University of Joensuu

Department of Computer Science

Master's Thesis

Participatory Design in a Cross-Cultural Design Context

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Abstract

The objective of this study was to investigate how well Participatory Design (PD) can work in a cross-cultural design context. The fact that participatory design among other design methods was developed in the western cultures and involves users to participate in the software design process may be problematic when integrated in a cross-cultural design. In addition, today's technology has advanced across geographical boundaries, reaching out to people with different cultural backgrounds and with varying aspects about particular design preferences. Therefore, software designers must consider whether the old design methods such as participatory design can work well in today's cross-cultural design context. Thus, representing participatory design as an example method that might require enculturation. However, there are various breakdowns that occur during cross-cultural design processes. To this extend, we undertook an empirical investigation to observe, identify and describe the root causes of these breakdowns and the effectiveness of western design methods such as participatory design when applied across cultures.

The study also aimed to investigate cultural related divergence in design between designers and target users, this being one of the dilemmas faced in Human Computer Interaction. To help with our investigations, participatory design sessions were conducted in which two designers from Kenya and Zambia worked with six Finnish users in designing mock-ups of an envisioned e-voting touch screen using the PICTIVE technique of PD. The findings of this study were mainly cultural oriented as the approach involved three different cultures. Besides PICTIVE, the study adopted other design techniques such as the think-aloud method, observations and informal interviews. The design sessions were recorded both on video and audio tapes and the data was transcribed and analysed at a later stage.

As this study was cross-cultural oriented, issues related to the interaction and communication breakdowns between the designers and the users were rigorously analysed. These issues include misunderstanding of certain concepts, difficulties in reading and writing and confidence in both the design style and speech were inevitably observed in the design sessions. Consequently, certain interaction breakdowns such as language barriers led to several omissions of design factors that could have perhaps been important to the e-voting interface design process. Communication and behavioural issues including facial expression, turn taking and surprising voice tones also occurred in the design sessions and were part of the findings of this study. The findings in this study are hoped to offer guidance for future cross-cultural

design situations using participatory design method.

ACM Computing Classification System, 1998 version: H.5.2. [User Interfaces]
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Contents

Chapter 1

Introduction

Cultural diversity has become a new challenge in Human Computer Interaction (HCI). Human computer Interaction is defined by the Association for Computing Machinery (ACM) as "a discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use and with the study of the major phenomenon surrounding them" [49]. The field of HCI is a computer-related research which has its heart centered on design, interaction and communication technologies, making design and evaluation the most two important concepts in the HCI definition (See Figure 1.1). There are many design and evaluation methods in the field of HCI, each with its own techniques, limitations, advantages and disadvantages.

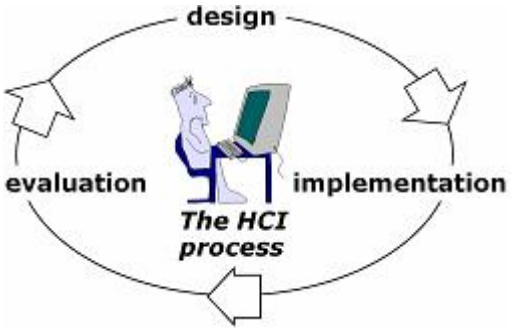

Figure 1.1: The HCI Process [18]

Design is an activity that follows a series of development phases from requirements through to implementation [14]. Design covers various methods that serve different pur-

poses in designing of user products. Ehn, P. et al (As cited in [49]) divided the development of design methods into three generations. The first generation consisted of product-oriented design methods that focused on system theory and software engineering. Design methods of the second generation were process-oriented and these focused on democracy, communication and user participation during the design process. User-oriented is the theme of the third generation with focus on actual use of situations and assessments of the quality in use of the system designed.

The third generation involves methods that attempt to understand and incorporate design knowledge into a more participatory and evolutionary approach, with full acknowledgements of the inconsistencies that may arise in design when wrong methods are selected. Therefore, design methods should consist of active and creative thinking by exercising interaction between the designers and the users in relation to the design process. In the long run, design methods could embrace a collaborative, skilled and shared knowledge approach towards software design.

Evaluation on the other hand, is an activity that should occur throughout the design process to eliminate errors of design and to ensure that all design procedures are assessed continually [20]. In this respect, there is a close relationship between design and evaluation processes. In normal circumstances, finding the best method or technique for any given situation requires thorough individual assessments of the available methods but however the case, a combination of design and evaluation methods is more beneficial for cross-cultural product designs.

The efforts of HCI to reach users distinguished by various cultures with regards to software design have been shown through usability evaluation methods such as questionnaires, interviews or think-aloud method, each constituted with a set of theory and practices which are naturally inter-related [20, 47]. However, the evaluation methods have turned out to be problematic when conducting evaluation in cross-cultural design situations. This is due to the consequences and effects culture has on different personal interactions and behaviour of various cultures [36]. In order to pave way to users across cultures, designers need to promote collaborative design methods that involve active user participation in the design process. Thus, identifiying user needs directly from target users. However, not only is cultural diversity and related design impediments faced in the evaluation methods alone, but in the design methods as well.

In order for HCI design and evaluation methods to eradicate the challenge of culture diversity in software development and in order to gain good global popularity in software

design across cultures, there is need for these methods to address cultural issues by taking full control over the methods in understanding users through collaborative designs with the users and by considering users as co-designers rather than as informants. One popular collaborative method in HCI is Participatory Design (PD) which provides a set of techniques for bringing knowledge and values of users directly into the design of software applications [8]. In participatory design, representatives or target users are considered as "co-designers" rather than as "informants". To facilitate and enhance knowledge sharing through interaction dialogues, participatory design utilises a wide range of techniques and practices such as prototyping, construction, workshops, stories, dramas, etc. [24]. Consequently, this approach of collaboration in design may investigate design issues at a much wider scope as it promotes knowledge sharing between the users and the designers although intercultural miscommunications can possibly occur both in evaluation methods and collaborative design methods. However, with collaborative methods one has better chances to overcome miscommunications.

Moreover, with today's advancements in technology across the globe that has encompassed a diverse range of users with different cultural backgrounds, collaborative design methods such as participatory design face challenges to spread globally. Participatory design may not work well outside the western world as its objectives have less consideration on specific challenges that could be encountered when the method is used in cross-cultural design situations. Therefore, we aim to investigate the design breakdowns when conducting participatory design in a design situation in which three different cultures are involved in designing mock-ups of an envisioned e-voting touch screen system. Thus, this study is about identifying cultural oriented breakdowns through rigorous observations of the design sessions.

1.1 Background

The origins of participatory design can be traced back from the Scandinavian tradition to shift from the old systems to the newly introduced computer-based systems. To this regard, workers in various organisations of countries including Finland, Sweden, Norway, Denmark and Iceland started to call for change due to political debates that arose concerning the introduction of computer-based systems and the democratic distribution of working power [24].

Active user participation and direct cooperation have been the key factors of participatory

design. Since its inception in the western countries, it is not clear as to how well participatory design goals can be achieved in cross-cultural design contexts. The goals of PD are not cross-cultural framed to consider the influences of culture on design thus remains a challenge. According to [49] due to environmental and cultural differences PD is more difficult to accomplish outside the Scandinavian countries. In addition, as participatory design utilises a range of techniques and tools to convey interaction and communication between users and designers, efforts by which to enculturate these techniques in cross-cultural design processes are limited [11, 46, 8, 9]. Designers face the challenge of integrating users from different cultures in the design process. Therefore, designers are forced to incorporate product-oriented design rather than user-oriented design due to the challenge of cross-cultural collaboration in software design which emerges from the global expansion of the computer industry [10]. Conversely, software designers define user needs themselves and this reduces user acceptance of products.

The awareness of cross-cultural challenges in design came to exist after the internationalization of computer products. Before the global spread in technology, cross-cultural design related studies were non-existent. The reasons why designers got interested in cultural matters are pinned down in [23] as having been caused by the spread in Internet and computer technology outside the western countries to the rest of the world. As a result of this, the user-base diversified mainly from western users to users representing various cultural backgrounds. In addition, further assurance of cultural diversity was largely dominated by western ideas and values.

A review conducted by Kamppuri et al. [23] of culture related articles published in five major HCI forums evidently showed that a decade ago in 1998 and the years after, culture related studies became more common. This indicates the premature age of cross-cultural studies in HCI. Despite its prematurity, interests in integrating cultural issues have expanded by a large margin following the internationalization of products to suit culturally diverse users.

Internationalization of products refers to the process of pruning or eliminating specific localised cultural elements of a product to suit a multi-cultural atmosphere. The opposite is done for localization of products, where the focus is mainly to infuse specific culturally contexts into a previously internationalised product [39]. An example of internationalisation and localization of products is by translating the text into an appropriate language, thus making other cultural conventions comfortable and recognizable to the user [15]. A typical language translation example is changing English text to French text which may be problematic due to the French vocabulary collection.

Efforts to improve on the internationalization and localization of software design have been shown in a number of studies [21, 39]. However, a study by Nielsen and Galdo [1] provide a number of examples concerning the problems and challenges incurred by designers in translating interfaces of software products. In respect to this, mere translation of interfaces is insufficient to support the internationalization and localization of software products. This calls for special needs to be addressed such as collaborations between designers and target markets to incorporate culture into the design methods, as cultural diversity of users also affects the design methods and brings about cultural challenges.

Historically, it was claimed in [39] that by 1993; internationalization and localization were the only two existing methods of preparing a product for another culture by means of cross-cultural checklists and cultural dimensional models. However, the nature of a product developed for international use perhaps pose various drawbacks on human performance, operation and interaction with the products. A number of factors including design preferences, age, knowledge, thinking capacity, competence or computer literacy are the key challenges of cross-cultural design. The different culture background misconceptions cause designers to sometimes overlook the importance of integrating culture in their products.

1.2 Problem Statement

There has been a number of cultural dimensions in form of models and theories in support of cross-cultural design and these models act as frameworks to measure different cultures and guide designers in designing for a multi-cultural approach. In most cases however, these models are theoretical and not practical and this requires effective prototyping as this was observed in a study by Kondratova and Goldfarb [26]. The most cited of these cultural dimensions is a model created by Hosftede [22, 29, 26, 15, 45, 54]. Hofstede cultural dimensional model has been used as a guideline in support of many studies. For instance, in [54] several empirical research studies were conducted based on human performance and user acceptance to evaluate the influence of Hofstede's factors. Sheridan in [26] relies on and applies Hofstede's cultural factors as cultural guidelines for interface design. Marcus and Gould [29] investigated how Hofstede's model might affect user-interface designs by overcoming the limits of website conventional paradigms.

However, based on the existing cultural dimensional models such as Hofstede's, various studies have indicated and proofed that these models are not comprehensive enough to collect exhaustive information for both internalisation and localisation translation of products.

Many problems are encountered when these methods are used [53]. Fitzgerald in his concluding remarks indicated that cultural dimensions are mainly focused on description of different cultures rather than on prescription for best user interface design [50]. An evident-based set of dimensions was developed in [38] to help with proving the value of cultural dimensions and provide a consensus on the impact and importance of the existing dimensions. Conversely, common problems were encountered with the cultural dimensions and these are outlined in [38] as:

- Cultural dimensions are too general to have real value in the design
- Cultural dimensional developers have many issues duplicated and omitted
- Cultural dimensions are parallel to and conflict with research literature

To fill this void in design, quality in design needs to be promoted by integrating deeper methods of uprooting data from a diverse view of users. This can only be accomplished by incorporating users into the design of artefacts which are nevertheless developed for the purposes of the users themselves.

To this end, culture plays a vital role in software design. In order to ensure that the direct interaction between designers and users works in a way required by participatory design, we need to actively engage users as part of the design team and to incorporate culture into the western design methods.

1.3 Aims of the Thesis

This thesis aims to investigate how well participatory design method can work in cross-cultural design situations and to provide an insight into the cultural related design impediments that may occur in the design process when designers and users are from different cultures. Findings are expected to shed light on the extent to which participatory design techniques should be modified in cross-cultural design. To frame the investigation, the following three research questions were formulated:

1. How well does participatory design work in a cross-cultural design context involving Finnish users and designers from Kenya and Zambia?

2. How does the cross-cultural design situation affect the interaction and communication between the participants and the designers?

3. What are the solutions to the cultural effects encountered in a cross-cultural design context?

To help with our investigation, a combination of design techniques, PICTIVE being the focal technique were used. The nature of this study mainly focused on cultural related breakdowns including interaction, behaviour and communication encountered in a design process. Based on this, occurrences of these breakdowns during the design sessions were observed. Thus, the analysis of the design sessions focused on finding any cultural related breakdowns between the users and the designers. To identify the cultural breakdowns, the design sessions were recorded on video and audio tapes. It was from the recordings that a design transcript was produced which helped to find solutions to the above research questions. The target investigation attributes from the transcript were language issues, interaction and communication issues, behavioural issues and the general atmosphere of the design sessions.

1.4 Motivation

Our world is a rich and diversified environment of technology which is becoming a global asset reaching out to different kinds of people with varying competences with computers and software products in general. This trend in technology has led software designers to gain insight into the way the target users understand and utilise given interface designs of their products. Due to cultural diversity between designers and users and human differences in interface design preferences, cross-culture design is perceived a challenge of software design. In respect to this, culture diversity is often seen as a challenge to design products for international reach.

Culture is rarely incorporated into the software design methods as these methods were developed in a certain cultural context. This implies that the design methods do not necessarily work equally well in other cultural contexts. This highlights and triggers the need for a deeper understanding of cultural differences in design through carrying out collaborative design methods alongside their techniques. To this extend the bridge between the world of designers and that of users can be closed. Eventually, technology may become easier to use with less complications as the users are part of the software design team in designing

products for their own use. Consequently, products can be made acceptable and appropriate to use in various cultures.

1.5 Outline of the Thesis

This section outlines the remainder of this thesis and briefly introduces the main chapter topics to be addressed.

Chapter 2 describes participatory design as a user-centered design method, covering the history of PD, ideas behind participatory design method, the goals of PD and the different techniques that are used to achieve the participatory design objectives. This chapter also provides a full description of PICTIVE as a major technique used in this study.

Chapter 3 discusses the impact of culture on design methods in general. The chapter covers the cultural diversity and its effects, how culture can be merged with participatory design, promoting user participation in a cultural diversified situation and the challenges faced and impediments experienced in cross-cultural design.

Chapter 4 describes the study's investigation of the works of participatory design in a cross-cultural design using PICTIVE technique. A list of the design techniques which were used in this study is provided with descriptions of how the technique was utilised during the design sessions.

Chapter 5 consists of an analysis of the data collected from the design sessions which is provided with the methods used for analysing the data. Further on, the results from the analysis provided in 'case' form from the design session transcript are discussed.

Chapter 6 discusses the findings of this study.

Chapter 7 reports the study's conclusions.

Chapter 2

Participatory Design as a User Centered Design Method

In the first decades of computer software development, software developers designed numerous software applications which were only understood by themselves regardless of other users who found it inappropriate to use the applications [43]. The design approach was regarded as one-dimensional implying that many organisations experienced a management-oriented approach which clearly indicated the perspectives of senior software development programmers being regarded as more powerful than the interests of the actual users of the software.

According to Shneiderman in his book "Designing the user Interface", he defined the style of thinking of the past in software development as egocentric and suggests that effort be made to accommodate user skills, wishes, and orientation during the design phase [43]. His common argument for this approach suggested for an increase in user involvement which would subsequently provide more accurate information and build ego investment in successful implementation of software. Thus, leading to a potential increase in user acceptance of the final product. On the contrary, Ives and Olson (In [43]) have argued against the extensive user involvement as being costly and prolonging and that this approach forces designers to comprise their designs to satisfy user incompetence of software design. In addition, critics as observed by Sutcliffe in her book "Human-Computer Interface Design" have in practice noticed actual experts who employ themselves as user participants, thus ceasing participation from incompetent users [47].

Contrary to Ives and Olson above, it is important to note that the strongest design strength is understanding user needs and this can be achieved by considering the backgrounds of target users and involving them in the early stages of the design process. This results in a consistent sharing of design ideas and knowledge between the designers and the users and enhances accuracy in making design decisions considering that users are not experts and are unable to analyse their design requirements on their own. In the long run, user acceptance of products is increased.

It is important to fully consider the views and suggestions of users regarding a product, as interjection of these would cause erroneous designs. Many authors at the time urged direct interaction with the users during the design phase, during the development process and throughout the system lifecycle [43].

User-centered design (UCD) is one common approach to interaction design which emphasises user participation in the design process. Interaction design is part of the whole system design which is integrated with the rest of the design process [47]. Interaction design is a user-driven approach concerned with the practices of how to design user experiences rather than with particular aspects and ways of carrying out design [20]. User-centered design aims to involve users in the system development. This design approach has been achieved by developing a group of methods such as participatory design and contextual design which aim to enhance user involvement in the design process.

Donald Norman in "The design of everyday things" [35] defined user-centered design as: "A philosophy based on the need and interests of the user, with an emphasis of making products useable and understandable". In [20] user-centered design is defined as an approach that emphasises on real users and their goals, not just technology, as the driving force behind product development. One important advantage of incorporating users in UCD is that human skills are utilised and decisions relevant to the design are made with support from the users themselves.

Gould and Lewis [17] defined three user-centered design principles that they believe would lead to useful and easy to use computer systems, and these are:

1. Early focus on users and tasks, meaning the user's characteristics should first be studied and this requires observing the users performing their tasks, studying the nature of the tasks and involving them in the design process;

2. Empirical measurement, the user's reactions and their performances on intended design

artefacts such as printed scenarios or manuals are observed and measured; and

3. Iterative design, this principle emphasises a repeated cycle of design, test, measure and redesign as often as possible in order to fix problems indentified throughout the design process.

According to [20] these principles are accepted as the basis for a user-centered design approach as it is today.

The methods associated with user-centered design advocate a common approach of active user engagement in decision making during the design process. One example method of user-centered design is participatory design (PD). Participatory design focuses on the relationship between the designers and the users with focus on the product design. According to [49] PD and UCD are often confused due to similarities in their goals. However the difference between PD and UCD as noted in [49] is that UCD can be non participatory, while one defining factor of PD is the full user participatory in the design process. In fact, there are a number of UCD methods with varying degrees of user participation.

Active user participation and direct cooperation have been the key focus of participatory design. Participatory design through its collaborative design techniques between the designers and the users brings to light important design artefacts that are discussed, expressed and shared during the design process. It enables users to actively contribute prior to the design of the envisioned product, thus considering users not only as informants but as co-designers and members of the design team. This implies that users are active collaborators in the design team whose involvement is of high value as opposed to passive participants whose involvement is entirely controlled by the designer [12]. It is claimed in [12] that co-designing ensures multiple perspectives of views and contributions that define identical goals in order to reach to the product design.

The perspectives and insights into what users and designers bring to the design process are combated and revealed through the use of techniques and tools. Participatory design method utilises a variety of techniques and tools that build the entire framework which aims to bridge the gap between the world of users and the world of designers as depicted in Figure 2.1 respectively.

Therefore, participatory design is a UCD design method that combines a set of techniques and tools to facilitate direct interaction between designers and users. During the design process, views related to the design artefact are collaboratively expressed, shared and agreed

Figure 2.1: Merging the two worlds in design through PD. The shades (Green and Black) represent the differences in mindsets that are combined and expressed in the design process.

upon. The design collaboration is usually between the designers and the users and draws on important design issues and concerns.

2.1 History of Participatory Design

Participatory design began in the 1960's as part of the Scandinavian workplace democracy movement [24]. This movement started in Nordic countries of Denmark, Finland, Iceland, Norway, and Sweden when workers in various organisations started to call for change due to political debates that arose concerning the distribution of working power and the introduction of computer-based systems. The shift from the traditional systems to the newly introduced computer-based systems brought controversies among workers as they feared that computers would reduce their control over immediate work situations. Some of their duties were automated into the newly embedded computer systems causing a reduction in the amount of work, deskilling and dislocating [24].

In the 1970's, laws and agreements were enforced in many organisations which mandated cooperation between management and workers over the introduction of new technologies and gave workers the freedom of speech in their working environments [20]. Despite having these laws and agreements in place, workers found influential causes of the technology interventions that changed their working structure [24]. Consequently, the workers' unforeseen reactions against this approach led to political interventions which also involved academic researchers to investigate the root causes of and find solutions to such dilemmas in organisations which lead to the early work of participatory design.

The early work of participatory design was influenced by the desire to enable information communication into the complex computer systems and efforts by the labour unions to influence workers to have democratic control over changes in their work [20]. The major goals of the trade unions were to eliminate the management-orientated control over working conditions and to see to it that the integration of computer-based systems was worker-oriented [2, 28]. Many researchers at the time argued that computers were becoming yet another tool for management to fully control the workforce without consideration of improving the working conditions of the workforce [24]. In reaction to the automation of worker's duties, and management's control over work decisions, researchers established relations with the trade unions to build technical and organisational competence among workers in order to strengthen working positions of workers during meetings with management [24]. In the long run, several projects attempted to resolve the dilemmas in organisations by involving workers in design by focusing on work rather than on simply producing a product. Projects that became known were conducted mainly in the Nordic countries.

2.2 Participatory Design Projects

In 1973, the Norwegian "Iron and Mental Worker's Union" (NJMF) project by Nygaard and colleagues [24] was the first to address the technological intervention change in organisations. This project aimed to remove the imbalance of access to computing expertise between managers and workers by training trade unionists to learn the concepts and language of computing. In addition, Bjerkenes et al. in [24] defined the so-called "collective resource approach" strategies developed in the NJMF project for workers to influence designs. Inspired by the NJMF project, a milestone of interests in such issues spread among other many pioneering researchers who adopted the NJMF project approach of technological change and development in organisations.

In the late 1979, the Swedish DEMO (Democratic Planning and Control in Working Life, Computers, Industrial Democracy and Trade Unions) pioneered by Ehn and Sanberg was launched [24]. Similar to the NJMF strategic approach, the DEMOS project used an approach called work-oriented action research, as academic researchers established relations with trade unions and formed working groups. From 1981 onwards, PD projects started to focus on the politics of technology design. In 1982 the Danish DUE project was launched [24]. Pioneered by Kyng and Mathiassen, this project concentrated on techniques for involving users in design. Later projects carried on the trend of integrating user design techniques as researcher's attention extended to issues of skills among workers.

UTOPIA project, a variant of the earlier projects was developed and is one of the most discussed projects that describes user involvement in design and decision making. UTOPIA was a cooperative effort between the Nordic Graphics Workers Union and the research institutions in Denmark and Sweden [20]. The goal of the project was to design computer-based tools for text and image processing. While interests in developmental projects spread within the Scandinavian tradition, undoubtedly interest of involving workers in designing of products spread to other Western countries.

Subsequent to the early projects, different PD techniques such as PICTIVE among others were later developed in North America in order to translate the UTOPIA projects by constructions of user interfaces using paper-and-pencil [37]. In the United States, Hugh Beyer and Karen Holtzblatt published a book in 1998 describing their design approach, contextual design [3]. The book describes contextual design as a "customer-centered" design approach aimed at managers and IT professionals in US companies that revolve around observing aspects of employees' work, developing work models based on the observations, and basing new system designs on the work models [3, 46].

2.3 The Principles of Participatory Design

Engaging target users in the design process is seen as a precondition to good design [24]. It includes making room for user experiences, skills and interests that shape the usefulness and well integration of systems into an organisation. Gregory J. [19] distinguishes the Scandinavian approaches to participatory design using three principles which reflect on her participation experiences in a Norwegian multi-disciplinary international collaboration in health informatics. Her reflections and experiences are based on the Scandinavian background approaches to participatory design that describe a sense of their distinctive history and critiques reflecting on problems and limitation to design encountered by workers [19].

However, the Scandinavian organisational implications of participatory design were integrated and promoted in law with a vision to accept work practices [11]. Therefore promoting a major democratic principle demonstrated through the involvement of different users during the design sessions and their equal contributions to the system outcome [52]. In relation to today's approaches to participatory design, three principles that distinguish the Scandinavian approach to participatory design outlined in [19] include:

- deep commitments to democracy and democratization;
- discussions of values in design and imagined futures; and
- how conflicts and contradictions are regarded as resources in design

2.3.1 Democracy and democratization

The Scandinavian participatory approach has a history of striving for democracy with complicated needs to involve new subjects, new ideas as well as new technologies in decision making. Early Scandinavian projects aimed to improve on the quality of work life in a broad context of democratization at organisational and industrial levels. This goal was understood as the rights of all employees to participate in decision-making concerning their work and technological changes through trade unions [46]. However, trade unions as important as they have appeared in participatory projects are considered less influential for working towards democracy [4].

Democratization goals were achieved in many early projects through establishments of strategies which combined global and local actions. Global actions were determined at a central level of institutions, and political arenas which made use of the legislation that governed workers' rights regarding technological change in their working environments. For instance, cooperation agreements between projects such as the NJMF project and DEMO [46] contributed to the objectives of the legislation. Local actions were practiced by engaging expert workers with their knowledge in system development projects. These projects concentrated on both the present and envisioned future goals. The future goals extensively focused to improve on technology and involve users in design of envisioned products, for example, the UTOPIA project [46].

In order to achieve democracy, [4] claims that non democratic strategic movements such as affirmation action to include people of different cultures and the unprivilaged in society or workplaces are required to enhance design values. The overall goal of democracy and democratization of PD aims to improve the working environments and worker's duties in relation to technological design and to embrace work-orientation which involves users rather than system-orientation [11].

2.3.2 Values in Design

PD encompasses the whole design cycle and is seen as a collaborative method that includes users in the design team who are free to contribute to any stage of the design [11]. This collective approach of resources in system development describes the importance of values in design [46]. The design values are achieved through explicit discussions of design intentions among team members and the emphasised values are embedded in design strategies and choices. Participants then collaboratively implement the implicit and explicit values into design future plans and into any practical changes envisioned in the design projects respectively [46]. Therefore, the collective approach to designing of projects builds a coherent design structure committed to value-oriented design practices of keeping design decisions open to users in order to gain a wide range of design values.

2.3.3 Conflicts as a Resource in Design

Drawing back to the Scandinavian tradition, design processes were of political scene and included conflicts between management and labour unions asserting a conflicted perspective to design. PD method incorporates an iteratively approach to design and is subject to evaluation and revision at each stage [11]. The iteration multiplies user needs and design intentions as multiple views are voiced out. Fundamentally, design is a collection of activities in which various methods are used by participants who meet to create new possibilities in design. Disputes may arise due to multiple needs and motives among participants during discussions of the intended design or any other design activity. Thus, causing conflicts which in turn creates opportunity for creativity [46]. It is also suggested in [46] that a diversity of issues that arise in participation design sessions can be addressed and achieved by negotiating conflict constraints and values along a variety of metric, in the long run making the participants views and interests visible and tangible to design.

Participatory design aims to close the gap between the world of designers and users alike, by integrating the two worlds into a common space that targets to enhance knowledge exchange regarding software design. Muller [33] states that each world both the user's world and that of designers have their own knowledge and practices with well defined boundaries which seem difficult to penetrate through. Therefore the challenge of participatory design is to build a bridge between the two worlds.

Traditional design methods involve a one dimensional practice of collecting system requirements from target users. Although the traditional methods are one dimensional, a few of them involve a two way discussion. The two-way exchange of ideas is stronger because it emphasises a reflective dialogue experienced throughout the design phase as opposed to single assumptions of user requirements determined by system developers. Thus the theme for participatory design is seen as an amplifier to mutuality and reciprocity that enables new relationships and understandings [33].

In the earlier days of PD, the major goal was to increase participation of workers and their unions including those workers with little say over technological design issues affecting working environments. Today's PD research has reached out beyond the office environments, thus becoming extraordinarily diverse drawing on fields such as user-centered design, graphical design, software engineering, architecture, psychology, anthropology, political studies and the likes [33]. Therefore, the early Scandinavian goals of PD have in today's many research projects been altered to suit specific research objectives. Some project examples include; Gärtner and Wagner's arenas for participation and Blomberg et al., 1993; Holtzblatt and Jones, 1993; Muller, 1993; Muller et al., 1995 with goals defined to develop strategies for worker participation in decision making relating to the structure and characteristics of technology interventions [24]. Consequently, important attributes from the earlier researchers are the foundational principles that have been reinterpreted in many areas of research.

The common goal for PD is seen as focusing on one attempt to directly engage interaction between the designers and the users [33]. Alternatively, Yu and Liu [52] consider PD as a method that promotes collaborative thinking through iterative verbal exchange of design ideas that create knowledge and understanding. Dix et. al [11] in their book "Human-Computer Interaction" consider PD as a design philosophy which encompasses users as active collaborators in the design process, rather than passive participants whose involvement is entirely governed by the designer. Their argument is that participatory design aims to refine system requirements iteratively by actively involving users in the design process. Furthermore, users are seen as experts in their work context and only when these experts are allowed to actively contribute to the design of the system, can the design be effective and acceptable by the users [11].

2.4 Participatory Design Techniques

A technique describes how an activity can be carried out [5]. Traditional approaches to system design make it difficult for users to identify the connection between their work and the technical description of new systems [24]. In addition these approaches provide less opportunity for designers to familiarise with the user's everyday work. Therefore, research which is concentrated on PD has recognized and recommended the need to develop tools and techniques to assist in the system development.

Participatory design is composed of a number of techniques and tools. These techniques and tools assist to strengthen and enhance knowledge sharing during the design process through interaction among members of the design team. To this extent some of the techniques complement one another. Dix et al. characterised the PD techniques into four types [11] and summarised as:

2.4.1 Brainstorming Techniques

Brainstorming techniques involves all participants of the design team to collectively reason "outside the box". The process is informal and relatively unstructured but tends to pool a range of ideas in relation to the design artefacts. Although this process is considered informal and unstructured in a way, it builds a concrete foundation of ideas about the design of a product as ideas materialize. All information produced during the brainstorming sessions is recorded without judgement and can be analysed using other techniques. This technique is normally integrated in other techniques as part of the design process. Therefore no specified example techniques are given in the literature reviewed.

2.4.2 Role playing techniques

Role playing techniques use both graphical and textual depictions of the outward appearance of the intended system, without any accompanyment of system functionality. Role playing techniques are conducted in many different ways depending on the product being designed. These techniques describe target users' day-to-day activities. Designers with the help of users select important attributes from the activities and embed them into the design process as the co-creation of potential product design requirements.

Example techniques

1. **Scenarios**

   A scenario is an informal narrative story line description of human activities or tasks that initiate exploration and discussion of contexts, needs and requirements. Scenarios focus on achieving user goals, otherwise defined as stories in [52]. Although scenarios explicate common working situations, they are commonly used for expressing proposed or envisioned situations in relation to products being designed. A good example of scenarios is a simple user-oriented scenario used to set design directions by promoting and involving users as full participants in the development process of participatory design [20]. However, there are various types of scenarios that are intended to describe and present any design artefact. Some scenarios are representations of feedback for information collected during a study tangible to the design phase.

2. **Dramas**

   Drama is a technique that enhances communication between software developers and users by means of contextualized narratives. Inspired by the famous works of Boal, participatory drama-oriented research has adopted the influential ideas of his Forum Theatre as a means of posing questions and asking participants for design ideas for the envisioned artefact [33, 38]. Experiences of participants are portrayed through role playing which is performed as an influence to technological design. Through direct or actor mediated participation means, dramas are effective in shaping and simulating the use of technological tools for envisioned design artefacts, thereby exploring new possibilities.

3. **Stories**

   Stories explore human personalities, problems, plot-lines and difficulties with technology which serve as a base for action [38]. In respect to this, stories are considered as collection of information concerned with technology but not about technology as their main aim is to trigger and initiate a foundation for the design process [7, 38]. Most importantly, participatory design stories work in three ways as described in [33, 38]. First, they may be used as triggers for creating conversations, analysis and feedback as investigated in [40]. Secondly, user participants may tell stories as part of their contribution to the knowledge required for understanding the product to be developed and thirdly, design teams may present their concept of how a designed product or service would look like, its use and resulting changes during the design process [33].

2.4.3 Workshops

It is sometimes so that both the designer and the user have totally different perspectives about the design of the system and some ideas may be missing. Workshops are used to provide a more focused view of the design by filling in the missing knowledge from both parties. The process may involve mutual inquiry in attempt to understand each other's opinions on the context of the design as this establishes a common ground between the designer and user and sets a foundation for the anticipated design.

Workshops utilises a combination of methods such as brainstorming sessions to gain insight into unarticulated aspects and develop shared ideas [24]; observations conducted to gain additional user perspectives regarding software development; questionnaires and interviews, used to gain a view in relation to the enactment of technology across multiple participants [24]; diagrams and drawing used to gather and analyse the participant's knowledge of the design theme [5]; and workshop courses and projects to explore different ways of integrating technology and related design attributes.

Example technique

1. **Strategic Design Workshop**

Strategic design workshop (SDW) uses a collection of generative tools to boost activities. These tools are selectively combined into the strategically workshop formulas in order to reach an overall conceptual strategy that combines market research [51].

The SDW comprises of design strategies which are divided into three aspects [51] of:

- Market research which describes the type of things people express about
- Ethnography which describes people's behaviour and
- Participatory design which describes people's design structures.

The design strategies are accomplished by conducting a variety of activities such as construction of design materials that focus on thinking in terms of expected future change in

working conditions; mapping, where participants layout their envisioned future expectations of work; feeling, where participants demonstrate their feelings to show their past experiences portrayed using pictures and words; and verbal story telling, where participants express their experiences in more detail.

2.4.4 Pencil and Paper

This is a simple and inexpensive type of technique used for early assessment of design models that require user participants to walk through typical tasks using paper mock-ups of the system design. The intended purpose is showing the inconsistencies encountered when identifying user's requirements and the actual design as proposed.

The pencil and paper technique is sometimes called the "card-based prototyping" [20]. According to [33] cards are used in the entire software development lifecycle from the analysis phase through to evaluation of work and technology. Card-based prototyping can be generated from storyboards assuming screens have been developed, the screens or screen elements of a card-based prototype can be manipulated and moved around to simulate interaction just like in storyboards [20]. Therefore, the pencil and paper practices use a collection of pieces of cardboard that resemble playing cards. Each piece of card represents a component of a user's work-flow or life activities including interface events such as screen shots or social events such as conversations with people. Thus, the visibility of the cards to all members of the design team often has room for discussions which include questions, negotiations and improvements, resulting in new shared understandings and collaborations.

The pencil and paper technique uses a combination of other techniques for a wider view of ideas. For instance, the storyboard technique is usually incorporated in the card-based practices when the design team needs to narrate the work flow of the system being developed by arranging the cards sequentially according to the steps of the envisioned system. The systematic steps demonstrate an understandable picture of the entire system work flow to both the users and the designers.

Example techniques

1. **CARD**

   Collaborative Analysis of Requirements and Design (CARD) is a simple layered technique applied in participatory design and participatory analysis [32]. The CARD mate-

rials are physical playing cards, each of which can symbolize a work activity, an object in the workplace, a person, an interpretation, mental operation or whichever line of design the technique follows.

CARD sessions proceed with an unstructured brainstorming session where participants combine different reflections of the diverse workplace needs and interests. CARD materials are then produced based on the needs and interests and the group carefully scrutinize the description of an activity on the open-ended template for each card. The layered approach of CARD technique makes great contributions to PD through simplifying design artefacts by means of cards grouped in relatively small sets of activity concepts and performances of easily comprehended components. The card component improves accessibility of information and strengthens the technique as a support for full exchange of knowledge in which participants are encouraged to voice out their work practices.

2. **Games**

The concept of games has had a great influence in participatory design techniques, and practices [33]. Games emphasize communication through a combined set of strategies of enhanced teamwork and democratic work practices within the design team. It is claimed in [33] that games can serve two purposes when properly selected. The first purpose considers the general characteristics of games as being intangible to worker's jobs or duties thereby creating equal opportunities among participants during game performances. The second purpose relates games to an activity that portrays neutral characters that appear novel to most or all design participants. This implies, desipte the participants' differences in learning working ranks or background or authority, they are likely to learn games at the same pace which leads to greater opportunities in sharing of ideas. There are many ways of conducting games in participatory design [4, 33]. Games require players to work together in order to understand each other, define the game contents, and to interpret these contents to one another in terms of multiple perspectives and disciplines.

3. **PICTIVE**

PICTIVE also follows the pencil and paper approach. Different from the rest of the techniques of pencil and paper, it uses a combination of office tools to generate paper mock-ups of a system design. This study embarked on designing an envisioned system from its earliest stage and non-functional at the time, thus followed the PICTIVE technique approach. Therefore, a full description of this technique is outlined in Section 2.5

2.5 A Detailed Description of PICTIVE

PICTIVE is an acronym for Plastic Interface for Collaborative Technology Initiate through Video Exploration. It is a participatory design technique that intends to enhance the direct involvement of user participation in the design process. The most powerful letter in the PICTIVE acronym is "P" which means "Plastic" and relates to three very important attributes of the whole concept. It entails:

- A combination of components made out of coloured plastic.
- Relatively, the plastic components are durable and inexpensive and
- Easily encourage an explorative and inventive design atmosphere.

PICTIVE creates flexibility in design because in most cases the interface concepts are malleable. The participants are able to improve on their designs by trying many other variations as quickly as possible. The artificiality of the plastic interface, unlike other prototyping paradigms portrays an imaginary interface that aids users and developers to share an understanding of the final system outcome which cannot be confused with a working system. In order to compensate with different types of user participants, PICTIVE technique developed at Bell core in 1990 within the context of participatory design uses a combination of low-fidelity design components including pen and pencil in conjunction with the high-fidelity approaches of video and audio recordings for record keeping.

The low-fidelity objects of PICTIVE are the none computer representations of system functionality intended to ensure that all participants have an equal opportunity to contribute their ideas. The high-fidelity objects such as recordings make it easy to keep records and reduces social distance during the design sessions [31, 30, 20]. It is suggested in [31] that the low-fidelity objects should be colourful, inexpensive, unsophisticated and easy to modify in order to pave way for participants' innovative thinking, confident use and interaction. Thereby trying different new ideas which eliminate efforts that did not work. On the other hand, the ideas expressed towards the design are captured using high-fidelity objects used for interpretation and implementation of the system.

It was discovered in one of the first experimental PICTIVE case studies conducted in [31] that video recording has several benefits over the static layout of the design elements. Dynamic recapitulation of both the design and discussions provided throughout the design

process can be obtained from the recordings and reconstruction or amendments are easily instantiated for the implementation phase.

2.5.1 Traces and Principles of PICTIVE

The roots of PICTIVE can be traced from the political Scandinavian conflicts about design methods in various organisations [24] and from participatory design school which emphasized a tradition of user participation in decisions related to computing systems that had great impact on people's working conditions [30]. The main idea behind the design of PICTIVE technique was to incorporate people who were not necessarily programmers, management or system analysts to effectively engage in the design process by empowering their concrete contributions towards the system design. This was in reaction to the unacceptable software designs of developers which led to the establishment of political design skills in the technology [30]. Thus the goals of the technique as outlined in [30] originate from the grassroots of the entire design concept:

- To empower users to act as full participants in the design of systems that will have impact on their jobs and their work-lives
- To improve knowledge acquisition for design, and the quality of the resulting system, by involving people with job expertise (the people who do the job) in the design process
- To improve the flow of the software engineering process by bringing representatives from major components of that process into the design phase as co-owners of the design

Alternatively, the PICTIVE goals were formulated in response to the mock-up technique called UTOPIA project developed by Ehn et al. of the 1980's (See [24]). However, due to its extensive system design modification in real time by the users, PICTIVE stands to have more advantages than other techniques. Muller in [30] describes and compares PICTIVE mock-ups with the work surveyed and explored by other researchers. He urges PICTIVE a technique that offers an equal opportunity in the design environment to both the users and the designers and that it draws less attention on the evaluation of the already designed interface as opposed to a survey by Nielsen in [1], but rather for the creation of the design of the interface.

The major theme of PICTIVE technique is to ensure a software-based rapid prototyping environment of common unsophisticated office tools such as pen, paper and pair of scissor used to transform design ideas through brainstorming during the design process pertaining to the final outcome of the software product and ensuring that the users are fully empowered participants in the design process [31, 30].

PICTIVE technique creates an educative atmosphere which benefits both the users and designers through an interchangeable knowledge sharing approach. A number of attributes of PICTIVE have contributed to its design popularity. Some of the attributes are associated with the atmosphere that surrounds a PICTIVE design session and most importantly some attributes are in line with the democratization influence of removing high technology tools used for interaction during design sessions [30]. As the design progresses, users tend to understand what they need from the application, project or product and are able to work out their ideas directly without any intervention by other members of the team. Similarly, designers fully understand the user requirements and successfully implement users' design quest.

In addition, Wildman et al. in [30] confirmed in a research conducted to assess the Bell core-intervenal version of the "Practicum" software that PICTIVE creates confidence for the user participants as they feel their ideas are given more consideration and opportunity to express their views in detail as they desire. Through interactive ways of sharing concrete ideas, PICTIVE ensures an effective communication approach between the designers and users alike. Therefore a combination of distinctive ideas is equalized rather than emphasising a one-dimensional design language understood only by software designers [30].

2.6 Summary of PD Techniques

To this end, the Scandinavian democratic move from the ordinary systems to the newly introduced computer-based systems marked the origin of participatory design. The implementation of computer-based systems in organisations caused controversies among workers as they feared that computers would reduce their control over immediate work situations. Efforts to eradicate organisational dilemmas were shown in various trade unions and projects whose common goals were to involve workers in decision-making as working conditions were not evenly distributed within organisations and workers' faced limitations in expressing their views. A summary of the four types of PD techniques is presented in Table 2.1.

Table 2.1: **A summary of the PD Techniques**

Type of Techniques	Description	Example Techniques
Brainstorming	Performed informally to build concrete foundation for the entire design process as design ideas materialise.	Not Specified. The technique is performed as a part of other techniques.
Role Playing	Uses both graphical and textual depictions of the outward appearance of the intended system, without any system functionality specifications	Scenarios, Storyboards, Dramas, and Stories.
Workshops	Used to provide a more focused view of the design by filling in the missing knowledge from both parties of designers and users who collaboratively trigger design ideas through discussions	Strategic Design Workshops (SDW).
Pen and Paper	Used for early assessment of the design models that require user participants to walk through typical tasks using paper mock-ups of the system design.	CARD, Games and PICTIVE.

Chapter 3

The Impact of Culture on Western Design Methods

As the world is rapidly turning into a global marketplace for products, anticipation to incorporate users across cultures into design processes has become a new challenge in HCI. Culture is the beliefs, values, behaviour, myths and structural elements of a given organisation, tribe, or society [34]. In general, culture is a concept that is difficult to talk about, define, and measure as it changes over time [38]. People of one native culture perceive a similar way of life as the only possible way. Only until they cross their cultural boundaries do they realise and learn about other cultures [34]. However, not all people belonging to the same culture emulate a uniform cultural pattern of attitudes, beliefs and values. Human misunderstandings within people of the same culture most often occur. Therefore, understanding what culture is and in what way it influences people's thoughts and behaviour is a challenge.

3.1 Western Design Methods

User participation by interaction through verbal expressions in the design process promotes a shared and rich diversity of views and ideas which can influence the product design. Although principles and merits of participatory design have been adopted beyond the Western countries, the method has not been adapted accordingly. Dix. et.al. having considered the

Western origins of PD, emphasise the need for participatory design practices to be utilised more widely in order to promote a clearer understanding of the PD goals in cultures beyond the western [11]. On the contrary, efforts to make western design methods to work well in other cultures have paved way and have been conducted in different cultural settings. This is as a result of the Scandinavian shift of organisational power and worker responsibilities which led Western design methods including contextual design and participatory design to be practiced beyond these countries. What used to be national-cultural oriented design shifted to multi cultural-oriented design for PD and this has been adopted and adapted outside the Western cultures.

In reviewed literature, it was noticed that the initial developmental goals of the design methods did not consider the specific challenges of operating in a cross-cultural design setting as these methods were particularly developed for western cultures. As a result the methods may not work equally well outside the Western world. However usability evaluation methods such as questionnaires, interviews or think-aloud protocols have been in existence and have been used in cross-cultural settings but studies have shown that certain problems are encountered when these methods are used. The use of design methods in cross-cultural situations could be considered an alternative option to usability evaluation methods.

3.2 Adapting Western design methods to other Cultures

As design methods were developed in the Western world and subjected to people in these cultures, one may question whether these methods are capable of producing the same results when applied in different cultures. This section explores the challenges faced when enculturating western design methods to totally different cultures.

The increase in global integration of western design methods and participatory design in particular has been adapted worldwide by designers alongside users with varying computer knowledge and cultural backgrounds. Participatory design consists of many different techniques and practices such as prototyping, constructions, workshops, dramas, and stories etc, and these require active user involvement when used in design processes. These techniques enhance knowledge exchange through interactive dialogues between designers and users towards the product design [28].

It is claimed in [31] that the challenges of adapting PD outside the western world are due to environmental and cultural differences making PD more difficult to accomplish. At

the same time, efforts to enculturate the PD methods in cross-cultural design are limited as products are designed for target cultural markets [33, 11, 52].

Therefore, it becomes difficult for designers to market their products in other cultural settings causing designers to speculate and define user needs (product-oriented). In return, user acceptance of the products is reduced. Regarding the challenges faced by designers in engaging users from different cultures to participant in the design process, [10] states that the adaptation of participatory design in different cultures makes it difficult for designers to practically shift from product-oriented to user-oriented design.

It is clearly seen from here that culture plays a vital role in software design. In order to facilitate an enhanced knowledge-base approach of ideas and views about a product in cross-cultural design, design methods especially participatory design need to be incorporated. These methods enforce and aim to accomplish direct interactions between users and designers in a design process.

3.3 The Effects of cultural diversity on user participation

User participation in software development process involves interpersonal communication between the users and the designers. User participation is effective as products are designed to suit their perspectives. According to [45] the Western culture perceives the involvement of users into the design team as having a democratic right. Based on this, as design originated from democratic roots of Scandinavian, the challenge lies in achieving expected results from Western design methods when they are applied across different cultures.

In [50] it is assumed that designers consider culture as important only if it is not Western because culture is always incorporated in whatever designers or users do, but if Western designers use Western methods, it is not easy for them to see how the effects of culture on design methods in their own cultural context. Therefore, in order to identify cross-cultural impediments encountered in design, users belonging to different cultures need to be employed into the design team as co-designers to actively participate and exhaustively contribute to the envisioned product of the design process.

In order to eliminate the discrepancies faced in cross-cultural design, many researchers have focused on identifying cultural influences of user participation during the design process as opposed to cultural influences on design itself [23]. Others have used cultural dimensions to

frame and strengthen their design [50]. However, different design methods strongly emphasise the need to actively involve users during the design process as a better way of eliciting user requirements. As it is acknowledged in [1] and [54] user requirements are the central point considering that users are the most key contributors to the product design. On the other hand, user requirements are strongly influenced by the user's local cultural perspectives, thus the need to engage users from different cultural spectrums to act as co-designers in participatory design.

There are many different techniques associated with the participatory design method and these can be used as stimulus to gain the users expressions and ideas pertaining to the design artefact. The uniqueness of an individual can be defined based on different needs, task performances and most importantly their cultural heritages [29]. By involving users into multi culture design process, each users' most significant and tangible contributions to the product design must be taken into consideration.

3.4 Efforts to eradicate cultural diversity in design methods

Taking into account cross-cultural design, technology through the World Wide Web and other related media has aimed to seal the gap between the world of designers and the world of users. In [34] technology is considered an amplifier for software development to satisfy human use across cultures. However, technologies are developed within their cultural origins and technologies developed in one culture are necessarily not suitable for other cultures as such.

A drawback has been on the designers' lack of increased awareness of cross-cultural differences and cultural diversities which, until today remains a challenge in software design. It was noticed in [39] that the design community has not always extended their views to include cultural awareness as an aspect of user awareness. As cultures differ in many aspects, software designers need to increase their awareness about cultural diversity by identifying anticipated product users. In addition, the strongest strength in design is to understand user needs and this can be achieved by involving users in the early stages of innovative design which in the long run, increases audiences and produces beneficial experiences and promotes user acceptance [44].

There are increasing concerns among user interface designers as to which aspect of cultural diversity to handle. Quite often studies talk about cultural diversity differently which makes it difficult for designers to focus and draw conclusions [16]. Attempts to incorporate culture into design have been shown through using design guidelines of which many multi-cultural designers have adapted to localise interface designs.

In the literature, much of the research on cross-cultural design issues heavily concentrates on developing cross-cultural user interface design for websites by use of design guidelines to frame the research findings [48, 45, 22]. Unfortunately, as noted by Koyani in [38] many design guidelines available are incomplete and incompetent with today's research, and seem to lack a research base, thus guidelines contradict one another to an extent of contradicting the research literature. However, some well known design guidelines have existed for decades and have been valued and implemented in many projects [29, 22].

3.5 Embracing Cultural Diversity into participatory design Techniques

User evaluation across the globe has been conducted using the traditional usability evaluation methods. These methods face a daunting challenge of incomplete participation with users from different cultures during the evaluation process [45]. It is also indicated in the literature reviewed that usability evaluation methods are costly to operate across cultures.

One approach would be to engage culture into the design methods, as culture plays a vital role in technology development. It is inevitable that, as different cultures carry their own cultural norms, cultural diversity adds to the misunderstandings and misinterpretation encountered in interface designs. However, it is suggested in [34] that communication breakdowns in collaborative design across cultures should be viewed as an opportunity instead of as an obstacle. It implies that designers should gain deeper understandings of target cultures by adapting and accommodating user cultural norms to produce creative design artefacts.

The significance of culture is shown not only for the design but for the entire process of design. Implying that designers should not only rely on intuition or personal experiences of their product designs but to gather design experiences in a collaborative manner from a diversified world of users. Serenko [42] stresses on the success of many commercial projects as often achieved from the leading roles users play in the inventions and improvements to a

new product. This approach of involving users in design is mainly practiced in User-Centered Design (UCD) methods, especially in participatory design (PD) as users are considered as co-designers rather than as informants.

3.6 Strategic Frameworks in cross-cultural participatory design

Although participatory design practices involve users in design, not much work has been accommodated in PD techniques concerning issues of cross-cultural design. Therefore, participatory design techniques should reach out to the cultural diversified users and involve them into the design process so as to achieve a shared understanding of design ideas with people who perceive aspects of life differently.

Conversely, participatory design emerged from the Western culture at a time when the main concern was about designing systems for organisations within a national culture holding particular cultural styles that did not match with the outside world. It becomes difficult for this method to operate well outside the Western countries because specific challenges of cross-cultural design were initially not formulated as part of the objectives for the technique. With regard to this argument, it was claimed in [45] that a framework containing a variety of user-based and expert-based techniques for analysis and design should act as the driving instrument within the software development lifecycle. Similarly, Brandit [6] emphasised user participation as a cornerstone to design and that designers need frameworks and tools to support collaborative design processes.

The cross-cultural design frameworks can be embodied in a variety of methods. In particular, PD uses a variety of techniques which aim to gain creative thinking and design knowledge from the users by empowering their expertise into the design process through direct interactive conversations with the designers.

Participatory Design may be a foundation to articulate occurrences of cross-cultural design problems considering that design is a process of negotiations that are strongly voiced out to find solutions not only through technical problem-solving criteria but through direct cooperative interaction among team members along with compromises among designers [23]. One would question if the westernised expected PD results can be obtained in other cultures. It remains a task for this study to investigate and perhaps find a solution to this question.

3.7 Challenges in cross-cultural design

The diversity of culture makes it clear that understanding of user needs through speculations, intuitions and personal experiences is inadequate to guide a design process and this remains a design challenge. Many studies such as [13, 39, 25] have stressed out the importance of bridging the gap between cultural diversified designers and users through multiple factors of internationalisation and localisation.

Internationalisation referred to as the process that separates the software components into components of cultural-independent and cultural-dependent and localisation as the process of translating the cultural-dependent component into a target culture [13, 39]. As cultural backgrounds differ according to cognitive styles and knowledge which in turn influence software application acceptance, it becomes a challenge for software applications to be adopted and may be rejected in situations where applications are difficult to learn [21].

Alternatively, other studies have used usability evaluation methods as their research base in cross-cultural investigations. Many findings have revealed problems with integrating usability evaluation methods. For instance, a case study to evaluate cultural differences in understanding of a virtual campus website by Evers involving four culturally different user groups of Japan, North-America, England and Netherlands investigated cultural applicability of user evaluation methods. Evers incorporated three user evaluation techniques; pre-questionnaire to collect demographic data, task observation concentrated on the virtual campus website and Interviews which collected feedback on the website evaluation (See Table 3.1). Her findings as summarised revealed that some methods are less applicable than others for a culturally diverse user base. She further concludes that direct observations among other techniques applied in usability methods may not be appropriate for international use. [13].

Table 3.1: An X indicates that the data collection method posed problems for the group involved [13]

Method	US	UK	NL	JP
Questionnaire	X			
Task Observation (Think-aloud)		X	X	X
Interview	X			

Similarly, Oyugi et al. [36] reviewed usability evaluation problems and issues in a cross-cultural study involving users from UK, Africa and India who all happened to be residents in one culture (UK). The fact that the users resided in a single culture did not change the multi-dimensional differences in cultural inheritance. There aim was to examine the effectiveness of the think-aloud method by eliciting users' views and ideas. Due to cultural differences in personal interactions among their target users, the results indicated that the Western methods are less effective with users from other cultures in this case Africa and India. In addition, Oyugi et al. gave an example of impoliteness when you openly tell someone that their design is poor as the main usability challenge faced in many Asian countries.

Jung and Kun in [27] worked with users from the Netherlands and Korea in order to extract influential cultural factors in cross-cultural evaluation of a product based on a combination of methods. The self observation method reviewed differences in every participants' behaviour; the probe showed uncertainity avoidance in the given 'work-book' open-ended tasks and results indicated that Dutch participants sufficiently completed the tasks and Korean participants had trouble with completing the tasks; usability test reviewed differences in the tendency of problem critism and the participant's eargerness to identify product problems. Their analysis based on verbal comments and behaviour reviewed rigor criticism and frequent discoveries of the product weakenesses and strengths from the Dutch participants as opposed to the Korean participants. Finally, the focus group interviews showed that the Dutch participants actively engaged in the dicussions than the Korean participants. Therefore, the cultural differences between their target countires emphasised the need to consider cultural influences on user experiences in design.

The challenges encountered in the above examples clearly reveal the cultural appropriateness, awareness and understanding of engaging users in the design process and viewing users as experts in their own styles of design by making them co-designers rather than as mere informants of the design team. The usability evaluation methods and mere localization and internationalization of interfaces are not an answer to the challenge of cross-cultural design. As seen in this chapter above, a number of problems are encountered when these methods are performed in a diversified world of users.

Therefore, mere translations of design features to suit a particular culture is insufficient to hold as the most valuable design principles. The credibility of design should be surrounded by useful, valid and consistent steps to guide the designers as well as other researchers into an in-depth effort of studying certain target cultures by working with the users, in order to succeed in their work.

3.8 Commonly experienced design impediments

There are many implications that arise in design when users and designers incorporated in the design process are from different cultures. High chances of culture and social misunderstandings and misinterpretations of information likely occur. The following section describes some of these impediments faced between designers and users during the design process in a multi-cultural setting.

1. **Unwillingness to Contribute**

   Most design sessions are interactive and require attention for user needs by allowing target users to freely voice out ideas regarding their preferences of the envisioned design artefact. Some users lack trust in design and prefer not to openly express their ideas. For example, Van Rijin in [27] applied context mapping techniques on North Asian participants and her results indicated that participant lacked trust, control and communication. In addition according to [12] however, the unwillingness to communicate during a multi-culture design can be linked to the perception that people have to be part of the same team.

   In respect to that, users of the design team personally do not know each other and maybe uncomfortable to freely express themselves. Therefore, design contributions can be seen as competitive in terms of posing knowledgeable ideas that are considered tangible to the design by some users and dispersive by others.

2. **Difficulties in Communication**

   From a multi-cultural design perspective, language is the most influential barrier in communication. Languages differ according to character sets with different ways of pronunciations. For instance, the Finnish language among other European languages contains a variety of characters such as ä, ö, and e [39], such that when a common language (English for instance) is used during the design process, pronunciation of certain words might be misleading and confusing. However, design contributions can be collected not only through verbal knowledge of language but through a combination of techniques.

   Design knowledge can be gained by two distinctive approaches of observations and explicitness [27]. Sanders (As cited in [27]) developed a framework that applies different techniques such as questionnaires and written interviews which effectively reflect on ways of communicating between designers and participating users in an approach she calls 'Saying, Doing or Making approach'. Consequent to this approach, both the

designers and users might not be fluent in reading and writing the adopted language for the design process and might withdraw from exhaustive expressions and thus limiting their contributions to the design. Therefore, communication barriers during the design process evolve around language.

In order to avoid certain cross-cultural challenges between designers and participating users, studies of target cultures need to be conducted before the main design process. This step would make designers familiarise themselves with the participating users' cultures and leaves room for anticipations of what to expect from the users during the design process. Despite belonging to different cultural groups, people perceive life in various ways which include a variety of factors including beliefs, values, attitudes and behaviour. Understanding of design applications might vary according to the users' cognitive style of thinking.

To this end, the impact of culture on participatory design and technology is strong and diverse. Therefore in order to enlighten the discrepancies embedded in cultural design, involving users in design as co-designers is the strongest strength in design and user needs are perfectly understood. In the long run, it increases audiences and produces beneficial experiences and promotes user acceptance.

Chapter 4

Investigating Participatory Design in a cross-cultural context

In order to help clarify the issue of cultural impediments encountered in cross-cultural design, we undertook a study into design methods and techniques. This study describes investigations of a number of related user and designer breakdowns which are experienced in a collaborated design process using participatory design. As part of the study, participatory design sessions were carried out in which two designers from Kenya and Zambia worked with six Finnish participants in designing an envisioned e-voting touch screen mock-ups using the PICTIVE technique of PD. During the design sessions, the users participated actively and interactions between the designers and the users were observed. The design sessions consisted of video and audio recordings and the data collection was later transcribed. In the following section, we outline the design techniques used in this study and their contributions to the investigations respectively.

4.1 The approach used in the study

A combination of methods was used in the study to satisfy the research goals. A total of six design sessions were carried out, each session with an individual participant. Thus, six e-voting interface mock-ups were designed together with the participants. To evaluate the interaction between the participants and the designers, the following techniques were used.

a) The think-aloud method enabled the designer to understand how each participant individually interpreted the design of a hypothetical system. During the sessions, the think-aloud method was used in all design activities that required the participants to perform tasks and verbalise design ideas depending on their ability and willingness to contribute their ideas to the design of an envisioned e-voting interface of their choice. This technique was used to capture the participants' intentions or ideas behind their task performances, especially when the participants were provided with the pen and paper design materials to enable them arrange the e-voting interfaces accordingly to their preferences.

b) It was extremely important to observe the design sessions without causing any interruptions during the design process. Thus, the goal of observation is to become virtually invisible to the participants in order to let them perform their tasks without interruptions [3]. Therefore in this study, the role of the observer was to observe the misconceptions and misinterpretations encountered in both the participants' verbalised thoughts during the entire interface design process and the levels at which the designer would intervene and contribute to the participants' design performances. Through observing the interaction between the designer and the users, observation notes were taken.

c) Follow up informal interviews were used as a way of gaining insight into views of the participants' design contributions. For instance, when the designer needed clarification of certain ideas and suggestions by the users that could not relate concisely to the design such as; adding certain interface features like buttons which did not clearly show their intended purpose on the design screen.

d) Pre and Post Questionnaires were used in this study. The pre questionnaire collected demographic data which included questions concerning the user's computer experiences and cultural background and the post questionnaire was used to collect feedback from the users concerning their views and future suggestions about the design sessions.

e) PICTIVE, an experimental participatory design technique was used to enhance user participation in the design sessions. Non-computer representations of the touch screen e-voting interface features such as papers, coloured pens, erasers, buttons, pictures, and numbers were used to ensure equal user opportunity to contribute their ideas to the design. The PICTIVE technique was used during the actual design sessions and was the focal instrument in designing of the e-voting interfaces.

Information from the above five design techniques was video and audio recorded, implying that each participant's contributions to the design of the e-voting interface were recorded

and a total of six recordings were later transcribed. The nature of this study followed the qualitative research approach which extensively depended on empirical observations to find the effectiveness and importance of culture and identify cultural implications of a cross-cultural design process. Therefore, the analysis of the design transcripts was conducted based on observing the activities of the design sessions in order to find cultural related design implications encountered between the designer and the users.

4.2 Conducting Participatory Design with Finnish Users

Participatory design has a variety of techniques including the low fidelity techniques that facilitate the users with an ultimate insight into what it would be like working with the envisioned design artefact. In this study, using the PICTIVE technique facilitated the design sessions. The technique was flexible enough to support the design sessions and to collect data from a combination of design tools including the pre and post questionnaires, think-aloud, follow up informal interviews and observation notes. The design sessions involved mock-up designs of the e-voting user interface using sketches, scissors, pen and papers. A touch screen user interface of an envisioned e-voting system was to be designed and six interface mock-ups were generated by the participants according to their design preferences. Each session consisted of an individual participant who worked hand in hand with an individual designer as illustrated in Figure 4.1. Therefore, it was easy to observe the behaviour of the designer towards each individual participant and the participants' behaviour towards the designer as well as the entire design session.

4.3 A Detailed Description of the Design Sessions

The sessions took place at the University of Joensuu, in the premises of the department of computer science. Interface design of the e-voting system was the original reason for carrying out design sessions with six users. On the other hand, the design sessions offered a chance to study cross-cultural effects on participatory design. Thus, investigating the role by which culture plays and its effects in cross-cultural design context using participatory design method with regard to the defined research goals of this study.

Prior to the actual design sessions, a test session was conducted to practice the design

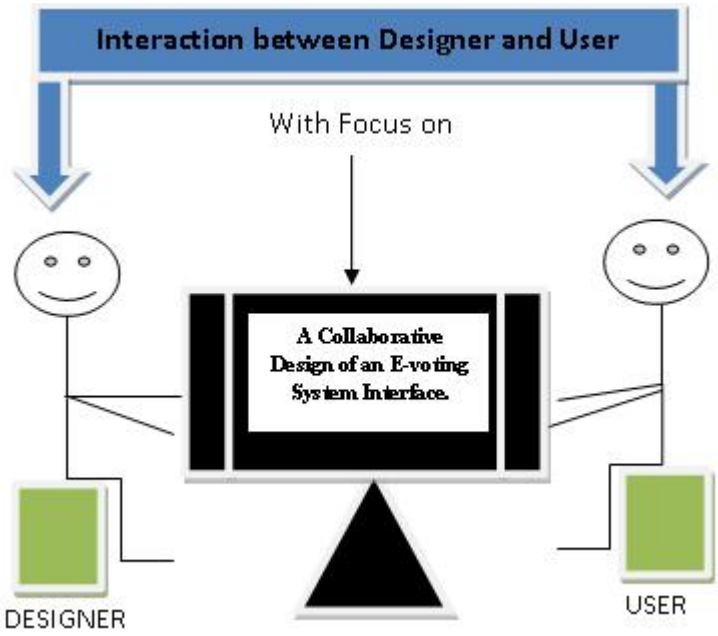

Figure 4.1: A one-to-one PICTIVE Design Sessions

sessions and finding out whether there were design activities which perhaps could not work well. In respect to this, the test session revealed problems in the pre design session. The pre and post questionnaires revealed some errors which lead to alteration of some questions to make them simple for the participant to understand and follow.

Design session instructions were suggested as the best method to familiarise the participants with the design process and to make them understand the purpose of the design sessions as opposed to verbal instructions, considering that English was not the native language for the participants but rather the 'national official language' for the two designers. A walk through of the design procedures was carried out and it was discovered that the interview which was initially part of the background questionnaire was unnecessary; instead it was proposed that the interview could be informal and conducted throughout the sessions in search for deeper views of the participants' contributions. The participants' background information, computer experiences, cultural exposure and age were to be attained using the Participant's Background Questionnaire. The questionnaire consisted of both closed and open ended questions (See 5.1.2)

The Post Design Session Questionnaire was used to get feedback from the participants

in order to understand their participatory experiences with the design sessions. The questionnaire mainly contained closed questions (See 5.1.3). During the test sessions, it was suggested that the identity of the participant be kept anonymous as assurance for fear of uneasiness during the design sessions. A Confidential Declaration Form (CDF) was proposed to be provided to the participants and this form was to be signed by the participant and both the designers prior to the design activities of the sessions.

Therefore, it was proposed that the main design sessions proceed with the session instructions which described the purpose of the study, the confidentiality declaration form which assured the participants of their identities remaining anonymous and only used for the purpose of the research, and the pre and post questionnaires that were used to collect the participants' backgrounds and computer experiences and participation experiences with regard to the overall design session respectively.

In the next section, full descriptions of the methods and tools used to analyse data have been provided.

4.4 Data Analysis

4.4.1 Transcript

Initially, the transcript was written manually by going through the audio recordings and writing down everything that was recorded. Due to natural human error, some important points might have been omitted during audio transcription. The video recordings of the design sessions were used to counter check the accuracy and efficiency of the audio version of the transcript and also to help with identifying and assessing the fundamental breakdowns in communication and interaction gestures related to different cultural factors that occurred during the sessions. Therefore, interactions between the designer and the users were analysed.

The participants' responses were sorted, and categorised into attributes based on the observations of the design sessions. It was also important to observe and analyse other design breakdowns including misconceptions, miscommunication, misunderstandings, expressions and expectations; designers and participant's lack of trust, shared information, confidence and control over the design and themselves and on the variations of participants' preferences of design features. A contextual description report and quotations of what was said during

the design sessions (In case form) of the analysis were formulated and the results can be found in Chapter 5.

4.4.2 Observation Notes

Direct observations were part of the design sessions. It was expected that it would have been difficult for the participants to speculate and assess their own behaviour and reactions towards the design of the e-voting user interfaces. It was important to observe the sessions without unnecessary intrusions or control, thus critically reflecting on the defined observation attributes of identifying cultural related breakdowns that occurred whilst taking notes of the design process. Given the focus of this study to observe the interaction between the users and the designer in order to investigate the works of participatory design in a cross-cultural context, the observations reported in this document were to identify the design breakdowns based on the four attributes of;

a) Language Issues: to identify consistencies as well as breakdowns in interaction between the designer and the users provided that English was not the native language for both the designers and the users.

b) Communication Issues: other than language problems, communication attributes such as taking turns in speaking, facial expressions, tone of voices and offensive statements were observed.

c) Behavioural Issues: behaviour is culturally oriented and it was for this reason that the different cultural manners of both the designers and the users during the design sessions were observed.

d) General atmosphere of the design sessions: the general style of conducting the design sessions was observed based on formal or official and informal design atmosphere.

The observation notes with the above attributes were included in the final transcript which contained all the six design sessions. As this study aimed to investigate how well some participatory design techniques work in cross-cultural situations, a combination of tools as the ones mentioned in 4.1 were integrated to help with the investigation of this study.

Data was processed and analysed in a variety of ways. The data provided in both

questionnaires was processed and analysed with Microsoft Excel. The collected data from the video and audio recordings of the design sessions with the aid of a digital camcorder and tape recorder was transcribed and analysed qualitatively. The observation notes provided support in cases where the verbal expressions were unclear in the recorded sessions. The collected data was based on the four attributes of language issues, communication issues, behavioural issues and the general atmosphere of the design sessions.

Chapter 5

Results of the Data Analysis

This chapter will report findings of the analysis described in the previous chapter. We start by discussing the quantitative analysis of the design session questionnaires through to the qualitative analysis of the transcript and the observations taken during the design sessions respectively.

5.1 A Quantitative Analysis of the Design Session Questionnaires

5.1.1 Participants' Profile

A total of six participants took part in the design sessions. The design sessions were conducted in three days with a maximum of three sessions per day. Of the six participants, 3 were female and 3 were male. Having considered the eligibility age to vote in Finland, all participants were above the age of 18 years as illustrated in Table 5.1.

Table 5.1: Age Range of Participants

Age Range	No of Participants
18-21	0
21-30	2
31-40	1
41-50	1
51-60	2
Over 60	0

5.1.2 Background Questionnaire

The background questionnaire included questions about the participant's demographic information, language use, computer experiences, Internet use and cultural exposure. The data was analysed using Microsoft Excel spreadsheets. The language data was analysed according to the average English skills with attributes of speaking, reading and writing. Participants rated their English language skills on a scale of 1 to 5 (1= poor and 5=excellent). Table 5.2 illustrates the ratings based on attributes of speaking, writing and reading. This information is also depicted in a column chart in Figure 5.1. The ratings indicate that the English skills of the participants were centered from levels 3 to levels 5, with no attributes scored for levels 2 and 1.

Although Finnish is the official language in Finland, English is studied as a foreign language in Finnish schools. English language ratings showed a good indication of appropriate communication and interaction with the participants during the design sessions.

Table 5.2: Participants' own rating of the English Language

Attributes	Level 5	Level 4	Level 3	Level 2	Level 1
Speaking	1	3	2	0	0
Writing	2	2	2	0	0
Reading	3	2	1	0	0

In general, the participants' skills with Finnish as their official language and Swedish as the second language in Finland among other languages were all analysed on a basis of 3 attributes of speaking, writing and reading. Each language was rated and calculated on an average basis, based on five levels as illustrated in Table 5.3. A graphical depiction of

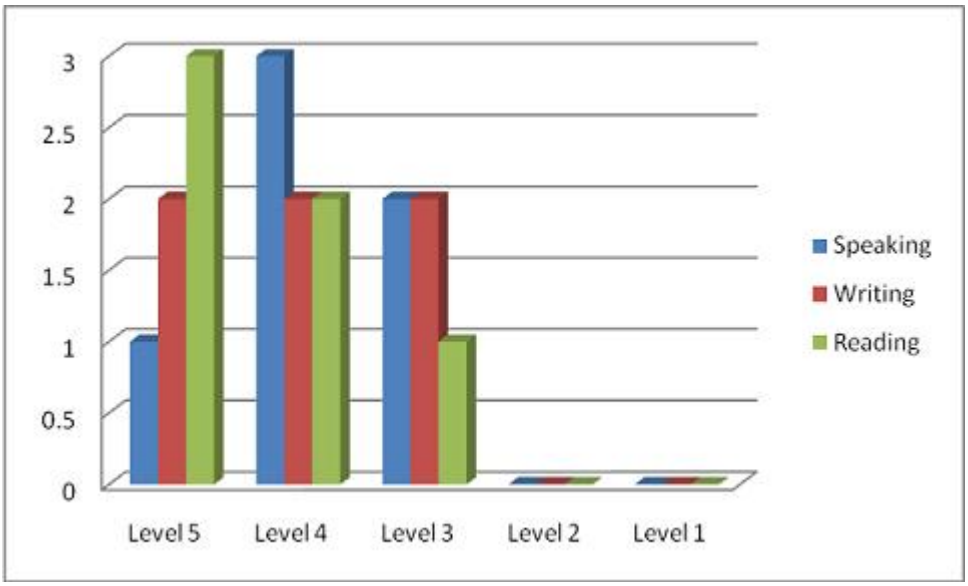

Figure 5.1: A depiction of the participant's levels of English skills

the same ratings is presented in Figure 5.2. Table 5.4 presents the average scores calculated for English, Finnish and Swedish languages. The ratings indicate an even distribution for speaking, writing and reading attributes calculated for all the 5 levels of each language respectively.

Table 5.3: General language skills rated on a scale of 1 to 5 (1= poor and 5=excellent)

Language	**Level 5**	**Level 4**	**Level 3**	**Level 2**	**Level 1**
Finnish	5	1	0	0	0
English	2	2	2	0	0
Swedish	0	1	3	1	1
Other	0	0	0	1	2

The data collection from the background questionnaire also included questions about the participants' computer experiences. It was important to collect the general computer experiences of the participants in order to understand their levels of technology know-how.

All six participants had used computers for more than 3 years of which five responded with 'I am interested in using computers and I could live without them' as the best statement that described their feelings about using computers, and only one participant was not sure about using computers and responded with 'I am not interested in using computers but can

Table 5.4: Average scores for English, Finnish and Swedish skills for all the 5 levels

Attributes	Speaking	Writing	Reading
Finnish	1	1	1
English	1	1	1
Swedish	1	1	1

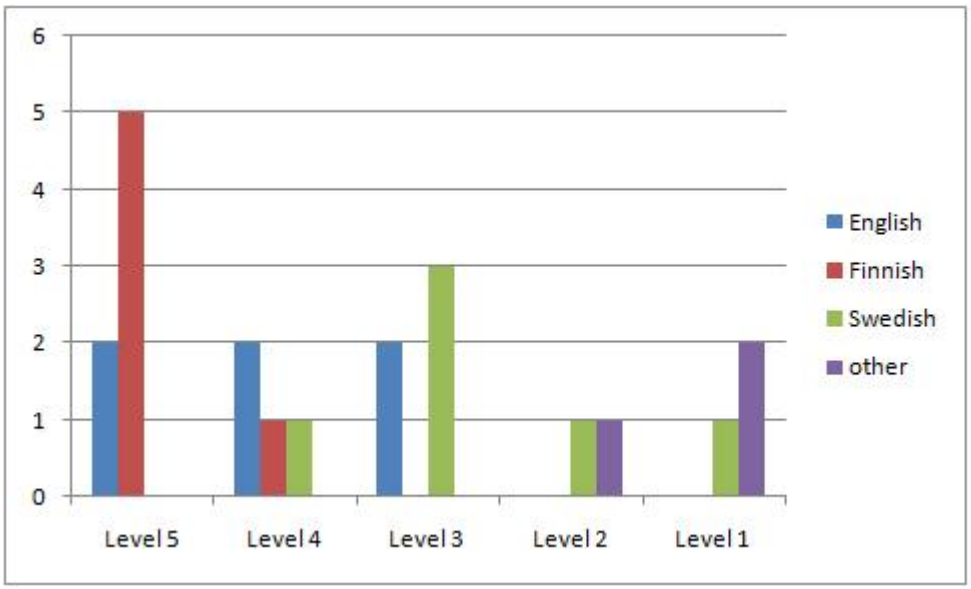

Figure 5.2: General language skills of Participants

not live without them'. The computer experiences assessed in this study indicate the high rate of computer usage among the participants. Work and study related activities were the highest frequency of the participants' use of computers on a daily basis.

In addition, the participant's educational levels were analysed. The university educational level predominated the highest level attained by the participants over the rest of the listed educational levels, which goes in line with their computer literacy and the importance of technology in education and everyday life. It was expected that the participants' knowledge and experiences with other countries and cultures could influence the way they conducted themselves during the design sessions. Two of the participants had lived outside the country for work purposes for a period of one and eleven year(s) for each participant respectively and the other four had been outside the country for holiday purposes. This attribute of cultural exposure was assessed in order to identify the participant's awareness of other cultures.

5.1.3 Post Questionnaire

The post design session questionnaire was used after each design session. This questionnaire was an aid to investigate the participants' experiences with participatory design sessions. It also provided an insight understanding of the participants' own ratings based on their performances and experiences during the design sessions. It also described the participants' familiarity with the design sessions and their overall feedback about the sessions. The participants' feedback from the questionnaire was collected and the necessary parts of their feedback to this study were assessed. Responses to the participant's familiarity, experiences and the importance of interaction design, 4 out of the 6 participants were not familiar and lacked experiences with the design sessions.

Despite this, all 4 participants found the sessions interesting, educative and important to the design process and above all, favoured the early stages of the design process by means of collaborative design with the users, which they rated as the foundation of the entire software development. The other 2 participants were familiar and had participated before in design sessions. From these 2 participants, 1 participant found the session interesting and agreed to the question of easy participation during the session but however disagreed to the question of easy identification of the necessary features for the interface design that were provided. Furthermore, the participant agreed that, there were adequate instructions provided for the design sessions but strongly recommended the instructions to be in Finnish language in order to make sure that participants would fully understand the idea behind the design sessions, which proves that the participant regarded language as an obstacle in the sessions.

In addition, the participant argued that conducting interactive design sessions with the users is not the best way to software development instead experts (designers) could design different kinds of models to the product in question and then people (users) could test all the applications and decide the best one. On the other hand, the other participant found the session important and agreed that the instructions provided were adequate for the design session.

Although the participant did not express his opinion about the use of interactive design sessions to software development, he agreed both to the question of easy participation during the session and that of easy identification of necessary features provided for the design of the e-voting interface.

When evaluating both the background and post questionnaires of the design sessions, we noticed that the participants had a problem with filling in the open ended questions which

were provided in both questionnaires. Most open ended questions were either left blank or with very short sentences of a maximum of ten words in some cases. When asked why the open-ended questions were left incomplete, one participant responded saying: "I like these...Agree/Disagree type of questions compare to the blank ones". In this case, it could be that the participants did not want to write too much in English or perhaps they felt they could not fluently express themselves in English. However, all closed ended questions were tackled.

5.2 Qualitative Analysis of the Transcript

To satisfy our research goals, we examined the breakdowns in interaction between the designer and the participants based on language issues, communication issues, and behavioural issues that were encountered throughout the whole design process. Many of the interaction breakdowns encountered throughout the design sessions were culture related.

5.2.1 Interaction Breakdown Analysis Results

1. **Language Issues**
   The language analysis was done to investigate whether language differences are attributable to the cross-cultural barriers in interaction design as mentioned in the literature. English was proposed and used as the interactive language throughout the design sessions. Conversely, the focus of the English language in this study is on the basis of initiating a fluent interactional relationship between the designer and the users in a cross-cultural design environment, rather than on the interaction of users and systems.

   As was expected, the analysis uncovered a number of language barriers encountered in all six design sessions. With the help of the background questionnaire, the participants evaluated their own language skills, each language with attributes of speaking, writing and reading. The results from the participants' own rating indicate level 5 of the English language having the highest reading attribute with three participants, and level 4 scoring the highest speaking attribute with three participants. The participants had a uniform rating for the writing attribute at all levels 3, 4 and 5 with two participants for each level respectively.

The above language scores rated by the participants during the design sessions indicate imbalances in attributes of speaking, writing and reading among the participants. The fact that English was not the native language for both the participants and the designers; it was used as the language of interaction throughout the design sessions. It was expected that difficulties in speaking, reading and writing, differences in vocabulary and pronunciation of English words and subtle difficulties in understanding the accents of individuals would be encountered. The different pronunciations of English words in line with understanding English accents were observed when transcribing the data from the video and audio recordings.

Examples of such words include: "Wolt" instead of "Vote", "Pason" instead of "Person", "Batones" instead of "Buttons", "Fast" instead of "First" and "Moi" instead of "More".

Some participants were faced with difficulties in remembering certain concepts in English. In case 1, we show an example taken from one of the design sessions illustrating a problem that a participant had in spelling the word "Interface".

Case 1: Having difficulties in spelling an English word

> Participant: "It was nice to plan the (showing the questionnaire to R1 for correct spelling) inter, how do you spell? 'Interfaces'"
>
> Designer: (laughs)"...inter"
>
> Participant: "Interface yes, Interface yes! It was nice to plan the Interface for the voting system."
>
> Some participants found it hard to answer certain questions because of the language. Case 2 illustrates a situation where a participant faced a problem with answering an open ended question from the post design questionnaire.

Case 2: Difficulties in answering questions

> Designer: "...before we finish you are required to fill the post-design session questionnaire"
>
> Participant: "Oh! These are hard questions"
>
> (referring to what the participant liked best or like least in the design sessions).
>
> Participant: "I hope you understand English is not my language..."
>
> (While filling the post test questionnaire)
>
> Designer: "Yes, That is fine"

In terms of reading, some participants requested for the design session instructions to be provided in Finnish language for them to get a clearer understanding of the sessions. An example of such a case can be found in the post questionnaire, in which one of the users recommended that the instructions for the design sessions should be provided in Finnish language to make sure that the users could fully understand the sessions.

There were times when both parties (designer and participants) could not understand each other well. For example in case 3, the participant did not clearly understand what the designer was trying to put across and kept quiet until the designer rephrased her questions.

Case 3: Miscommunication and Misinterpretation

> Designer: "Ah so to you it matters if you vote and the vote goes to someone else?"
>
> Participant: Keeps Quiet.
>
> (A sign that the participant did not understand the question, the designer had to rephrase the question and said it slowly)
>
> Designer: "If you cast a vote...yeah and it goes to someone else, how would you feel?"
>
> Participant: Looks puzzled.
>
> (participant did not understand the question again and designer rephrases it again)
>
> Designer: "If you vote and then it's given to the wrong person?"
>
> Participant: "That would be a very negative thing, but I didn't think ah thought about that".
>
> (unpleased with the statement)

2. **Communication Issues**
   Other than language issues, the participants and the designer faced communication difficulties. Some of the miscommunications were observed through details in the video tapes such as facial expressions, tone of voice, taking turns when interacting and keeping quiet when a question was posed to the participants and they did not understand.

   Facial expressions were shown in varying approaches such as; difficult questions and asking for help, laughing extensively and not understanding what the other is saying. An Example of facial expressions is illustrated in Case 4.

In Cases 5 and 6, we show situations where the designer and the participant did not take turns when interacting. Both the designer and the participant did not wait for each other to finish expressing themselves, rather they both thought they knew what the other person was going to say and easily interrupted and made their suggestions. Different cultures have different styles about turn taking.

Case 4: Facial Expressions

Designer: "We have a questionnaire before and after the design sessions".

Participant: "Ok"

Designer: "If you need any clarifications you can always ask"

Participant: "Ok"

(Quiet for some time as user is filling in questionnaire)

Participant: "I don't know the right word for...ah voting for council in the...ah Joensuu"

(Looks worried)

Designer: "Oh County!" (With a surprised face)

Participant: "Is it County election?"

(Not sure with the answer provided by the designer and opens her eyes widely)

Designer: "Yeah you can just put that one it's ok"

Case 5: Interrupting Expressions

Participant: ..."I don't know the name of the type of the system. So it was the... ah"

(Participant looking at the roof and rolling her eyes whilst thinking)

Designer: "Did you use any machine or..."

Participant: "No it was the...you get this paper and..."

Designer: "Ah and a pen?"

Participant: "Yes and you put the number..."

Designer: "Ah you can just say a manual voting system. Manual"

Participant: "Manual?"

(Seems not to understand the word manual exactly)

Designer: "Yeah. Oh yeah ok"

Case 6: Interruptions when speaking

> Designer: "Ok thank you very much uh..."
> Participant: "No problem"
> (Before the designer could finish her sentence)
> Designer: ..."Yeah for participating in this study"

The designers' maintained a low and polite tone of voices towards the participants. This was in line with the designers' cultural tradition of lowering oneself when speaking to someone for the first time and showing respect for people since some of the participants were older than the designers. In contrast, the participants maintaining their tone of voices throughout the design sessions and probably had different line of thought about the designers' behaviour towards them.

3. **Behavioural Issues**
Each participant was unique in a way, posing their own style of thinking, attitude and behaviour. The participants were not so enthusiastic about designing user interfaces for an e-voting system but were rather concerned with keeping time by asking how long the sessions would last. Contrary to our expectations, all design sessions were carried out in a short period of time. The estimated length for the sessions was 1hour and 30minutes. The participants were not so eager to elaborate their contributions further and it turned out that participants were not looking forward to the design sessions to last long, leading to a maximum time length of 45 minutes for some sessions. Case 7 illustrates such situations that occur during the sessions.

Case 7: Preference for short design sessions

> Designer: ..."We have come to the end of the design session. Thank You for making yourself available for this design sessions".
> Participant: "It's nice that it did not take long".
> Designer: Laughs..."But if you are free to make comments"

The short design sessions resulted in a minimised interaction between the designer and the participants. Although this shortened the design sessions, adequate information was collected from all six design sessions. When designing the e-voting interfaces, the participants were able to think aloud whilst designing. After the participants'

interface designs, the designer would ask the participants for further clarifications of their designs. This made it easier to observe the interaction between the designer and the participants and observe both the designer and the participant's behaviour.

Additionally, the participants' inadequacies to fully contribute to the design process can be analysed from some of their responses to the post design questionnaire. Question 3 of the post questionnaire asked the participants whether they would prefer using the e-voting system in the future. Five participants disagreed to this statement except for one who strongly agreed. Upon reading question 3 of the post questionnaire, one participant verbally responded saying:

> "Would you use e-voting systems? (Laughs)
> ...I have not used such kind of systems before, I think I can say anything here...I have not used these systems!"

The above case indicates the lack of interest in e-voting systems.

4. General atmosphere of the design sessions

   The general design atmosphere was informal but rather pleasant in the sense that both the participants and the designers were always with a smile and cracking jokes and laughing when necessary which made the designers and participants comfortable and free to ask questions unrelated to the study. We illustrate some examples in the following cases.

Case 8: General conversation unrelated to the study

Participant: "Where are you coming from?"
Designer1: "Kenya"
Participant: "and you?"
Designer2: "Zambia"
Participant: "I have this project in Southern Africa for young mothers..."
Designer2: "Which part of South Africa?"
Participant: "A small city. But it is a long trip"
Designer2: "How long is the trip?"
Participant: "It takes some hours, 23 hours to Johannesburg"
Designer1: "Ok"

Case 9: Design instructions given informally

Designer: "Ok ok...now it's time to have fun!" (smiles)
Participant: "OK!" (smiling)
Designer: "Here are the tools!" (Office stationery)
Participant: (Bursts into laughter!)
Designer: (Laughs along!)

Case 10: Forgotten Design Instructions

Designer1: "You can have fun!" (telling the participant when designing)
Designer2: "The Instructions?"
Designer1: "Huh?"
Designer2: "The instructions."
Designer1: "Oh yeah!...or sorry yeah, here the instructions"
Participant: "Ok, it's fine"
Designer1: sorry I was almost forgetting, we've already done some of the things" (Laughs)
Participant: (Laughs along).

Other observations

Despite the participants' discrepancies with the e-voting system, efforts to make sure the designer understood how their interfaces work were shown. For instance;

Case 11: Making the designer to understand

Participant: "Did you get the picture here (laughs)?"
Designer: "yeah I get the picture."

I was impressed by the fact that participants showed consideration for the senior citizens in their interface design of the envisioned e-voting system that it should allow older people to vote easily (See case 12 and 13).The commonly emphasised design attribute throughout the entire design process was the 'ease of use' due to the participants' total empathy and consideration shown to their elderly and senior citizens.

Case 12: Showing consideration for elderly people

> Participant: "If some old person is using this, it must be very easy and those buttons must be very big and that he or she can see then and hmm, I guess that's very important. Older people must vote this way."
>
> Designer: "Yes, ok"

Case 13: Applying usability skills for elderly people

> Designer: "Mouse is ok for you?"
>
> Participant: "Yes it's ok yeah"
>
> Participant: "Ok"
>
> Designer: "this is very nice interface! Yeah I like it myself!"
>
> Designer: "Yeah I can see everything here"
>
> Participant: "I know that older people, especially it may be very ah difficult to use the mouse, the hand might be shaking or doing something"
>
> Designer: laughs!
>
> Participant: yeah...for example when they want to press a button! Laughs

One participant was uncomfortable with the video and audio recordings of the design session and wanted to make it clear that the information was kept confidential (Case 14).

Case 14: Uncomfortable with design session recordings

> Designer: "...the sessions are going to be recorded both audio and the camera but We would like to assure you that the information taken from this study will be used only for the purpose of this study".

[Before participant could sign the declaration form]
Participant: "Will you destroy all the information after the research?"
(sounded worried despite being assured)
Designer: "Yes"
Participant:That is good! (Laughs and continues)

In regard to designer-participant direct interaction, it was observed that interactions were barely adequate especially during the user interface design phase. In most cases the designer did not assist the participants in their interface designs, nevertheless rendered help to the participants when asked. It was also observed that both the designer and the participants rarely maintained a direct contact when interacting. The inconsistencies in maintaining contact perhaps indicates that both the designer and the participants felt uncomfortable to face each other whilst talking or it could have been because of similarities in their cultural manners or expectations.

This shows the influence culture has on human behaviour, even to the way people respond to certain questions or conversations. It is claimed in [27] that the concept of 'face' is influential to human behaviour as everybody tends to be aware of how other people think of them as they engage in conversations.

5.3 Lessons Learned from the Design Sessions Analysis

The fact that human behaviour is culturally constrained, it was expected that the participants' life experiences could influence their design contributions and that their e-voting interfaces could be designed uniformly. However, an individual's behaviour and values are not entirely determined by their cultural backgrounds as it was the case with the participants in this study. It was not apparent to conclude that behaviour predominate the cultural factors.

In regard to the questionnaires, completion of answers to the open ended questions was a challenge for the participants despite their English skills of reading and writing.

Regarding the participants' design preferences of the interface features; almost all the participants preferred a few options on their interface contents with an exception of one

participant who preferred a variety of options. In all, the participants were conversant with usability attributes as they liked their interfaces to be simple and easy to follow.

Drawing back to the study by Sanchez Burks [41] who found that Northern European culture is a typical task-focus culture while Eastern Asian culture and Indian culture are socio-emotional relational oriented cultures, implying that users in the Northern European culture (including Finland) may not be so much influenced or intimidated by the fact that the designers are from another country since they pay more attention on the tasks than on the designers was not the complete case during this study. Although this may be true for Sanchez Burks' findings, despite being task-oriented the participants in this study were still affected by the fact that the designers belonged to two different cultures. The participants were enthusiastic to find out where the designers came from and asked the designers personal questions.

As design methods originated from the western world including Finland, the participants in this study had no difficulties in implementing the design techniques which included thinking aloud and designing using PICTIVE. Irrespective of the differences in cultural backgrounds of the design team during the design process, interaction between the designer and the participants would have probably been the same had the designers being Finnish.

The first question most participants asked was how long the design session would last. This resulted in less design discussions between the participants and the designer. Perhaps this was due to the participants' less concern of e-voting in general. On the other hand, the designer's behaviour described a socio-emotional cultural approach which evoked a feeling of discomfort by the designer to freely communicate with the participants despite being fluent in English. Moreover, the designer and the participants avoided certain degrees of losing face during interaction such as shyness and uneasiness when speaking as this perhaps is a common practice in a culture that does not maintain direct eye contact when interacting with a person. In the long run, the designer and the participants managed to overcome their uneasiness towards each other by extensive laughing during interaction and this also contributed to the informal atmosphere of the design sessions.

Throughout the design sessions, several cultural related activities were observed and these are discussed in the next section.

5.4 Additional Observations

This study experienced a number of limitations in particular; both the designer and the participants could not express themselves comfortably which left important design aspects unsaid making language implications the most experienced design breakdown. This hindered the pace at which the participants filled in the questionnaires as they translated most of the English sentences to Finnish language in order for them to fully understand the questions.

Each of the participants' accuracy in communication was observed and it was found that all the participants used a slow tone in speech which took more time to express their ideas. In spite of this, the design sessions were still conducted in less than an hour. In some cases, the designer did not pay much attention to the explanations by the participants. However, this did not stop the participants from deliberating their design views and ideas. Given this kind of situation in the Zambian context, the participants would have shown their offensive emotions which perhaps could have led to personal issues.

In addition, the pronunciation of certain words by the designer and the participants were unclear and difficult to understand. However, this can be attributed to cultural differences in language and thus, made me to gain a better insight into the Finnish and Kenyan cultures in terms of language as it proved to remain the most sensitive cultural barrier encountered during the design sessions of this study.

Chapter 6

Discussions of the Findings

This study was conducted in Finland, which is one of the Scandinavian countries were participatory design originated from. Despite the importance of integrating culture into the design processes, there is still insufficient research performed about it and thus remains a challenge in HCI.

The fact that HCI design methods were developed in the western culture and do not consider the specific challenges of cross-cultural design, conducting participatory design studies among other design methods within the western context does not fully produce the problems and challenges encountered when design methods are perhaps integrated in non-western cultures. This is so, because the users in western cultures have adequate knowledge (As it was the case with Finnish users of this study) about the design methods as these methods were developed and are still utilised today in the western culture.

Therefore, to investigate how well participatory design works across cultures, investigations of this sought need to be conducted in non-western environments where the users are less conversant with the design process as this was not the case with the Finnish participants in this study. Having designers from two different cultures (Zambia and Kenya) did not stop the Finnish participants from expressing themselves, identifying design attributes and able to think aloud on their own without being instructed or reminded to do so. In respect to this, we can rigorously see how effective these western design methods and techniques are in the Finnish context.

For the purposes of this study and future studies, I would recommend a "neutral space" which is non-western (for instance Zambia or Kenya) in order to gain a deep-rooted insight into the design breakdowns experienced when participatory design is integrated outside the western culture.

It is inevitably true that the impact of culture is strong and diverse in the design methods of HCI due to the differences in cultures across users. I would therefore recommend designers especially of participatory design to embed design frameworks of cultural related factors into their proposed techniques as guidelines to significantly address tangible design ideas and overcome cultural hurdles in design which in turn would benefit the entire software development. In addition, before conducting design sessions in a cross-culture setting, designers need to gather more knowledge about their target users including user behaviour, language skills, user preferences, and technology awareness which should be in line with the target design. These cultural attributes would help the designers to understand their target users as well as to formulate descriptive frameworks according to the specific cultures in which the design artefact will be designed.

6.1 Satisfaction with Thesis Goals

Three main research goals were presented in respect to the investigations and documentation of this study: (1) to investigate how well participatory design works in a cross-cultural design context involving Finnish users and designers from Kenya and Zambia, (2) to investigate how the cross-cultural design situation affects the interaction and communication between the users and the designers, and (3) to find solutions to the cultural effects encountered in cross-cultural context.

In the following section, we address our fulfillment to these goals.

1. **Investigating the works of participatory design in a cross-cultural design**

   Our first research goal was to identify what kind of problems may occur when participatory design is integrated into a cross-cultural design process. Several design breakdowns were experienced as each participant portrayed a unique way and style of thinking, attitude and behaviour towards the design of their e-voting interfaces and during the design process.

It was found that participants were not as creative with their interface designs as it was anticipated before the sessions were carried out. The reason perhaps, could be that the participants were not so inquisitive to provide detailed views about the design due to their lack of interest in e-voting despite their good computer skills and knowledge. Their main concern was keeping time and the anticipated design time frame was barely fulfilled. Besides all these drawbacks, the participants were knowledgeable about and able to use the proposed techniques such as the think aloud method which was used when designing their interfaces and identifying design attributes for their interfaces including error free, satisfactory and ease of use.

Literature reviewed [41] reports that North European countries (Finland inclusive) are typical task-oriented when performing a design task, and that cultural issues are hardly incorporated when conducting research in western countries. In relation to task-orientation, the participants paid more attention to designing their user interfaces in the shortest period of time. In relation to cultural differences, the participants were less influenced by the fact that two designers from two different countries (Kenya and Zambia) were carrying out the sessions despite their inquisitiveness to ask the designers personal questions. In addition, the cross-culture design sessions did not hinder the progress level by which the participants articulated their design abilities; and the fact that the design sessions were conducted in the Finnish environment which can be defined as 'western', the scope of the user participation in the overall design process was equal with the designers because the participants were familiar with the design techniques despite their little experiences with the design sessions as analysed in Chapter 4. However, several cultural related breakdowns were observed throughout the entire design process.

2. **Cross-cultural design affects on Interaction and Communication between the designers and the users**

   Even though culture is perceived an important part in today's design, its importance and integration into HCI design methods is still low. There is still insufficient research in identifying the role in which culture plays in the design methods. In general, the phenomenon of culture is difficult to pinpoint, thus has many definitions. Instead of finding a general definition for culture, many of the researchers reviewed in literature have embraced the concept of culture differently by finding a definition of it that defines their research interests.

   In this study, we embrace the concept of culture by identifying its role and values in interaction and communication between the designer and the participants throughout the design sessions.

Cultural related communication, behaviour and expectation breakdowns predominated in the design sessions of this study. In relation to communication, English was the language of communication throughout the design process and different pronunciations and accents were identified which were misleading and confusing when observing and transcribing the data. Sometimes the interactions between the designer and the participants during the design sessions were unclear due to the different styles of communication. The different communication and interaction styles could also be related to both the participants and the designer's low tones of voices.

In relation to behaviour, there were two different culture manners which were exposed during conversations between the designer and the participants. These were observed and identified as part of the investigations. When interacting the designer would easily interrupt and speak while the participant is still talking; as opposed to the participants who waited for their turn to speak. With regards to interface design, although the sample of participants was drawn from a single culture, the style of the participants' design preferences in terms of arranging the touch screen interface features was different and unique from each other. From this aspect, we cannot fully conclude that people from the same culture carry a uniform pattern of thinking.

Despite the cultural differences encountered in the design sessions, the participants expressed their ideas to the best of their abilities as they openly reviewed their communication levels in the demographic information which was provided in the background questionnaire. In addition, during the design sessions both the participants and the designers covered their uneasiness towards each other by extensive laughing and noding their heads when interacting.

The general design atmosphere was informal but rather pleasant in the sense that both the participants and the designers were always with a smile and cracking jokes and laughing where necessary which made the designers and participants comfortable with the design session style in general. Thus, both the designers and the participants worked in a collaborative manner. Provided that Zambian participants were involved in the same design sessions, the general design atmosphere could have probably been the same as Zambians laugh as a way of covering their discomforts.

In future work, in order to highlight the differences in cross-cultural design and to gain an insight into the breakdowns in the design process, it would be appropriate to engage a combination of cultures of either western or non western origins or both. It follows that Finland is a western country as PD was developed in the Scandinavian context. Thus, having conducted the design sessions with the Finnish users in their territory, turns out trivial to conclude that cross-cultural design breakdowns outlined in the reviewed literature were fully encountered in this study.

3. **Finding solutions to the cultural effects encountered in a cross-culture design context**

   Most of the design breakdowns identified throughout this study were cultural related, implying that the goals of PD are not cross-cultural framed to consider the influences of cultures. To eliminate the cultural related discrepancies experienced during the design process of this study, it was important to focus on observing the interaction between the designer and the participants, thus identifying cultural influences on both the designer and the participations rather than observing cultural influences on design alone. This was accomplished by engaging target users and designers from three different cultures as part of the design team.

   Active user involvement in the design process frames and strengthens cross-cultural related research. User activeness in design can be stimulated by the many techniques of PD which aim to gain user experiences, needs and ideas about the design in order to frame the quality of the design. As a result, user acceptance of software application designs is promoted.

   Participatory design can **only** work well outside the western world if culture is integrated into its techniques. It was proposed in the reviewed literature that frameworks containing a variety of user-base and expert-based interactive techniques could be embodied into the participatory design techniques to support and act as driving instruments in cross-cultural design as opposed to cultural dimensions which have been identified as too abstract to guide the design process. Thus, this enlightens the challenges encountered in cross-cultural design, and increases the awareness of the effectiveness, values and benefits of participatory design techniques.

6.2 Related Findings

In this study, observations of the interaction between the designer and the users were drawn in relation to cross-cultural design. In respect to individual and cultural differences of the designer and the participants, the observations concentrated on language issues, communication issues, behavioural issues and the general atmosphere of the design sessions. The observations were utilised as supporting tools in the investigations of this study which aimed to answer the three research questions.

This study aimed to investigate how well some of the PD techniques can work in a cross-cultural design context. Perhaps the most intriguing finding from the analysis of this

study is fact that the participants understood and had the overall knowledge and use of the think aloud technique which was not a problem for all the participants. The participants emphasized simplicity of their e-voting interface features in order to suit all kinds of human beings including the senior citizens who were of critical concern to the participants. However, the participants did not show their own creativity with the interface design of the e-voting system. Some participants referred to their current Finnish e-voting system as an example or guideline, and others familiarised their e-voting interfaces to what they had seen either on the internet or in the media.

Although the participants were exposed to e-voting, they lacked interest in e-voting which predominate their inadequacies to fully contribute to the interface design of the envisioned e-voting system. Conversely, the participants lacked enthusiasm in their e-voting interface designs. In order to have motivated the participants to contribute fully to the design sessions, perhaps the designing of the interfaces could have been for the goodwill of the participants. Implying that, the participants could have designed different types of interfaces upon their preferences. In respect to this, the influence of culture on design could have probably been significantly exposed, thus revealing more cultural related attributes based on the different interface designs and providing various interface choices to guide the design process.

People view aspects of life differently and this varies from culture to culture. As this study was cross-cultural oriented, matters related to misunderstanding of certain concepts, difficulties in reading and writing and confidence in both design style and speech were inevitably observed in the design sessions. With regards to design, the concepts of knowledge that users articulate in the design process vary according to their willingness and ability to contribute which follows their cultural values. In addition, culture has a strong influence on the Western design methods and becomes a challenge for designers to integrate these methods to non-western cultures. Western design methods were developed at a time when cross-cultural challenges in design were nonexistent.

From this perspective, the purpose of the study was to find out the type of cultural problems that were encountered during the design sessions and estimate the degree in which participatory design goals can achieve their purposes in a cross-cultural design context. The estimations of the goals of PD were calculated and measured in the data analysis phase of this study and the results from the analysis are presented in our findings (See Chapter 5).

Chapter 7

Conclusions

As part of the study, participatory design sessions were carried out in which designers from Kenya and Zambia worked with users from Finland. This study aimed to investigate the works of participatory design in a cross-cultural design context. This was accomplished by rigor observations and identifications of cultural related design breakdowns. The observations and design breakdowns were drawn from the design sessions and from the transcript which contained the video and audio recordings of the entire design process.

The significance of the investigation of this study comprehended participatory design, a user-centered design method as an alternative solution to cross-cultural design situations and experiences. In addition, the concept of culture is withdrawn from both design and evaluation methods and is often perceived a challenge in software development. A culture is defined by a set of features that become intrigued by an iterative discovery of the features in that culture. The differences in culture affect the way in which people conduct themselves.

In order to consider culture an opportunity in design, it was important for this study to incorporate culture into the design techniques used and the design sessions conducted respectively. By making users co-designers rather than informants in design, participatory design promotes interaction design between designers and users and allowes designers to learn about and gain an insight into the consequences of deep-rooted cultural differences in personal interactions of target users.

The reviewed literature in this study has evidently shown that most evaluation meth-

ods which are used in cross-cultural related studies are proofed to be problematic and less effective to the intended research purposes. Even so, studies of this sort are continuing to contribute knowledge awareness of the cultural impediments faced in evaluation methods and not much is done to find alternative solutions to such experiences. Therefore, this study has demonstrated further evidence by investigating how design methods rather than evaluation methods could work in cross-cultural situations and provided solutions to the problems of cross-cultural design that incorporating culture in the design and evaluation methods is necessary to eradicate the cultural drawbacks in conducting research and that western design methods need to be modified in order for them to work well in non-western cultures. In the long run, ensures success in the design process of product development.

The results obtained in this study clearly show a greater understanding of cultural differences despite a replication of certain cultural related design breakdowns that are also faced in evaluation methods. This implies that culture is an important concept in the design process. Although it remains complex to identify cultural attitudes, values, meanings and expectations that are deeeply-rooted in people's actions, in this study we directly observed the reasons for such actions and the results reported indicate that environmental conditions and individual behaviour might influence such cultural factors.

Therefore, participatory design and its techniques seemed appropriate in this study with the Finnish users as the study was conducted in the users' local cultural environment which is also western where participatory design originated from. However, the relevance of both the design methods and the findings of this study still need to be tested in evironmental conditions of non-western cultures in order to consider the degree in which culture influences cross-cultural design when embedded in different user groups.

To this extend, obstacles experienced in collaborative design can be viewed as opportunity to deepen shared understanding of products between the designers and the users. Thus, making cross-cultural design useful to a certain degree in which the PD techniques can prove reliable and influential when adopted in the design process.

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Appendix A

Background Questionnaire

Appendix **Usability Study: Participants' Background Questionnaire**

Please help us understand your background and experience by answering the following questions. Mark the appropriate answer(s) by **X**.You should pick one choice unless otherwise stated.

N.B. Read through all options before making your selection.

SECTION 1: GENERAL INFORMATION

1. Age (Years)

   [ ] 18-21 [ ] 21-30 [ ] 31-40

   [ ] 41-50 [ ] 51-60 [ ] Over 60

2. Sex

   [ ] Male [ ] Female

3. Please specify what describes you best

   [ ] I have not been out of the country

   [ ] I have been on holiday outside the country

[ ] I am a Finn but have lived (for studies/work/other purpose) outside the country. Please state where.....and for how long.....

4. Please indicate what describes you best

   [ ] Working

   [ ] Studying

   [ ] Retired

   [ ] Other (Please specify) .....

5. Highest educational level attained:

   [ ] University

   [ ] Vocational Training

   [ ] High school

   [ ] Other (Please specify)

6. What faculty, department or organizational unit do you work for/study in?

   .....

On the scale of 1 to 5 how would rate your skills in the following languages **(1=poor and 5=excellent)**

English

Speaking [ ] Reading [ ] Writing [ ]

Finnish

Speaking [ ] Reading [ ] Writing [ ]

Swedish

Speaking [ ] Reading [ ] Writing [ ]

Other (please specify)

.....

Speaking [ ] Reading [ ] Writing [ ]

SECTION 2: COMPUTER EXPERIENCE

	Daily	Several Times in a Week	Weekly	Monthly	Rarely/Never
Work/Study					
Internet Surfing					
Email					
E-commerce/Banking					
Other (Specify)					

7. Which statement best describes how you feel about using computers?

   [ ] I am not interested in using computers

   [ ] I am interested in using computers and I could live without them

   [ ] I cannot live without using a computer

   [ ] I am not sure about using a computer

8. If you have used computers before

   a. How many years have been using computers?

   [ ] I have not used computers

   [ ] Less than 1 year

   [ ] 1-3 years

   [ ] More than 3 years

   b. How many hours per week would you usually use the computers

   [ ] Less than hour

   [ ] 1-2 hours

   [ ] 6-15 hours

   [ ] 15-30 hours

   [ ] More than 30 hours

   c. Please indicate the frequency of your use of the computer for the following kinds of activity (mark all that apply)

SECTION 3: FAMILIARITY WITH THE E-VOTING SYSTEM

9. Do you feel that voting is important?

   [ ] Yes

   [ ] No

Please give a brief explanation.

.....

.....

.....

10. Have you voted before in any election?

[ ] Yes

[ ] No

If **NO**, given the possibility to vote using an e-voting application. Would you do it? (Please explain)

.....

.....

.....

If YES, please answer (a) and (b) below

a. How many times have you voted?

[ ] Once

[ ] Twice

[ ] 3-4 times

[ ] More than 4 times

b. What kind of system did you use (Please indicate when and where) in the following table

Type of election	Type of system used	When(Year)	Where(Location)

Please describe in your own words your experiences

.....

.....

.....

.....

11. How do you feel about electronic voting in general (**threats/issues**) and would you trust an e-voting system?

    .....

    .....

    .....

    .....

12. What kind of things would make you **NOT** trust an e-voting system?

    .....

    .....

    .....

    .....

-Thank You-

Appendix B

Post Questionnaire

Appendix

Post-Design session Questionnaire

Please help us understand your participatory experience with the design session by answering the following questions. Mark the appropriate answer with an **X**.

N.B. Read through all options before making your selection

1. Was this the first time you participated in a design session?

Yes	
No	

2. How did you find the session?

Educative	
Interesting	
Important in Design	
Not Educative	
Boring None of the above	

How much do you agree/disagree with the following statements?

3. Would you prefer using the e-voting system in future?

Strongly Agree	
Agree	
Neither Agree or Disagree	
Disagree	
Strongly Disagree	

4. It was easy for me to participate in the design session

Strongly Agree	
Agree	
Neither Agree or Disagree	
Disagree	
Strongly Disagree	

5. It was easy for me to identify the features necessary for the e-voting system

Strongly Agree	
Agree	
Neither Agree or Disagree	
Disagree	
Strongly Disagree	

6. There were adequate instructions and help provided during the session

Strongly Agree	
Agree	
Neither Agree or Disagree	
Disagree	
Strongly Disagree	

7. What did you like best about the whole design session?

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8. What did you like least about the design session?

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9. Do you feel the use of interactive design session is a good way of developing an e-voting system?

Yes	
No	

10. If your answer to question 9 is **NO**, what would you prefer instead? Please specify

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11. Please add any comments and/or recommendations for the improvements of the session.

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-Thank You-