

An Evaluation of Cultural Roles and Usability Attributes in Learning Management System

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ABSTRACT

Culture has attracted the attention of many e-learning researchers who suggest it to be a very important factor in e-learning design development. Barber et al. (1998) suggest that, for a successful system interface, it is necessary that the design should consider cultural values. They combine culture and usability into “culturability” and add that cultural values affect the degree of user friendliness of a system because different cultures are having different perceptions about background colours, graphics and animation. In addition, Marcus et al. (2000) add that as the web is continuously developing, precautions should be taken about user interface design, by keeping in mind culture. Furthermore, they argue that cultural values in interface design are now necessary yet not optional. The purpose of this exploratory study was to explore the relationship between cultural dimensions and the usability attributes (Navigation, Learnability, Accessibility, Visual Design, Interactivity, Content & Resources, Media Use, Learning Strategies Design, Instructional Feedback) of a learning system management (myLMS) in Open University Malaysia. This study is a part of an ongoing study.

Keywords :

Culture, e-learning, learning management system, myLMS, usability attributes

1.0 INTRODUCTION

In the digital age, the speed of learning has become vital differentiator for organizations and individuals in the pursuit of knowledge. The advent of the Internet has greatly influenced the way knowledge is transmitted. The exponential growth of knowledge also has made it imperative for learning to happen quickly. This fact has increased the necessity for learning and in combination with the new technology opportunities, has led to the emergence of e-learning. e-learning is one of the most significant recent developments in the Information System (IS) industry (Wang, 2003). E-learning solutions facilitate the delivery of the right information and skills to

the right people at the right time (Ruttenbur, Spickler, & Lurie, 2000). However, without an effective interface, an e-learning system can not be efficient. A properly designed interface is able to draw the learners' attention, motivate them toward interaction with the system and help them achieve their goals without confusion and fatigue (Faiola, 1989, Galitz, 1989; Jacques, Preece, & Carey, 1995).

The design of e-learning can draw on a broad range of cultural models and learning theories. Regardless of which approach is chosen, e-learning design considerations must be consistent with the cultural backgrounds, learning styles and learning outcomes of the work team and the individuals on the team (Stoney & Wild, 1998). Evers & Day (1997) examined the influence of culture on interface design preferences and on the attitude towards software technology. One of the key findings of Evers & Day (1997) is that there are "not only interface relevant cultural differences between Asians and Australians, but that significant differences also exist within Asian groups. Most importantly, consideration of users' cultural background is important to the success of a usable e-learning design.

2.0 BACKGROUND OF OPEN UNIVERSITY MALAYSIA (OUM)

Open University Malaysia (OUM) is an open and distance learning (ODL) private university established by a consortium of eleven Malaysia public universities. It thrives on its motto of a "University for All" as it believes in the philosophy of education for all. This philosophy implies that education should be made available to all, regardless of time, place and age. Since its establishment in 2000, the number of learners enrolled at the University has increases from 750 to more than 42,000 and the number of academic programs from 4 to 41. Currently, OUM employs more than 3,500 tutors and tutorial sessions are conducted at 36 University Learning Centres (ULC) serving learners throughout the country. Its strengths span a wide range of disciplines, from Information Technology, Multimedia Communication, Engineering, Business and Management as well as Science.

In order to develop a learning system that is on par or better than the conventional learning method, OUM has adopted a multi-mode learning approach. The university's adoption of blended pedagogy provide renewed opportunity to working adults wishing to work for an emerging skill or for an academic degree without having to leave their jobs. The blended pedagogy consists of the following respective components namely the self-learning modules, e-learning system known as myLMS and face to face tutorial sessions fortnightly.

The learning management system known as myLMS in Open University Malaysia (OUM) is use as the e-learning platform. Through the mediation of myLMS, learners are able to control their learning at their own pace and convenience. myLMS is packed with e-learning tools enablers such digital library, e-mail, chat, online forum, academic links as well as courses information. Electronic communication tools such as e-mail, online

forum and chat rooms are provided to facilitate interaction among learners, tutors and Subject Matter Expert (SME).

More than 42,000 OUM learners representing the total population of 26.04 million Malaysian (Malaysia, 2005). These learners depict multi-cultural races such as Malays, Chinese, Indians, Ibans, Kadazans, Bidayuh and others. The Malays and the other indigenous groups like Ibans, Kadazans and Bidayuhs comprised 66.1 per cent of the total population while Chinese 25.3 per cent and Indians 7.4 per cent in the year 2004 (Malaysia, 2005). Regionally as well, about 84.9 per cent live in Peninsular Malaysia, 8.4 per cent in Sarawak and 6.7 per cent in Sabah (Malaysia, 2005). Hence, appropriate awareness of cultural differences and their effect on usability on the learners is vital to a success of usable e-learning design

2.0 PURPOSE OF STUDY

The purpose of this study was to explore the relationship between culture and the usability of myLMS, Open University Malaysia home-grown learning management system. The following research questions guided the study:

1. What is the relationship between power distance and the usability attributes of myLMS.
2. What is the relationship between individualism and collectivism and usability attributes of myLMS?
3. What is the relationship between femininity/masculinity and the usability attributes of myLMS?
4. What is the relationship between uncertainty avoidance and the usability attributes of myLMS?
5. What is the relationship between long term orientation and the usability attributes of myLMS?

3.0 METHODOLOGY

This following section describes the methodology aspect of the study. Included in these descriptions are discussions on the study's variables, population and sample, instrumentation, data collection and data analysis procedures.

3.1 Study variables

The theoretical frameworks that were used to guide this study are Hofstede's cultural dimensions and Nielsen's usability attributes. Hofstede (1997) identified cultural dimensions that the researchers thought may influence user interface and web design. These cultural dimensions are: power distance, individualism versus collectivism, masculinity versus femininity and uncertainty avoidance and long term orientation.

Hofstede's cultural dimensions have been used and tested by several researchers to explore influence on user-interface and systems design (Bernard, 2000; Dunbar, 1991; Ever and Day, 1997; Marcus & Gould, 2000). Hofstede (1991) defined culture as "a collective programming of mind that differentiates members of one group from other".

Nielsen (1993) defines the usability of a computer system in terms of the following attributes: learnability, errors, and satisfaction. Nielsen's usability attributes are used by many researchers to guide usability studies (Borges, Morales, & Rodriguez, 1995; Instone, 1997; Kurosu & Kashimura, 1995; Rajani & Rosenberg, 1999, Zaharias, 2004). This particular study required the examination of usability and cultural variables in order to determine potential relationships between cultural dimensions and the usability attributes of myLMS.

3.2 Usability Attributes Variables

The term usability, generally refers to the ease of use and operational suitability of the interactive displays and controls that serve as the user interface to a computing system (Murphy, Norman, & Moshinsky, 1999). Usability is the measure of the quality of the user experience with interacting with something whether a website, a traditional software application or any device the user can operate in some way or another (Nielsen, 1997). According to Nielsen (1997), usability is one of the most important aspects of web design, but often the most neglected.

Many web usability problems may arise due to variations in behaviors and cultural differences. Such variations may be found in colour, graphics, phrases, icons, character sets, pictures, symbols, date and time format and so forth (Onibere, Morgan, Busang, & Mpoeleng, 2000). Users from different cultures may understand the same websites in totally different ways. Some metaphors, navigation, interaction or the web-site appearance might be misunderstood and confuse or even offend the users (Evers & Day, 1997; Marcus & Gould, 2000; Mahemoff & Johnston, 1998).

Nielsen defines usability to consist of five kinds of attributes:

- **Learnability:** Systems should be easy to learn. Users can rapidly start getting some work done with the system.
- **Efficiency:** Systems should be efficient to use. When a user has fully learned the system, productivity will be possible on a high level.
- **Memorability:** Systems should be easy to remember, making it possible for casual users to return to the system after some period of not using the system, without having to learn everything all over again.
- **Errors:** The system should have a low error rate, which enables users to make few errors during the use of the system. When they do make errors they can easily recover from them. Catastrophic errors should not occur.
- **Satisfaction:** The system should be pleasant to use; which makes users subjectively satisfied when using it.

Based on years of researches in usability areas, he also concludes that users prefer pages that can load quickly (Nielsen, 2000). In other words, designers should design for speed of pages downloading to improve usability. Nielsen also sees effective use of linking between pages as a contributory factor towards usability. Proper linking would help users find information within the web content. On the other hand, broken and inaccurate linking might force them to turn away from a particular content.

The following usability attributes variables are considered for this very study:-

Learnability (learn) problems may result in increased training, staffing and user support or corrective maintenance costs (Guillemette, 1995; Lindgarrd, 1994). Learnability refers to “*the ease with which new or occasional users may accomplish certain tasks*” (Lindgaard, 1994). Users must be able to understand navigation options and to use them to locate wanted information. In addition to ease of understanding, web systems should be *easy to remember*. The users should have no problems in remembering how to use and navigate in the system after periods of non-use.

Accessibility (access) is considered to be very important for web-based applications. Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C) have focused their efforts to the design of accessible web pages and applications for disabled users. For example the provision of text option over images, diagrams etc. will provide visually impaired users to utilize screen reader software to extract the content of the e-learning course.

Navigation (navi) has been considered as an important consideration when designing e-learning; Weston et al. (1999) define navigation as “*how the learner moves through the instruction and how the instruction is designed to facilitate understanding of organization and structure of content*”. Little attention is given to the content of the instruction and how the navigation can be designed so that the organization of the content is evident to the learner.

Visual design (vdesign) is one of the main characteristics in web design. Visual (or screen) design can be divided into 4 sections: space provision, choice of colour, readability, and scannability (Shirley, 1999; Morkes and Nielsen, 1998). Choice of colour emphasizes the need to use proper colour in web page design not only to attract users but to also improve learnability and ease of use (Powell, 2000). This is also considered valid for e-learning courses and learning environments; graphics and the colours used in an e-learning course should make it easier for the learner to understand the content.

Interactivity (interact) is one fundamental way of how learners can be engaged during their learning experience. Interactivity, interaction, and engagement are terms that have been used interchangeably in the literature. Interactivity is difficult to define and even more difficult to implement in terms of instructional design. Weston et al. (1999), put special emphasis on interactivity, as they consider it to be the most powerful feature of the Web to date and as such “*it deserves special attention when designing online instruction*”.

Content and Resources (contrs) refers to “the subject or ideas contained in something written, said, or represented” (Cambridge University Press, 2001). Content design has attracted the interest of HCI researchers. Nielsen (2000) strongly believes that users prefer to scan for information before reading it. Hence, he recommends using short text, skimming features such as bold, italic and highlighted words, and page chunking. In term of language, he suggests using simple and plain language to accommodate different type of users’ educational background.

Instructional Feedback (intfeedback) is a vital part of the learning process during which misconceptions are corrected. Meaningful feedback improves performance (Driscoll, 2002). Effective web-based training programs can provide rich and meaningful feedback to develop learners’ ability to self-diagnose their learning problems and correct errors without prompts. Meaningful and respectful feedback is important especially when it comes to adult learners.

Media (media) has a prominent position in web design literature. Nielsen (2000) outlines the importance of proper integration of multimedia elements into web pages. In addition multimedia can reduce the effort required to convey a message (Driscoll, 2002). All media elements especially animations should be used effectively and attractively (Keeker, 1997). Despite the fact that multimedia elements such as video and animation could enhance presentation, they should be used properly so as not to affect usability (Nielsen, 2000).

Learning Strategies Design (Isd) refers to the fact that while trying to emphasize the shift from techno-centric e-learning design to learner-centred design, it is imperative to take into account how certain learning strategies can be conveyed or facilitated through interface design. Learning (or instructional) strategies refer to how key tenets of learning theories and pedagogies can be practically implemented. Squires and Preece (1999) use contextual authenticity as a key determinant for educational software design.

3.3 Cultural Variables

The country index scores for the five cultural variables (power distance, individualism/collectivism, masculinity/femininity, uncertainty avoidance and long-term orientation) in this study were based on Hofstede’s (1997) work on cross-cultural values. The cultural dimensions on which cultures differ were revealed through theoretical reasoning and statistical analysis. The following cultural variables: power distance (PDI), individualism/collectivism (IDV), masculinity/femininity (MAS), and uncertainty avoidance (UAI) and long-term orientation (LTO) were used to guide the cultural aspect of this study (Hofstede, 1997).

Each cultural variable is described below. Please note, the scores associated with each of these variables represent relative, not absolute, positions of individual members of each region.

Power Distance (pdi) is defined “as the extent to which the less powerful members of institutions and organizations accept and expect that power is distributed unequally” (Hofstede & Bond, 1984). The Power Distance Indicator typically has a value between 0 (Low) and 100 (High), but values below 0 and above 100 are technically possible. Thus scores near 0 reflect less acceptance of the unequal distribution of power while scores near 100 reflect greater acceptance of unequal distribution of power within one’s culture. In accordance with Hofstede’s work, a value less than 50 represented Low PDI and a value of 50 or more represented High PDI.

Individualism and Collectivism (idv) focuses on the relationship between the individual and groups. Highly individualistic cultures believe that the individual is the most important unit while highly collectivistic cultures believe that the group is the most important unit (Hofstede, 1997). Scores typically are between 0 (Strong Collectivist) and 100 (Strong Individualist), but values below 0 and above 100 are technically possible. A value less than 50 represented collectivism and a value of 50 or more represented individualism.

Masculinity and Femininity (mas) represents one of the dimensions of culture. “Femininity stands for a society in which social roles overlap; both men and women are supposed to be modest, tender, and concerned with the quality of life” (Hofstede, 1997). While masculinity culture have very distinct expectation of male and female roles in society. The variables values typically are between 0 (Strongly Feminine) and 100 (Strongly Masculine), but values below 0 and above 100 are technically possible. A value less than 50 indicated FEM and a value of 50 or more indicated MAS cultures.

Uncertainty Avoidance (uai) focuses on the extent to which a culture feels threatened or anxious about ambiguity and how hard individuals will work to avoid it. These variables focus on how cultures adapt to change and cope with uncertainty. The variables values typically are between 0 (Low Uncertainty Avoidance) and 100 (High Uncertainty Avoidance), but values below 0 and above 100 are technically possible. A value less than 50 represented Low UAI and a value of 50 or more represented High UAI.

Long-Term Orientation (LTO) focuses on the degree the society embraces, or does not embrace long-term devotion to traditional, forward thinking values. High Long-Term Orientation ranking indicates the country prescribes to the values of long-term commitments and respect for tradition. A Low Long-Term Orientation ranking indicates the society does not reinforce the concept of long-term, traditional orientation. In this culture, change can occur more rapidly as long-term traditions and commitments do not become impediments to change.

4.0 POPULATION AND SAMPLE

The population for this study was composed of the 150 Information Technology learners of Faculty of Information Technology and Multimedia Communication, Open University Malaysia. This population was selected for this study because of the learner's diverse multicultural backgrounds and their underlying interest in all forms of training and instructional delivery. The sample of this study consisted of the 79 attendees who volunteered to participate in the study. Those who did not volunteer to participate in the study were unavailable to complete all stages of the study and therefore could not produce useable data sets for analysis.

5.0 INSTRUMENTATION

Instruments developed by Zaharias (2004) and Hofstede (1994) were used in this study with each instrument collecting information regarding unique aspects of the study. The self-administered questionnaire was piloted and used in previous research, including a study on e-learning and national culture.

The questionnaire targeted the study participants' opinions regarding issues such as satisfaction with navigation schemes, colour selections, information presentation, page layout and overall usability as all of the respondents have been using myLMS as their primary online interaction tool in their studies. Essentially, this instrument measured the cultural dimensions and usability attributes. Each study participant was given an approximately an hour completing the data collection process for this study.

6.0 DATA ANALYSIS

Data gathered via the above instrumentation were analyzed using several techniques. Demographic information collected using the User Background Information Form was reviewed and categorized using simple frequency counts and statistical means. The remaining data were utilized in a series of correlational calculations necessary to measure the relationships between participants' their cultural dimensions and usability attributes.

7.0 FINDINGS

The following section describes the key findings emerging from this study. This section presents the findings or results of the study by organizing them around the four research questions of the study. There were five cultural variables and nine usability variables utilized in this study. As the normality is assumed as shown in Table 3, the relationships between the cultural variables and the usability variables were measured through the use of correlational calculations involving each of the cultural factors and multiple measures for both system usability shown in Table 2.

1. What is the relationship between power distance and the usability attributes of myLMS?

The findings shows that power distance mean index for this study is 130.57

(SD=45.28). These figures are shown in Table 1. Further more, the correlation analysis reveals that PDI has significantly positive relationship with 6 usability attributes except 3 other attributes, namely INTERACT, ($r = -0.879$, $p = 0.0001$), LSD ($r = -0.887$, $p = 0.0001$) and INTFEEDBACK ($r = -0.887$, $p = 0.0001$).

2. What is the relationship between individualism and collectivism and usability attributes of myLMS?

The findings shows that individualism mean index for this study is 42.97 (SD=23.645). Apparently, the correlation analysis reveals that IDV has significantly positive relationship with 5 usability attributes except 4 remaining attributes, namely LEARN ($r = -0.708$, $p = 0.0001$), INTERACT ($r = -0.759$, $p = 0.0001$), LSD ($r = -0.763$, $p = 0.0001$) and INTFEEDBACK ($r = -0.763$, $p = 0.0001$).

3. What is the relationship between femininity/masculinity and the usability attributes of myLMS?

The findings shows that masculinity mean index for this study is 93.67 (SD=96.85). Moreover, the correlation analysis reveals that MAS has no significant relationship with variable NAVI. It has significantly positive relationships with other usability attributes except 4 other attributes, namely VDESIGN, ($r = -0.465$, $p = 0.0001$), CONTRS ($r = -0.465$, $p = 0.0001$), ACCESS ($r = -0.494$, $p = 0.0001$) and MEDIA ($r = -0.505$, $p = 0.0001$).

4. What is the relationship between uncertainty avoidance and the usability attributes of myLMS?

The findings shows that uncertainty avoidance mean index for this study is 80.89 (SD=48.20). Also, the correlation analysis reveals that UAI has no significant relationship with variable NAVI. However, it has significantly positive relationships with other usability attributes except 3 attributes, namely VDESIGN, ($r = -0.514$, $p = 0.0001$), CONTRS ($r = -0.527$, $p = 0.0001$) and ACCESS ($r = -0.530$, $p = 0.0001$).

5. What is the relationship between long term orientation and the usability attributes of myLMS?

The findings shows that long term orientation mean index for this study is 68.86 (SD=17.75). Again, the correlation analysis reveals that LTO has no significant relationship with variable NAVI. Nevertheless, it has significantly positive relationships with other usability attributes except 4 other attributes, namely LEARN, ($r = -0.656$, $p = 0.0001$), INTERACT ($r = -0.722$, $p = 0.0001$), LSD ($r = -0.708$, $p = 0.0001$) and INTFEEDBACK ($r = -0.708$, $p = 0.0001$).

8.0 DISCUSSION

If studied in a purely statistical light and given the relatively small sample size, these three findings appear to provide little enlightenment with regard to conducting cross-cultural training and e-learning activities. Basically, the study reveals that the sample is a traditionally collectivist, power centric, highly risk-avoiding and masculine society. However, when one considers the nature of the culture role represented by the participants in this study, one may get a basic understanding of how the findings, particularly respondent's cultural dimensions, can truly impact a learning organization's operations.

In each case, participants represented cultures where there are historic precedents and general tendencies for strong centralized authority figures, whether in the form of teachers, office leaders, or governmental authorities. Bearing this mind, organizations conducting training or e-learning operations in learner's culture where power-centric, collectivist, and change accepting societies exist must give consideration to a few logistics. First, the university should consider learners' the level of leadership expectation. Learners from cultures where strong authority figures such portrayed in this study usually expect greater leadership and guidance from their tutors. As a result, university learning may take on a more traditional lecturer-centred approach.

It will not be a unique if the university find their learner-centred learning approach challenging. Another factor to consider is the level of group interaction and support offered to learners. Training conducted in strong collectivist cultures might employ strategies where group work, collaboration, and socially oriented approaches are more prevalent. Learning strategies design variable relationships with cultural dimensions reveals interesting finding in which the present learners needs a more streamlined orientation in their learning process. In other words, the learning provider should guide them more. It is unsurprising that in the present traditional sample, their interaction is suspect.

9.0 CONCLUSION

As described in the beginning, this paper is only a snapshot of an ongoing research so literature regarding Open University Malaysia owned learning management system known as myLMS, cultural dimensions and characteristics, limitations and usability attributes are progressing. Culture seems to be an important factor in any information system development particularly learning management system.. Studies carried in this field pinpoint the implementation stage to explore multicultural influence. As this is an exploratory study incorporating cultural effect on e-learning, many other future scopes could be further explored and thoroughly evaluated.

REFERENCES

- Barber, W & Badre, NA (2004). Culturability: The Merging of Culture and Usability, conference proceedings, AT&T Labs, New Jersey. Available: <http://www.research.att.com/conf/hfweb/proceedings/barber/>
- Bernard, M. (2000). Constructing user-centered websites: The early design phases of small to medium sites. Usability news 2.1. [Online]. Available: <http://psychology.wichita.edu/surl/usabilitynews/2W/webdesign.htm>
- Borges, J., Morales, I., & Rodríguez, N. (1995). Guidelines for designing usable World Wide Web pages. Available: http://www1.acm.org/sigs/sigchi/chi96/proceedings/shortpap/Rodriguez/rn_txt.html
- Driscoll, M. (2002). Web-Based Training: Creating e-Learning Experiences (2nd ed.). San Francisco, CA: Jossey-Bass/Pfeiffer
- Dunbar, R. (1991). Adapting distance education for Indonesians: Problems with learner heteronomy and a strong oral tradition. *Distance Education*, 12(2), 163–174.
- Evers, V., & Day, D. (1997). The role of culture in interface acceptance. In S. Howard, J. Hammond, & G. Lindegaard (Eds.), *Human computer interaction INTERACT'97*. London: Chapman and Hall.
- Faiola, T. (1989). Principles and guidelines for screen display interface. *The Videodisc Monitor*, 8(2), 27–29.
- Galitz, W. O. (1989). *Handbook of screen format design* (3rd ed.). Wellesley, MA: QED Information Science.
- Guillemette, R. A. (1995). The evaluation of usability in interactive information systems. In Carey, J. M. (Ed.), *Human factors in information systems: Emerging theoretical bases*, Norwood, NJ: Ablex, 207-221.
- Hill, J. R. (1997). Distance learning environments via World Wide Web. In B. H. Kan. (Ed.), *Web-based instruction*. Englewood Cliffs, NJ: Educational Technology Publication.
- Hofstede, G. (1997). *Cultures and organizations: Software of the mind*. New York: McGraw-Hill.
- Hofstede, G., & Bond, M. (1984). Confucius & economic growth: New trends in culture's consequences. *Organizational Dynamics*, 16(4), 4–21.

Instone, K. (1997). Users test your web site: An introduction to usability testing [On-line]. Available:<http://webreview.com/wr/pub/97/04/25/usability/index.html>.

Jacques, R., Preece, J., & Carey, T. (1995). Engagement as a design concept for multimedia. *Canadian Journal of Educational Communication*, 24(1), 49–59.

Keeker, K. (1997). *Improving Web site Usability and Appeal*. Available: <http://msdn.microsoft.com/workshop/management/planning/improvingwebsiteusa.asp>

Kurosu, M., & Kashimura, K. (1995). Apparent usability vs. inherent usability: Experimental analysis on the determinants of the apparent usability. In *Proceedings of CHI* (pp. 292–293). Denver, Colorado.

Lindgaard, G. (1994). *Usability testing and system evaluation*. London: Chapman & Hall

Mahemoff, M. J., & Johnston, I. J. (1998) Software internationalization: Implications for requirements engineering. In the *Proceedings of the 3rd Australian Workshop on Requirements Engineering*. Geelong, Australia [On-line]. Available: <http://www.cs.mu.oz.au/~moke/papers/reqsi18n>

Malaysia, Government of (2006) *Nine Malaysia Plan 2006-2010*. Prime Minister's Department. Percetakan Nasional Malaysia Berhad.

Marcus, A., & Gould, E. (2000). Cultural dimensions and global Web user-interface design: What? So what? Now what? *Proceedings of the 6th Conference on Human Factors and the Web* (pp. 1–15). Austin, Texas.

Morkes, J., and Nielsen, J. (1998). *Applying Writing guidelines to Web pages*. Online archive available at: [<http://www.useit.com>].

Murphy, E., Norman, K., & Moshinsky, D. (1999). VisAGE usability study. (NASA/Goddard Space Flight Center Report HCIL-TR-99-04, February, 1999). Available: <http://www.lap.umd.edu/LAPFolder/papers/LAP1999TR01/LAP1999TR01.html>

Nielsen, J. (1993). *Usability engineering*. New York: Academic Press.

Nielsen, J. (1997). Usability testing. In G. Salvendy (Ed.), *Handbook of human factors and ergonomics* (pp. 1543– 1568). New York: John Wiley.

Onibere, E. A., Morgan, S., Busang, E. M., & Mpoeleng, D. (2000). Human computer interface design issues for a multicultural multilingual English speaking country-Botswana. *The Interdisciplinary Journal of Human- Computer Interaction*, 4(13), 497–512.

- Powell, T.A. (2000) *Web Design: the Complete Reference*. McGraw Hill: California.
- Rajani, R., & Rosenberg, D. (1999). Usable? or not?...Factors affecting the usability of web sites .Available: <http://www.december.com/cmc/mag/1999/jan/rakros.html>.
- Ruttenbur, B. W., Spickler, G. C., & Lurie, S. (2000). E-learning: The engine of the knowledge economy. Available: <http://www.masie.com/reports/elearning0700nate2.pdf>.
- Shirley, H. (1999). Effective Electronic Training. *Designing Electronic Materials: Articles and Papers*. Online archive available at: [<http://www.rockley.com/designin.htm>].
- Squires, D., and Preece, J. (1999). Predicting quality in educational software: Evaluating for learning, usability and the synergy between them, *Interacting with Computers*. 11, (5), pp. 467-483.
- Stoney, S., and Wild, M. (1998). Motivation and interface design: Maximising learning opportunities. *Journal of Computer Assisted Learning*. 14, pp. 40-50.
- Wild, M., & Henderson, L. (1997). Contextualising learning in the World Wide Web: Accounting for the impact of culture. *Education and Information Technologies*, 2, 179-192.
- Wang, Y.S. (2003). Assessment of learner satisfaction with asynchronous electronic learning systems. *Information & Management*. 41, pp. 75–86.
- Weston, C., Gandell, T., McApline, L., and Filkenstein, A. (1999). Designing Instruction for the Context of Online Learning, *The Internet and Higher Education*. 2, (1), pp. 35-44
- Zaharias, P., Vassilopoulou K., and Poulymenakou, A. (2004). Designing Affective-Oriented e-Learning Courses: An Empirical Study Exploring Quantitative Relations between Usability Attributes and Motivation to Learn. *Proceedings of ED-MEDIA 2004: World Conference on Educational Multimedia, Hypermedia & Telecommunications*, Lugano, Switzerland June 21-26, 2004 .

APPENDIX

Table 1: Descriptive Statistics

	Mean	Std. Deviation	N
pdi	130.5696	45.28391	79
idv	42.9747	23.63612	79
mas	93.6709	96.85010	79
uai	80.8861	48.20336	79
LTO	68.8608	17.75816	79
navi	3.0802	.27329	79
learn	2.4241	.22771	79
access	2.8636	.17519	79
vdesign	2.1994	.39908	79
interact	2.5266	.16069	79
contrs	2.5975	.19740	79
media	2.3165	.65784	79
lsd	2.7025	.09868	79
intfeedback	2.3722	.47365	79

Table 2: Correlations of Cultural Dimensions & Usability Attributes

	pdi	idv	mas	uai	LTO	navi	learn	access	vdesign	interact	contrs	media	lsd	infeedback
Pearson Correlation	1													
Sig. (2-tailed)		.667**	-.475**	-.528**	.724**	-.385**	-.795**	.884**	.866**	-.879**	.887**	.887**	-.887**	-.887**
N	79	79	79	79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation		1												
Sig. (2-tailed)			-.562**	-.342**	.517**	.441**	-.708**	.760**	.742**	-.759**	.766**	.763**	-.763**	-.763**
N		79	79	79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation			1											
Sig. (2-tailed)				.457**	-.341**	-.169	-.399**	-.494**	-.465**	.518**	-.486**	-.505**	.505**	-.505**
N			79	79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation				1										
Sig. (2-tailed)					.701**	.266*	-.467**	.455**	.454**	-.438**	.455**	.451**	-.451**	-.451**
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation					1									
Sig. (2-tailed)						.114	.000	.000	.000	.000	.000	.000	.000	.000
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation						1								
Sig. (2-tailed)							-.708**	.696**	.661**	-.722**	.687**	.708**	-.708**	-.708**
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation							1							
Sig. (2-tailed)								.455**	.454**	-.438**	.455**	.451**	-.451**	-.451**
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation								1						
Sig. (2-tailed)									-.889**	.897**	-.903**	-.907**	.907**	.907**
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation									1					
Sig. (2-tailed)										-.978**	.999**	.997**	-.997**	-.997**
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation										1				
Sig. (2-tailed)											.995**	.977**	-.977**	-.977**
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation											1			
Sig. (2-tailed)												-.966**	.990**	.990**
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation												1		
Sig. (2-tailed)													-.994**	-.994**
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation													1	
Sig. (2-tailed)														-.994**
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														1
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79
Pearson Correlation														
Sig. (2-tailed)														
N				79	79	79	79	79	79	79	79	79	79	79

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 3: Tests of Normality

	Kolmogorov-Smirnov ^a		Shapiro-Wilk	
	Statistic	df	Statistic	Sig.
navi	.075	79	.981	.279
learn	.047	79	.992	.887
access	.067	79	.985	.456
vdesign	.051	79	.981	.275
interact	.093	79	.974	.112
contrs	.061	79	.988	.642
media	.076	79	.981	.286
lsd	.063	79	.983	.386
infeed	.062	79	.988	.684
motiv	.080	79	.984	.439
usability	.063	79	.990	.822
PDI	.082	79	.963	.021
IDV	.074	79	.986	.518
MAS	.068	79	.989	.758
UAI	.064	79	.987	.620
LTO	.072	79	.986	.536

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction