact than in training and education. Such educational systems are developed with the specific purpose to broaden the users experience, knowledge and competence. If a cultural clash occurs between that of the user and the culture that has been implicitly designed and built into the system then the user feels alienated very rapidly. Typically these problems result in users feeling isolated from the system and they often then decide to drop from classes that force them to experience using that system.

Ironically very few educational technologists or designers are aware that they are designing for a specific culture when they implement a digital learning environment. Even many educational technology theorists have implicit western cultural perspectives built into their models of how users interact using new communication and education technology. This in turn affects how an entire generation of educational technology designers view "productive" interaction methods or what they assume is the basis for all successful learning.

Often even the users of learning systems are unaware that the reason for their dissatisfaction with a system may be due to the mismatch between the culture that has been imbedded within the system they are using and their own experiences and background. The user assumes the problem lies with their ability or intelligence and simply withdraws from the class that uses that system. The educator often also assumes a student withdrawal from a class is due to individual preference and the problem of digital culture clash remains hidden.

1.1 Cross Cultural Differences in the Use of Technology and Digital Learning Systems

Studies such as those of Woolnough (1997) provide us with a view of the different perceptions that exist among students with regard to science and science-based education across a range of countries and cultures. Research into cross-cultural differences in attitudes towards high technology across different countries in Europe (Ganesh & Kumar, 1997) found significant differences in the patterns of average wealth, and education of each target population and also correlations between product characteristics and the cultural characteristics of the nations. In their comparison of nearly 2,500 people from across 10 countries Rosen & Weil (1995) reported finding significant cultural dependent models of computer anxiety.

1.2 Simulation and Systems Dynamics Learning Environments

Within the literature of Systems Dynamics Eden (1994) noted the importance of creating a cognitive map which corresponds to the target users understanding of the problem being modelled. One effective method of determining cultural and ethnic differences has been reported by Pedersen (1995) who discussed the introduction of cross-cultural design teams and debriefing sessions to determine some of the cross-cultural needs of their target user population.

1.3 Promoting Cross Cultural Understanding

Fowler's (1994) review of diversity training suggests that simulations can be useful for training practical skills that can then be applied to any cross-cultural simulation design. Bond and Park (1991) investigated cross-cultural differences within an interactive learning environment. Atsumi (1989) reported how cross-cultural factors can influence behaviour in collaborative learning and problem solving situations.

1.4 Learning and Cross Cultural Design Considerations

Piaget's Cognitive Stage Theory, Freud & Erikson's Psychoanalytical Theory, Social Learning Theory, Information Processing Theory, Ethnological Theory, Gibson's Perceptual Development Theory, Vygotsky's Theory and the work of the Contextualists all provide various explanations for the ways in which individuals learn when using digital environments. The common theme within these theories is that they propose that experience prior to using interactive learning environments influences the way in which the various online activities impact the learning process. These prior influences include the cultural differences that we all acquire from our environment and personal history. Our research suggests that any truly successful international interactive learning environment must include these cultural differences within their design.

Many factors are proposed to explain why these cultural variations emerge. However there are thought to be at least four major components, and these are biological, psychological, philosophical and educational respectively (Garling & Evans, 1991).

1.5 Growing Recognition of Cultural Issues in Educational Technology

Over the past few years there has been growing recognition of the importance of culture in information systems design (Day, 1996) and more recently educational technology (Simons, 2000; Marinetti, 2002; Sandon, 2002). Some of these researchers (Simons, 2000; Sandon, 2002) have even proposed a basic design framework to help designers respect the cultural difference of their users. In other work we have presented our methodology (Morgan & Morgan, 1998a; Morgan & Morgan 2000; Morgan & Morgan 2003) but in this paper we will report on a development of our work resulting from series of case studies in 2001 and 2002 where we tested our methodology in the Middle East and South Pacific Islands.

1.6 Bridging the Cultural Divide

As user populations become more diverse it is increasingly difficult to find universally understood symbols for activities and actions. We therefore recommend that the designer should produce a library of possible shapes and icons to best fit the understanding of a user from a culture that is not familiar with that technology or activity. In the following section we will describe the methodology that we have developed in a series of field trials (2001-2002) in various under represented cultures. Specifically in the Middle East and the South Pacific, where we explored the impact of various alternative levels of involvement in the design process of digital systems from representatives from non Western cultures. In a series of case studies we varied the involvement from single representatives from the target user group who consulted with the designers at the early stage of the design process, through to small consulting groups who met with the designers regularly throughout the design process to provide feedback and finally to the training of groups of target users to produce the conceptual designs for the systems themselves.

The results from these series of case studies suggest that even quite minimal input from representatives from the target culture at the very early stage has a dramatic effect on the acceptance and effectiveness of digital systems into a target culture. In the following section we will briefly present a methodology that we have found to be extremely effective in producing digital systems with a high level of cultural sensitivity.

2 A Methodology for Culturally Sensitive Design

2.1 Basic Components of the Digital Environment

Every digital environment has key components or structures that permit the user to control and interpret the current state of the system. Our work has shown that ensuring that these key components or structures follow the cultural norms of the target culture results in higher levels of acceptance and understanding within user populations from the target culture.

The first step, after having identified the target culture(s) or ethnic group(s) for the simulation, is to find appropriate representations for these key components.

2.1.1 Starting States

The entry to the digital system should reflect the typical form of an entrance in the target culture and it should also support any features (such as community notice boards) that the target culture associates with entrances.

2.1.2 Communication Methods

Most cultures have specific types of communication for different purposes ranging from the most informal of information passing mechanisms that might be associated with an arrangement of objects (flying a flag at half mast) to complex or formal messages. It is important that, as a minimum, the designer should identify how a culture differentiates between very important and formal communication and the more normal peer to peer information transfer.

2.1.3 Processes

The designer should identify how a culture shows that something is busy or operating. The traditional hour glass may be well recognised in many Western digital systems but might not be recognisable to cultures that use tides or moon phases as their traditional and absolute markers of time.

2.1.4 Data Items

Numbers and facts are not always recorded in written forms. It is a challenge to work with cultures that have no established history of written transactions. However it is possible and often pictures of a meeting can be enough for some cultures to recognise all the facts associated with an agreement in the same way that a written record would be used in Western societies. Where cultures have to mix then use of pictures and sounds can be used as iconic links to full written records of an event.

2.1.5 Locomotion or Direction

In cultures where boats are the primary method of transport icons such as trains, stop lights and fuel gauges can be misunderstood. The designer should therefore find appropriate metaphors for these types of movement, or directions. For example the path of the moon over the sky is an equally effective method to show the passage of time and this can replace the more traditional clock or calendar.

2.1.6 User Controls

In non-mechanised cultures the symbols of user control are quite different and some imagination may be required. In the authors work with non-mechanised societies tools from farming or controlling animals have been successfully used as metaphors for computer system controls. As an other example for some desert communities the graphical representation of water levels in a vessel can be an effective interface metaphor for controlling the sound and other features for a learning system.

2.1.7 Terminating Conditions and Learning Goals

In many simulations and games there are a series of possible terminating conditions in which the user may find themselves. Care must be taken in how these terminating conditions are represented. What are perfectly acceptable metaphors for some western users can be highly distressing or insulting to other cultures. It is also standard practice within many gaming and simulation systems to include some clear goal or target which can be used as a measure of the success within the task or sub-task being performed. It is important to check that these goal symbols are attractive and meaningful to people from your target user population.

2.1.8 Symbols and Sounds

Great care should be taken with the use of symbols in icons and as parts of the digital system. Some symbols, which appear quite innocent to a western eye, can be of great religious significance. An example is a drawing of an eye that can be disturbing to many cultures as a symbol of evil. Also, in many cultures animals can be regarded with religious reverence. It is therefore important that the designer try and determine which animals or objects have significance and if necessary to avoid the use of such objects within any digital system. And although the use of sound within a system can add life and interest, many innocent sounds may have a meaning other than the one you intend to someone from another culture. For example, the cries of some animals can be an indication of evil for some cultures.

2.1.9 Language

The designer should make himself or herself aware of the natural directional flow which language takes in the users culture. The western written flow from left to right and top to bottom may not be that which your user will assume. The choice of language or languages utilised within the system will also determine the user population who can benefit from the interactive learning environment. Caution should be applied to direct translations of words and to the meanings of the sounds of words used within a system. Also, in many cultures a female voice giving instructions would not be as effective as a male voice, since females have a much lower social status in those cultures.

2.1.10 Behaviour Stereotyping

One of the most frequently cited criticisms (Caplin, 1986) with regard to the computer-based portrayal of people is behaviour stereotyping. Careful design of the interface and by systematically interchanging the figures performing the activities within the simulation can reduce offensive material. At the same time, care should also be taken in portraying the dress codes of some religions or other groups.

2.1.11 Timing of Events in a Simulation

Many religious and ethnic groups place an emphasis on activities that can take place on a certain day, date or time. By portraying inappropriate activities taking place in a simulation environment on such occasions you may cause offence and lose much of the potential impact of your simulation.

2.1.12 Death and Superstition

It is important to realise that in many societies death is also closely associated with sets of symbols or events that are thought to either predict death or act in some way to assist the process. Closely linked with the topic of omens of death are the various superstitions that each culture develops around its daily activities and objects. Some of these are minor in nature but some have a strong influence on the daily behaviour of individuals from those cultures.

2.1.13 War and Violence

It is important for the designer to recognise that the views of war which form the designers perspective are likely to have been formed by films and mass media coverage of the subject. Any simulation that tries to portray these topics is likely to cause offence to those users of the interactive learning environment who have actually experienced such situations.

2.1.14 Politics and Religion

Both are extremely sensitive topics and most wars and acts of mass violence have been excused or performed under the direction of them. Great care must be taken with both topics since they are directly linked to the belief system of the users and can cause great offence and even direct action.

2.1.15 Numbers and Colours

In many cultures numbers and colours have a semi-mystical or magical significance, for example, the number 13 is often considered to be unlucky and the colour white is considered a colour of death in some far eastern countries.

2.1.16 Gestures

In some cultures a nod can be taken as a sign of a negative response and physical contact or even the simulation of physical contact can be taboo for many ethnic groups. In some cultures passing or touching items with the left hand can be highly offensive. There are some basic standards, such as those from the Entertainment Software Ratings Board (ESRB) that are available for designers to try and keep interactive environments within internationally accepted standards of decency and violence, similar to those used by film censors.

2.2 Cultural Mapping

Using the major headings that we have described above for each of the basic components that form the digital environment the designer must create a description for the symbols or methods that are to be used for that part of the

simulation. Both designer and typical user representative will then need to go through the list of basic components looking for possible cultural incompatibilities between proposed representations of simulation components and those symbols which are readily recognised by individuals from the target cultural group.

2.3 Additional Environmental Factors

In addition to the basic components of the simulation the designer should also look at the environmental aspects of the simulation. The difference between the environmental factor analysis and cultural mapping is that the designer is looking to see if the user reacts negatively to the proposed symbols and environmental components in the settings intended for the learning environment.

3 Summary

In this paper we have given an overview of the impact of cultural and ethnic differences on the effectiveness of digital systems with a special emphasis on digital learning environments. We have outlined those topics and considerations that are likely to cause problems in a cross-cultural situation and have provided an outline of an effective method that we have developed over two years of detailed case studies in very non Western cultures to ensure that digital systems designs respect the cultural backgrounds of their target user populations.

Every digital environment has key components or structures that permit the user to control and interpret the current state of the system. We believe, based on our current understanding from our fieldwork, that it is possible to construct libraries of these basic components for each different culture and thereby provide users with the basic tools to enable them to design for other cultures. Once such libraries are established design teams will be able to access them when they are called upon to develop a system for that target culture. Future research might investigate if it is possible to integrate these cultural symbols into a runtime version of a digital system that would then enable one single system to provide multiple different interfaces to best suit the cultures represented among their users at that time.

Finally we hope that designers will find our recommendations useful to improve the cultural sensitivity of their own systems.

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