Study on the Human Computer Interface through the Lens of Co-relational and Experimental Method

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Abstract— **The present study looks at the physical factors related to computer and their relations with retention of time, physical discomfort, rate of user errors and satisfaction of human. The present study also relates to work surface area, chair adjustability, change in temperature, size of monitor and illumination in order to find, how these factors affect human computer interaction. The study adopts experimental method where pre and post test were conducted. The population for the study comprises of all the students studying computer sciences at postgraduate level. The sample size n=200 students users of computer within age group 20 to 25 years were selected through multi-stage sampling, across Sindh from 05 universities and 05 computer institutes (n= 20 each). Conducive environment was provided to all the participants during pre and post - test .Experimenters were asked to mark their feelings on given check list . Consent letter was signed by all the respondents. The results reveal that human errors and time factor in relation to subjective satisfaction play crucial role in human computer interaction. Work surface area affect attention span of the male users, whereas changing surface area develops physical discomfort for female. Change in room temperature cause physical discomfort for males while females have shown difference in attention span and increase rate of error. Fixed seat adjustment showed effect on male attention span, with increase rate of errors, whereas female show great physical discomfort with change in seating adjustment. Environmental factors affect male more than female. Suggestions are incorporated at the end of the paper.**

Keywords- *Technology, Human Computer Interface*

I. INTRODUCTION

The interaction of human with technology is not a new phenomenon. It has always been used to improve the efficiency of work. This interaction is common in all the fields, including management, science, education (Carey et al., 2004). As the use of computers in society accelerates, the need to design an effective human-computer interaction (HCI) becomes more important.

Human computer interaction is an interactive approach, where efficiency of work is measured, based on social and behavioral human interaction. It emerged as a design-oriented field of research, directed at large towards innovation, design, and construction of new kinds of information and interaction technology, but this field of research is almost neglected in Pakistan . Human computer interface is the latest system, a very complex one because of the breadth of user population and its application (Alan Dix, 2009) which study interaction of human with computer technology (Olson & Olson, 2003). It combines the field of social sciences with computer technology. Researchers are analyzing its relation to improve process of technology and to apply new technology.

Human are the centre characters in human computer interaction. As users, they have different characteristics as

their limited sensory receptive system, storage and processing of information as well as their physical and emotional states. A designer of Interactive system has to consider all those human factors to make their product useful, usable and used. This interactive system cannot be only based on usability analysis but also needs to build analytical and implementation methods. Every design of technology needs thoughtful planning, sensitivity to users' needs and comfort.

Several researches were conducted in the past to find how working system relates to the efficacy of work. Prior research in HCI has investigated human factors and computer systems in isolation without considering the interrelationships between the two. This study attempts to bridge the two fields of studies by looking into the various factors that affect human performance in a environment. Referring to Bailey (1982) designed study categorizes the research variables into three main categories, i.e., human users, hardware factors, and the contexts in which they interact. It looks into the three factors in turn and analyzes how they affect human performance interactively. Specifically vision, hearing, and touch are included as human factors, while visual display unit, keyboard as hardware factors. For environmental factors, physical contexts such as noise, lighting, and work space are considered as well as social contexts. These physical factors are highly co-related to the working performance. Environment has certain objects, which can distract working condition and impact the overall performance, Nahl (2010) suggested that technology should be aligned in such a pattern that it fit to the person.

Very limited researches have been conducted on this area in Pakistan which intersects the interest of researcher to dive into its depth. This research will highlight this crucial area through experimentation.

I.RESEARCH DESIGN

The research adopts experimental research method. Pre- test condition was provided for two weeks (10 days), where normal working circumstances were provided and time of 1 hour 30 minutes was allocated. Performa was given to mark five tested area during pre testing. The present study looks at the physical factors and their relations with retention of time, attention span, physical discomfort, rate of user errors and satisfaction. The present study also relates to work surface area, chair adjustability, change in temperature, size of monitor and illumination. Remaining factors were consistent teacher, teaching and room. After pre-test phase, each area was changed for one week, where respondents

later filled the same Performa for each situation. Both were compared to find the effect of physical changes on human behavior.

II. DATA ANALYSIS
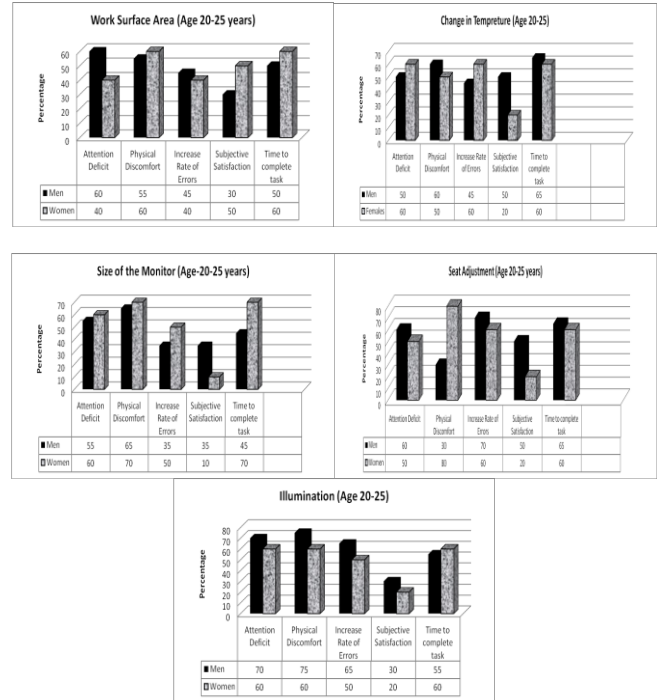
Figures: Showing all five dimensional coherence

Work surface area effect on attention span of the users as male are more affected than females. Results also indicate that changing in surface area develops physical discomfort among female subjects as compare to male subjects. Although the difference was marginal, however, physical area alteration also effect on working performance. Errors increase with the change of surface areas and the time to complete the work.

Change in room temperature during use of computer effect on male with physical discomfort and change in complete targeting work while females have shown difference in attention span and increase rate of error.

Change in size of monitor effect more on females' attention, time to complete their work with increase in physical discomfort with slight change in attention.

Providing facility of fixed seat adjustment, in place of adjustable seating showed effect on male's attention span, with increase of errors in work. While female show great

physical discomfort with the change in seating adjustment and showed less subjective satisfaction with condition.

Environmental factors like change in illumination effect on visibility factors which increase physical discomfort, state of errors, time to complete task as well as on attention of male more than on female, while females shows more effect on attention as well as physical discomfort. It is also analyzed how gender affect human computer action with change of these factors.

DISCUSSION

Human-Computer Interaction (HCI) deals with the study of human relation with information and technology in organizational or managerial setup (Zhang et al. 2002; Banker et al. 2004).

This phenomenon is not only common for educational purpose but for every walk of life including business, either means of transportation, construction industry, media industry. Communication and every day business like utility bills ,dealing with your account ,contacting your family on Skype ,getting information's related to all new inventions and development ,danger alerts about tsunami etc. A house wife depends on computer for communicating with her family ,A doctor ,an architect all using computer for their needs ,so, it is becoming important to discuss investigate and analyze how interaction between human and computer can be made effective, fast and hazel free .Areas like homeland defense crime fighting medical record management terrorist attack investigations accurate diagnoses of diseases creative work of arts can be more effective and accurate by human computer interaction .

Diversity of human abilities, motivation, work style, educational or social background, their personality intellectual or physical features like left handedness, knowing about these factors is important for manufactures as well as for learners (Carrol, 2004) .Education and system of education highly impact by facilities learners receive in their educational institutes and at impact on their performance output

Since Information technology has taken greater space in this fast place world, the importance of human computer interface has become central to every walk of lives. It is highly used in HCI field. The components of HCI can be analyzed through the graphical representation.

The two crucial components of human and its relation to technology have certain characteristics. It can be categorized on the basis of demography, physical skills,

cognitive skills and affective aspects, which are helpful and interrelates human with technology (Zhang et al., 2013).
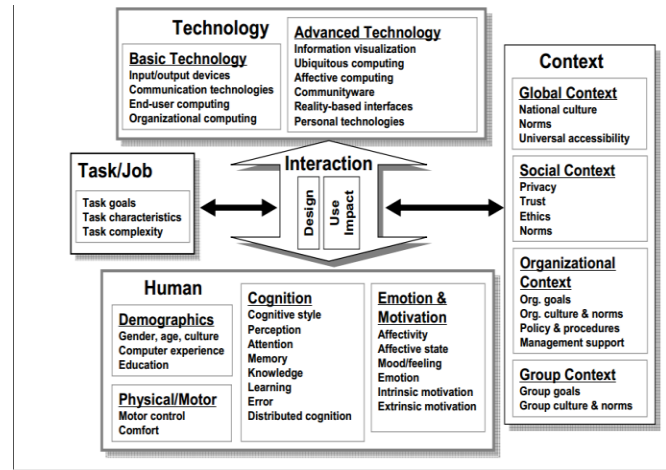
(Retrieved from Zhang, 2006)

Human are the central characters in HCL(human computer interaction), as user they have limited capacity of sensory receptive system they can store and process information through their brain but as living being their physical and emotional state directly or indirectly can effect on HCI such as fear, frustration and failure when they encounter extra complex menus, incomprehensive terminology or chaotic navigation paths .A designer of interaction system has to consider all human related factors to make their product useful for maximum users.HCI is the latest man-machine system and a very complex one because of the breadth of user population and its fields of application (Dix et al., 2003). Human characteristics, personality, cognitive skills like memory, verbal ability, spatial ability their age, attitude toward others and experience of using technology all can effect on HCI(Rosson & Carrol, 2002; Facer, 2011; James, 2011). Human –Computer interaction, such as how effective or efficiently an individual can use mobile application.

Designing of computer technology needs thoughtful planning, sensitivity to user needs and analyses of their interaction process, devotion to requirement analyses and diligent testing generate positive feelings of competence, clarity, mastery and success for the user.

Human Computer Interaction is radically changing in the area of electronic devices, they have broken the boundary of plastic and glass .We are living in a society where every part of our life is linked with electronic devices it includes any technology ranging from desk top to large scale computer by interaction we means any communication between computer and its user.

HCI is a multidisciplinary area which is related to the complicated nature of an individual's interaction with a computer and his task, his wants to perform with the system, his understanding of the design, machines, tools and software packages. These disciplines are human-psychology, sociology, computer science. Experts says that there are three thing that must be true for being a successful product ,its usefulness easy working system and error free working (Selwyn, 2013)

Users must commonly cope with fear failure and frustration when they encounter extra complex menus in comprehensive terminologies or interact with difficult navigation parts.

The factors which commonly are considered as impact builders for computer designing are Work surface: width , depth; Display support height; Under work surface for legs; adjustability of height and angels of chair; seating depth and angle ; back rest; arm rest and foot rest; elimination of room/space; glare; air/ room temperature; movements within the room; humidity; noise environment; no. of persons in a room; presence of genders positioning; room layout.

Variation in physical activities and physical characteristics at workplace and diversity of human factors is a clear challenge for designer as well as for educators . Data about human dimension comes from social and scientific research All the ages and nationalities provide guideline for manufacturers and designers.

Human factors that need to be considered: increased productivity and effectiveness, injury reduction, user satisfaction, convenience, error prevention and reduction.

Providing positive environment with comfortable computer systems can increase human capabilities. These factors should be kept in mind while designing working environment especially for the learners.

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