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Abstract. The discipline of human-computer interaction has become a subject taught across universities around the world, outside of the cultures where it originated. However, the intercultural implication of its assimilation into the syllabus of courses offered by universities around the world remains under-researched. The purpose of this ongoing research project is to provide insights for these implications in terms of the student and teacher experience of HCI. How this subject is socially represented and valued across the different universities studied is also a key question for us. A multiple case study involving students and lecturers engaged in evaluation and design tasks in the UK, Denmark, Namibia, Mexico and China is described.

Keywords: HCI education, culture, design, evaluation, cognitive styles

1 Introduction

Human-Computer Interaction (HCI) is a well-established and important subject in computing, technology and design in universities across the world. HCI is taught in order to explore, understand and aid in improving the usability and user experience of interactive systems and products. Though each educational community refers to similar methodologies and frameworks in order to teach this subject, little is known of the student experience and how local perspectives have influenced their content and approach to teaching. In addition, different levels of 'maturity' in the adoption of HCI among different countries suggest that its representation and experience can take many forms. Therefore, a current challenge for this discipline is explicating the possible tensions created between local cultures and the assumptions, priorities and values embedded in HCI concepts and methods mainly developed under particular paradigms.

This project proposes to explore how HCI is socially represented, taught and experienced in different institutions spanning four continents in China, Namibia, Mexico, Denmark and the United Kingdom. The project will first begin by investigating how each educational community perceives what a usable system is through observation, discussion, and interviews in the context of a common

evaluation and design task task. This will provide data on their benchmarks for what they view as good usability as well as identifying similarities or differences with other institutions and the influences, which dictate their attitudes to this subject.

The project will then progress to investigate their teaching approaches and methods, gathering data on all aspects such as the structure of their modules, the learning outcomes, the content, choice of literature, assessment methods, use of technology and their conduct in day-to-day teaching. Close attention will be paid to their perception on how HCI issues such as colour, metaphors, semiotics are delivered, which will also offer data on the influences culture has had on their delivery.

The short duration of this project and its methodological design make it impossible to report on longitudinal accounts of appropriation of HCI by teachers and students. However, we hope to provide insights on the nature of HCI education as an intercultural encounter and the opportunities this can bring to locally validate, question and enrich some of its key concepts and methods.

2 HCI Education in different countries

Though there are numerous articles on HCI education and a few in relation to a country's delivery of the subject, there is no substantial body of literature which offers a thorough investigation into the influence that culture has on its delivery and in comparison with other countries/cultures. There are however a number of studies that discuss HCI education delivery in certain countries such as New Zealand (Sharkey & Paynter, 2004), Sweden (Gulliksen & Oestreicher, 1999), South Africa (Kotze, 2002), Brazil (Souza *et al.,* 2008) and Costa Rica (Calderon, 2009).

These studies offer a brief view into HCI education. Sharkey & Paynter (2004) investigated the need and coverage of HCI in relation to their educational courses in New Zealand. Their research came to the conclusion that the use of design tools was the most common topic followed by task analysis. This contrast with Sweden (Gulliksen & Oestreicher, 1999) where design principles, processes and cognitive psychology are the two subjects deemed to be the most important. Both countries had different approaches in their decisions but it would be interesting to investigate this factor especially regarding the time lapsed since these papers were published. Also, students in Costa Rica (Calderon, 2009) offered their view that HCI should include more graphical design and heuristic evaluations, which the institution amended to accommodate.

In Brazil, a multicultural and developing country, challenges such as illiteracy and digital illiteracy impact on how HCI is implemented and ultimately how it is taught without discriminating against their fellow citizens being a important issue (Souza *et al*., 2008). Souza confirms semiotics has had a stronger influence, unlike traditions in Europe and North America, and that along with social inclusion are the two key areas that define Brazilian attitudes towards HCI. They are however disadvantaged in the

fact that Portuguese HCI educational material is limited and is hindering understanding and development of this subject, a complaint shared by Gulliksen & Oestreicher (1999) and Calderon (2009) in regards to Sweden and Costa Rica.

Kotze (2002) looks at HCI education in South Africa, which in many ways shares cultural similarities with Brazil in terms of the range of ethnic, cultural, language and educational background issues. Kotze argues that HCI is a critical subject that needs to be taught but South Africa has been slow to embrace it. This is due partly to the ICT industry, which is characterised by systems development with little consideration for human factors. There seems to be a problem with institutions and cultures taking HCI seriously. This is echoed by Smith *et al*. (2003) who indicate that in India where a large IT industry exists, HCI education has been neglected which is having an effect on the population and on India's global marketability. Though India produces high-class engineering graduates, very few courses address HCI. However, over the last few years the HCI community in India has grown and the topic begins to be addressed at national level through events such as the India HCI conferences taking place annually since 2010.

With the need for HCI apparent in order to aid the usability of systems at home and abroad, what are best strategies for teaching this subject? Smith *et al*. (2007) suggest that western HCI tools and techniques might not be effective in developing countries and that some degree of localisation or adaptation are required. Lazar (2011) has utilised community-based projects to enhance HCI education in Canada and has discovered that if students are involved with users they are in a better position to appreciate their needs.

Ultimately the literature available offers glimpses into HCI education in different environments though the papers vary in depth, content and publication dates. An aim of this project is to add consistency and contemporary analysis to this body of research, and to make sense of cross-country variations, convergences and emergences from a cultural perspective. In the next section we describe the main theories driving this perspective for us.

3 Culture and Cognition

One area of consideration when discussing teaching and learning is that of the individual cognitive style of the learner. Cognitive, or learning style theory is a complex and contentious subject area with many conflicting theories and very many instruments to determine the different perspectives of cognitive style (Coffield *et al*. 2004; Cassidy 2004) and in addition, the cultural background of an individual may affect the outcome of any cognitive test (Witkin 1967). However, researchers in the fields of both culture and cognitive styles have identified a correlation between cultural characteristics and the holistic or intuitive versus analytical dimensions of cognitive style (Nisbett & Norenzayan 2002; Hayes & Allinson 1988).

Nisbett's investigations into the relationship between culture and cognition investigate the cultural differences between East Asians and people from the Western world (Nisbett & Norenzayan 2002; Nisbett & Miyamoto 2005) and discuss how an inclination towards holistic or analytic reasoning is influenced by cultural identities. Building on Witkin's definition of subjects as 'field dependent' or 'field independent' (Witkin et al. 1954), Nisbett differentiates between holistic and analytic reasoning, defining holistic thought as 'an orientation to the context or field as a whole' and analytic thought as 'detachment of the object from its context'. (Nisbett & Norenzayan 2002, p.19). A later study that further focused on attention and perception discovered that the exposure of the subject to particular cultural icons or practices influenced the analytic versus holistic perception, particularly amongst bicultural subjects, concluding that the relationship between culture and cognition is not fixed, but flexible and dynamic (Nisbett & Miyamoto 2005).

Hayes and Allinson tested the hypothesis that culture would account for differences in learning style in a study involving managers from East Africa, India and the United Kingdom. Using Hofstede's (1991) four dimensions of Power Distance, Uncertainty Avoidance, Individualism-Collectivism and Masculinity-Femininity, and the Theorist/Pragmatist and Activist/Reflector scores of Honey and Mumford's Learning Style Questionnaire, Hayes and Allinson identified two dimensions of learning style, Analysis and Action (Hayes & Allinson 1988). Further work in this area resulted in Allinson and Hayes' Cognitive Style Index (CSI) (1996), a compact questionnaire which is designed to test whether individuals tends more towards an intuitivist (right brain dominant) or analyst (left brain dominant) approach.

3 Methodological strategy and initial analysis model

The case study in each country includes a visit to a university where a group of around 20 undergraduate HCI students will be asked to engage in a heuristic evaluation and evaluation task of a science education portal for primary school children. The activity given to students will act as a cultural probe (Gaver et al. 1999) as it contains elements with different cultural affordances, e.g. heuristic evaluation as stimulating analytic thinking and prototype sketching as stimulating holistic thinking. The visit will also include meetings and interviews with lecturers and staff in charge of curriculum design. In addition, documents and course materials produced by the university will be analyzed.

Quantitative data on culture for each student group will be collected using Hofstede's VSM94 instrument, and Hayes and Allinson's CSI survey will be used to situate each student in an intuitive-holistic scale. We acknowledge the limitations of Hofstede's model on national culture (McSweeney 2002) and are very careful not to make stereotypical interpretations or generalizations from the data collected. Even more we are not expecting students to match the national culture scores 'predictions' for their country. However, we still believe that it will be useful to find out the mean scores for each group on each cultural dimension, e.g. power distance, masculinity and

collectivism, to enrich our comparative analysis of quantitative and qualitative data. Qualitative data will be analyzed for manifestations of national culture dimensions (Hofstede, 1991), cognitive styles (Nisbett & Miyamoto, 2005) and high and low context cultures (Hall, 1993). While these different cultural models give us a top-down framework for analysis, a bottom up analysis of this data will also be developed. In this case the aim will be to uncover cultural patterns, themes and dimensions exclusively emerging from the HCI education domain.

Data gathering can be structured in three levels looking at different types of culture markers per group:

a) Student experience will be studied through completion of VSM 94 and CSI surveys, individual 'expert' evaluation and interface design tasks producing quantitative and qualitative data on students' performance and views on the use of heuristics, scenario and persona development richness and content, usability and user experience goals; focus groups aimed at exploring perceptions of the task given to them and HCI concepts and tools in the local context. Students' evaluation and design rationale statements and sketches will be analyzed in terms of the dimensions holistic-analytic, and high and low context as well through development of emergent themes.
b) Teacher experience will be studied through interviews and analysis of HCI course materials. We expect to obtain information on their role as HCI educators, the challenges and indigenous perspectives on the discipline. Qualitative data obtained at this level will be analyzed in terms of the dimensions holistic-analytic, and high and low context as well through development of emergent themes.
c) HCI in the curriculum: through interview and document analysis quantitative and qualitative data will be obtained with a view to find out about how HCI as a subject is represented in the course offer and discourse of each university. Its relative importance will also be measured in terms of its presence in the pathways of different courses. The teaching and assessment methods used and their rationale will also be studies and analyzed. We will look for evidence of holistic-analytic dimensions, and high and low context as well through development of emergent themes.

These activities will help us answer the following questions:

a) How does culture influence delivery of HCI education?
    i. How is selection of teaching material influenced by cultural differences?
    ii. Which topics do an institution choose to deliver in HCI curriculum – why? Any correlation to Hofstede dimension scores for the country and/or cognitive styles found?
    iii. Institutional perception/representation in computing curriculum of HCI education.
    iv. What is the HCI teacher perception?

b) How does culture influence the experience of studying HCI?

   i. What is the Student perception of HCI tools and concepts?
   ii. How do cultural dimensions and cognitive styles correlate with students' preferences for learning HCI?
   iii. What are the perceptions of HCI tools and methods vis-à-vis findings for cultural markers?
   iv. What is the community's understanding of what constitutes a usable system?

In summary, this project intends to enhance our knowledge of HCI Education from an intercultural perspective. It aims to find opportunities and challenges for the dissemination and enrichment of this discipline through eliciting and assessing the importance of local, disciplinary, national and HCI cultures. It does so by exploring the context, performance and views of stakeholders involved in learning and teaching.

This multiple case study project is limited by the short duration of data gathering in each country and by not being able to observe first hand experience of HCI education happening over a period of time. Nevertheless, this study provides a unique, and probably the first, opportunity to systematically compare and analyze data obtained from four continents. We are aware that it stands in different epistemological positions as it looks, on one hand, at performance and, on the other hand, at meanings used to represent and experience HCI. However, we see this as an opportunity for triangulation, co-validation and enhanced understanding of HCI education in a multicultural context.

References

Calderon, M.E. "Teaching Human Computer Interaction: First Experiences" 2009.

Coffield, F. et al., 2004. Should we be using learning styles? What research has to say to practice. Learning and Skills Research Centre, London.

De Souza, C.S., Baranauskas, C.C., Prates, R.O., and Pimenta, M.S. "HCI in Brazil - Lessons Learned and New Perspectives" 2008.

Gaver, B., Dunne, T. & Pacenti, E., 1999. Cultural Probes. ACM Interactions, 6(1), pp.21-29.

Gullisksen, J & Oestreicher, L. "HCI Education in Sweden" 1999.

Hall, E.T., 1993. An anthropology of everyday life : an autobiography, New York: Anchor Books.

Hayes, J. & Allinson, C.W., 1988. Cultural differences in the learning styles of managers. Management International Review, pp.75–80.

Hofstede, G., 1991. Cultures and Organizations: Software of the Mind., Berkshire,UK: Mc Graw-Hill.

Kotze, P. “Directions in HCI Education, Research and Practice in Southern Africa” 2002.

Lazar, J. “Using Community-Based Service Projects to Enhance Undergraduate HCI Education: 10 Years of Experience” 2011.

McSweeney, B., 2002. Hofstede’s model of national cultural differences and their consequences: A triumph of faith - A failure of analysis. Human Relations, 55(1), pp.89-118.Cassidy, S., 2004. Learning styles: An overview of theories, models, and measures. Educational Psychology, 24, pp.419-444.

Nisbett, R.E. & Miyamoto, Y., 2005. The influence of culture: holistic versus analytic perception. Trends in Cognitive Sciences, 9(10), pp.467–473.

Nisbett, R. E. & Norenzayan, A., 2002. Culture and cognition. Stevens’ handbook of experimental psychology.

Sharkey, E. & Paynter, J. “Computing Interaction Education in New Zealand Universities” 2004.

Smith, A., Ghosh, K. and Joshi, A. “Usability and HCI in India: Cultural and Technological Determinants” 2003.

Smith, A., Joshi, A., Liu, Z., Bannon, L., Gulliksen, J. and Baranauskas, C. “Embedding HCI in Developing Countries: Localizing Content, Institutionalizing Education and Practice” 2007.

Witkin, H.A., 1967. A cognitive-style approach to cross-cultural research. International Journal of Psychology, 2(4), pp.233–250.

Witkin, H.A. et al., 1954. Personality through perception: an experimental and clinical study.