

DETERMINATION OF PERCEPTIONS OF THE TEACHER CANDIDATES STUDYING IN THE COMPUTER AND INSTRUCTIONAL TECHNOLOGY DEPARTMENT TOWARDS HUMAN-COMPUTER INTERACTION AND RELATED BASIC CONCEPTS

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ABSTRACT

HCI is a field which has an increasing popularity by virtue of the spread of the computers and internet and gradually contributes to the production of the user-friendlier software and hardware with the contribution of the scientists from different disciplines. Teacher candidates studying at the computer and instructional technologies department are individuals to take office in the field of instructional programs and software development. Acquaintance of teacher candidates studying at the computer and instructional technologies department with the HCI and its findings will enable such candidates to design usable websites and the achievement of message and interface design conforming to the rules. This research was conducted by using the phenomenological research method in order to determine the descriptions and perceptions of teacher candidates studying at the computer and instructional technologies department in respect of the human-computer interaction and respective basic concepts. Data gathered from the candidates by means of an open-ended question form were analyzed using descriptive analysis. According to the research results, it was seen that teacher candidates described the human-computer interaction and related basic concepts approximately close to the truth.

KEYWORDS: Human-computer interaction, teacher candidate, CEIT, perception

INTRODUCTION

Contemporary society is increasingly reliant on interactive computer systems (Curzon, Ruksenas & Blandford; 2007). Computer systems is a comprehensive concept involving bank ATMs, mobile phones, electronic appliances such as television and fridges used in our houses. Individuals send some commands to the electronic appliances via buttons thereon, and the appliances perform works and operations pre-designated according to such commands received. As a result of the rapid development of the information and communication technology, the use of computers in education has become inevitable (Serin,2011). Electronic appliances used in our houses are microcomputer applications and limited with the operations and tasks they can achieve. Computer systems we use are enabled to perform different operations and tasks by the help of programs installed. When observing communication between humans, we can see that a lot of information is only exchanged implicitly (Schmidt; 2000). People either transmit the messages explicitly or give some implicit messages in the communications set between them. However, when the subject is related with the human computer interaction (HCI); individuals should give clear and certain messages. Current computer technology interaction is explicit - the user tells the computer in a certain level of abstraction what s/he expects the computer to do (Schmidt; 2000). If missing or indefinite data is sent, functions and procedures will not work or will work undetermined, for computer programs run through functions and procedures.

HCI is a specialization of the more general field of ergonomics because HCI deals with a particular set of tools, computers (Diaper & Sanger; 2006). HCI and ergonomics are sciences which are mostly confused and compared. Whereas ergonomics aims practical production of appropriate tools and technologies for the human health, HCI studies more functional designs of computer software. Hewett et al.(1992) defined HCI as “a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them” (Zhang & Li; 2004). As understood from the definition, HCI is concerned with the designs and implementations as well as the evaluation of the interface designed. HCI is not only a field which is required to be engaged by the scientists producing and evaluating computer hardware and software. HCI is a major interdisciplinary conjunction of several sciences and technologies (Shackel; 2009). The interdisciplinary area of human-computer interaction emerged as a partnership among researchers from computer science, business administration, psychology, communication, educational technology, and librarianship (Fidel; 1987). For being an effective and productive utilization of the computer software and hardware by humans, HCI research field is affected by studies of the scientists dealing with the instructional technology and computer science, scientists analyzing the differences caused by the designs on humans in the field of physiology and the scientists engaging in the production of accurate messages and accuracy of the messages perceived by the individuals in the field of communication. Usable websites enable the user to get the most efficiency from the websites by increasing the level of userwebsite interaction (İşman & İşbulan,2010). It is essential to evaluate the computer software free from person targeted, the development

process, computer system he used and context in which it is used. The HCI field defines four main dimensions, which take part in interactions: CIS characteristics, user characteristics, development process, and context of use (Despont-Gros, Mueller & Lovis; 2005). HCI conducts evaluations take the four main fields designated and differences in these fields into consideration while analyzing software and hardware. Human-Computer-Interaction (HCI) is the area where usability is planted (Akıllı, 2005).

Computers have been called universal machines, machines that can execute an indefinite amount of different functions, and that can therefore function as very different tools for us at different times (Brey; 2005). While computer is a must for the occupation of some individuals living in today's community, it is an entertainment tool for some of them. Today, business men perform most of their daily works using computer and Internet and students realize their educational lives over internet and computer. The way people interact with devices is vital for their success (Schmidt; 2000). The interaction process of humans with computers by giving commands, clicking icons, pushing buttons or using appropriate input units is important for the tools to fulfill their tasks and thereby for humans to benefit from such interaction process. For example, a computer user who does not know exactly the functions of the icons on the screen of word processor programs may not save the file even if he writes the text as desired. Computer users have contact with an information system only with the help of an interface that defines information flow rules between a human and a machine (Michalski, Grobelny & Karwowski; 2006). Today's contemporary computer operating systems and utility programs base all their functions and commands on the principle of clicking icons and visuals. Meanwhile, in contemporary IT systems, users most frequently exchange information with the application by pointing various graphical elements and by confirming (usually by clicking) the execution of a given activity (Michalski, Grobelny & Karwowski; 2006). The advantage of graphical user interfaces over the older symbol-based interfaces (such as DOS and UNIX) is that they rely on our sensorimotor abilities to orient ourselves in space and to recognize and manipulate objects (Brey; 2005). In command-based operating systems, humans needed to write some commands and all parameters thereof in a complete manner in order to communicate with computers. In graphics-based operating systems humans communicate with computers by the help of the scripts which are installed with certain functions and tasks and transformed into icons and buttons. HCI engages in design of icons and buttons, design of content and design of message.

The real beginnings of HCI as an emerging discipline are more like 25 years ago, with the founding of early conferences: Interact, CHI, British HCI and Vienna HCI (Dix, 2010). Studies performed before that date are generally evaluated within the field of ergonomics and they generally focus on the hardware and environment units rather than the screen design. HCI emerged after humans started to use graphic interfaces as a result of introduction and expansion thereof. In the earliest days of HCI, the contribution from human factors researchers took the form of guidelines, which summarized known findings that could be applied to the development and evaluation of computer interfaces (Boehm-Davis; 2008). The evolution of human-computer interaction design (HCID) over the last 20 years suggests that there is a growing need for educational scholars to consider new and more applicable theoretical models of interactive product design (Faiola & Matei; 2010). Finding of HCI field are taken into consideration in the production and design of both software and hardware of new interactive tools and new tools are developed as per such rules. Mice used in recent years can be cited as an example in this regard. Whereas old model mice comprise of only 2 buttons and a roller enabling the mouse to move, new mice are produced with a wheel enabling to scroll up and down on internet browsers Human-computer interaction is a rapidly evolving discipline (Santos; 2006). As human-computer interaction (HCI) and interactive systems design have developed a sense of people living with and through technologies, our concerns have broadened from usability to include wider qualities of people's experiences with technology (McCarthy et al; 2006). Humans access to the information they search through the software and hardware developed by the help of the HCI findings and transmit the messages to the computers more easily.

Modern information technology now affords organizations, businesses, individuals, and institutions of learning a variety of options for engaging in communication and information exchange (Burgoon and et all, 2000). Computer technology is involved in many aspects of our daily lives (İşman & Çelikli, 2009). With the proliferation of desktop computers, it was discovered that non-technical users were not satisfied with the same type of environment that programmers used (Gerlach & Kuo ;1991). Inexperienced users started to use computer and Internet upon the expansion of the use of computer and Internet and the expansion of the services of institutions and organization over Internet, as well as the users experienced in the field of computers. One of the main objectives of HCI is to insure users inexperienced in using computers to use computers problem-free. The human-computer interface (HCI) problem under consideration is the location and sequencing of the menu items and icons that assist the person with maximizing efficiency of the computer as a tool (Peer & Sharma; 2008). Images, menu and content elements available on the interface should be placed rationally for the users inexperienced in graphic interface to be at ease and to use the same easily. Placement of the menu items

organizing interface and content is significant particularly for interactions of the inexperienced users. The objective of the user interface components layout problem is to locate the menu/icon items on the screen/keyboard/mouse in order to achieve the greatest efficiency in exchanging the inputs and outputs between the user and the system (Peer & Sharma; 2008). Interface designers ought to be concerned with facilitating clear and accurate information exchanges, efficient transactions, and high-quality collaborative work (Burgoon and et al, 2000). Interfaces are complex, cybernetic-like systems that can be built quickly but are difficult to build well (Gerlach & Kuo ;1991). More importantly there is a lack of guidance in applying HCI research findings to design practice. Consider a typical interface design based upon many decisions: which functions and objects to include; how they are to be labeled and displayed; whether the interface should use command language, menus, or icons; and how online help can be provided (Gerlach & Kuo; 1991).

PURPOSE

Main purpose of this research is to reveal teacher candidates' perceptions towards human-computer interaction and related basic concepts.

METHOD

Phenomenological research, one of the qualitative research models, was selected as the research method for this research. Phenomenological research is a method aiming to determine people's opinions and views about any phenomenon that they experience and their individual experiences. Daymon and Holloway (2002, 153) characterized phenomenological research as below;

- Researchers consciously suspend, or bracket, their own assumptions so they can see through the eyes of participants,
- Sample sizes are usually small,
- In phenomenological research, you try to make sense of a phenomenon according to participants' own terms, identifying the essence or 'real' meaning of the phenomenon under investigation.

In phenomenology, foundational question is "What is the meaning, structure and essence of the existing experience of this phenomenon for this person or group of people" (Patton, 1990). Phenomology as a method looks at the lived experiences of those who have experienced a certain phenomenon (Lichtman, 2006). Todres (2005) described phenomenological research through the following components:

- The researcher gathers detailed concrete descriptions of specific experience from others,
- The researcher adopts the attitude of the phenomenological reduction in order to intuit the intelligibility of what is given in the experience,
- The researcher seeks the most invariant meanings for a context.

WORKING GROUP

Purposeful sampling was used for the determination of the participants comprising the working group. Purposeful sampling refers to study with the cases meeting the measures determined previously in the research (Yıldırım and Şimşek, 2006). Researcher designates participants having the most proper and desired characteristics for the research as sample with his own judgment in such sampling (Balci, 2004). In this research, 51 teacher candidates who study in Sakarya University, Educational Faculty, Computer and Instructional Technologies Education in 2009-2010 educational year and are enrolled in the course of "Human-Computer Interaction" were selected as the research participant using purposeful sampling.

DATA COLLECTION

The literature was reviewed for the purpose of data collection and basic concepts were determined related to human-computer interaction. A measuring tool including 6 concepts designated by the researcher was developed. In the measuring tool developed, teacher candidates were given concepts and requested to describe them. A session was organized and thereby it was provided that the teacher candidates make respective descriptions. Data that were gathered after the teacher candidates described the concepts covered by the measuring tool were computerized and themed.

FINDINGS AND INTERPRETATION

This section covers the findings within the framework of the human-computer interaction key concepts posed to the teacher candidates and requested to be described by the teacher candidates within the scope of this research. In the research, teacher candidates were initially asked to describe the concept of usability. Themes derived from the usability descriptions of the teacher candidates are provided in Table 1.

Table 1 Themes derived from the usability descriptions of the participating teacher candidates

Theme	N
Satisfaction	37
Effectiveness	18
Efficiency	13

Themes derived from the participating teacher candidates' descriptions related to the usability concept were designated as **satisfaction**, **effectiveness** and **efficiency**.

When the descriptions of the teacher candidates about the usability were analyzed, descriptions focusing on the relationship of the user with web site or program, use of the web site or program with ease by the user or the satisfaction of the user from the visual design of the web site or program were gathered under the theme of satisfaction. The direct quotations from the descriptions written by the teacher candidates are as follows;

- "...means providing ease of use. Namely, it means whether the web site is fast or provides ease of use, in other words, scroll bars may be sometimes vertical and it makes the use difficult."*
- "It is a concept addressing to the user with its ease of use and simplicity."*
- "It means a service degree of the web sites prepared by us for the users..."*
- "...all of the things appeared as a result of the layout providing us to access more easily to what we search in the programs or websites, colors and sizes to be more easily used and technical substructure ensuring to do faster transactions."*

Although the usability concept includes concepts and phenomenon such as technical substructure of the web site and information organization; teacher candidates generally centered on the satisfaction of the user from the website and program, navigation in the website with ease (placement of familiar icons in the website and program etc.) and easy access to the information and section searched.

Following the satisfaction theme, theme of effectiveness was derived from the usability descriptions of the teacher candidates. The themes evaluated under the effectiveness being one of the usability descriptions provided by the teacher candidates are generally the descriptions related to the inclusion of information fitting the purpose of service in the website, exclusion of the irrelevant, direction to the contents with the help of proper icons and content tables and access to the content without branching out. The quotations from the descriptions provided by the teacher candidates are as follows;

- "...shows how successful the web site is. In other words, it is the achievement of the user in accessing to the information searched"*
- "It means that the user performs his transactions in a shorter time and more effectively..."*
- "...means that the user access to the content in a fast, easy and comfortable manner. It refers to the fact that the user finds what he searches in the website without losing his rotation..."*
- "...user should access to any information searched without facing any difficulty or waiting problems and isolatedly from any item distracting him."*

The theme of efficiency was derived after analyzing the usability descriptions of the teacher candidates. Efficiency theme includes several concepts such as website and program enabling the user to navigate in the website without any difficulty in accessing to any content without spending too much time, and the access cost of the site and contents being low. The direct quotations from the usability descriptions provided by the teacher candidates are as follows.

- "...means that the user performs any desired act in the simplest and merest manner"*
- "...means that the user satisfies his needs optimally and as soon as possible in terms of time and cost..."*
- "...in terms that user navigates and does not get lost in the website..."*

When the themes derived from the usability concept descriptions of the teacher candidates and the direct quotations from the descriptions of the teacher candidates are analyzed, it can be deduced that websites that can be considered as usable are the websites satisfying the users with its interface, ensuring the users to visit the website repeatedly, providing the user with the researched information without navigating too much and the websites in which the users are well guided while navigating.

Within the scope of the research, the second concept which teacher candidates were asked to describe is the concept of message. Themes derived from the message concept descriptions of the teacher candidates are provided in Table 2. Two themes derived from the message concept descriptions of the teacher candidates were determined as contents and alerts.

Table 2 Themes derived from the message descriptions of the participating teacher candidates

Theme	N
Contents	27
Alerts	23

When the message descriptions of the teacher candidates were analyzed, the descriptions centering upon opinions and views transferred to the users within the scope of the website or program, contents transferred to the users were gathered under the theme of contents. 27 descriptions of the descriptions written by the teacher candidates were evaluated under the theme of contents. The direct excerpts from the descriptions written by the teacher candidates are as follows;

“In practice, it refers to the theme and thought we desire to transmit”
“We can define as the content we desire to transmit to the target audience”
“It means the information which attracts us in the course of accessing to the website and is inserted into the website”
“It is the information desired to be given by a website”

23 descriptions of the message descriptions of the teacher candidates were collected under the theme of alerts. Teacher candidates defined the messages evaluated under the alerts theme as the user directions available in the website or program, feedbacks given to the users in case of error occurrence in the website or program.

“Directing the user through an alert such as “You made an invalid request” when he made a request which is not available in the website...”
“Feedbacks given by the application or website about the things to do and not to do, feedbacks and alerts received by the user from various web-pages”
“The user who made a mistake in the web-page can be informed with a message and assisted to take proper actions.”
“It means that feedbacks given in order to inform the user after the bad or incorrect processes performed by the user in a website”

When the message concept descriptions of the teacher candidates and themes derived from such descriptions are analyzed, it is seen that there are teacher candidates defining the message concept as the content introduced by a website as well as teacher candidates defining the same as the direction and error messages. In the research, another concept which teacher candidates was asked to describe is design. Themes derived from the design concept descriptions of the teacher candidates are provided in Table 3. Themes derived from the descriptions were determined as **interface** and **contents**.

Table 3 Themes derived from the design descriptions of the participating teacher candidates

Theme	N
Interface	49
Contents	16

49 descriptions of the design concept descriptions provided by the teacher candidates were collected under the interface theme. The fact that descriptions of the teacher candidates include concepts such as web site interface, page layout, visual items enabled the definitions to be evaluated under this theme. The direct quotations from the descriptions of the teacher candidates are provided below.

“...it means that interface of a website is designed properly to meet the expectations of the user.”
“...to prepare the website after establishing the details where the title and content will be inserted, to which parts of the page the content and menu will be placed...”
“...it a part of the program we use which will communicate and interact with the user visually.”
“Placing the page, fonts, images, flash and animations etc. properly into the website...”

16 descriptions of the design concept descriptions provided by the teacher candidates were collected under the contents theme. Teacher candidates stated that the design interface covered the interface design as well as contents introduced by the website and program and it was necessary to carry out contents design at the beginning stage of the website or program designing. The quotations from the descriptions provided by the teacher candidates are as follows;

“...it means an effective presentation of contents prepared in any field...”
“...it means determining the target audience and where, which and how information will be introduced...”
“...related to decreasing unnecessary information and complexity, and increasing user satisfaction...”

When the design descriptions of the teacher candidates are examined, it is seen that teacher candidates’ perceptions towards design is collected under two dimensions including interface and contents. Teacher candidates stated that it is necessary to introduce information in an organized manner by designing both interface addressing to the users as well as contents introduced by the website and program so that users use the websites and programs with ease.

Themes regarding the teacher candidates’ interaction descriptions are provided in Table 4. As seen in the Table 4, whereas 41 descriptions of teacher candidates describe the interaction concept as a phenomenon between human and computer, 32 of them evaluated it as a phenomenon between human and human. In 26 descriptions, teacher candidates stated that interaction was a phenomenon among the computers.

Table 4 Themes derived from the interaction descriptions of the participating teacher candidates

Theme	N
Human - Computer	41
Human - Human	32
Computer - Computer	26

Teacher candidates described that the interaction occurred between human and computer; humans make an effect on the icons and writings available on the computer screen in the course of using computer; and computer perform a process as a result of such effect. Teacher candidates expressed that interaction phenomenon includes the processes that individuals fill forms available on the screen and cross specific parts of the images; and the contents on the web site create a change in the minds of the users. The quotations from the descriptions provided by the teacher candidates are as follows;

“...it is a concept that we can describe as a transmission of messages between user and computer through design, content and tools...”
“...It means that user can use an application through forms, images and texts and receive feedbacks. ...”
“...Interaction of people with computers using some external hardware accessories and appropriate programs...”
“...interacts with user introducing a web page designed...”

Another theme derived from the acceptability descriptions written by the teacher candidates is human – human interaction. Under this theme, teacher candidates stated in their views collected that interaction occurred between a human and another human. They described the interaction concept as the conversations between the individuals and get being affected by from their gestures and facial expressions mutually. The quotations from the descriptions provided by the teacher candidates are as follows;

“We can describe it as the conversations between people, involving in activities and sharing...”
“Communication between two people, and getting influenced from each other...”
“...it means that individuals attach importance to the personal problems and views of the others and act accordingly...”

There are some teacher candidates stating that interaction occurred between humans and other humans, and humans and computers while others stating that interaction occurred between a computer and another computer. Some of the teacher candidates describe the information exchange through computer, Internet as interaction process. The quotations from the descriptions provided by the teacher candidates are as follows;

“...Interactions between two objects...”

“...means that two different components in a relationship come to an agreement and set a communication easily between each other.

“... Namely existence of a continuous relationship between two things...”

In the research, another concept which teacher candidates were asked to describe is human-computer interaction. Themes derived from the descriptions written by the teacher candidates are determined as **software** and **hardware**.

Table 5 Themes derived from the human-computer interaction descriptions of the participating teacher candidates

Theme	N
Software	43
Hardware	33

Descriptions focusing on the software provided by the teacher candidates in respect of the human-computer interaction concept were evaluated under the theme of software. In their descriptions of interaction, teacher candidates state that interfaces of programs and websites provide the human-computer interaction; and individuals interact with the computer by means of the objects available in the interface and access to the information they search. The quotations from the descriptions provided by the teacher candidates are as follows;

“...means that users use an application more easily with the help of a good interface...”

“...a reaction given to us by a program or webpage operating in the computer...”

“...Any software that is commonly used by all the people facilitates the human and computer interaction...”

“...it means how the programs we use in computers affect us and how they direct us...”

When the human-computer interaction descriptions provided by the teacher candidates were analyzed, descriptions giving weight on software as well as hardware were evaluated hereunder. Teacher candidates expressed that they needed environment units and hardware so that programs, software besides individuals interacted with the computer. The direct quotations from the descriptions of the teacher candidates are provided below.

“...accordance with hardware or software during the use of computer in order to perform the task of...”

“...it means that people use the computer in line with their demands using some external hardware accessories and programs...”

“...a field researching how to make better the ergonomics and usability in design...”

“...two-way communication of user, environment, hardware and software...”

Within the scope of the research, the last concept which teacher candidates were asked to describe is the concept of interface. When the interface descriptions are analyzed, it is seen that all the teacher candidates describe the concepts of interface in a similar way. Teacher candidates define this concept as the visible part of where the transactions are performed by the users; as an interface that is eliminated from the code complexity of the program and website and formed with fonts, images, graphics and icons so that the individuals who do not understand the stacks of computer codes carry out their works and operations. The quotations from the descriptions provided by the teacher candidates are as follows;

“The visible part of which users interact while carrying out their processes...”

“...the interface ensuring the user to interact with the medium he needs... It can be a website. Or a program...”

“...It is the visible pages of the applications and websites. All the elements visible on a webpage compose the user interface. Interfaces should attract users’ interest...”

“...It is a visual design element enabling user to use the application he uses in fast and active manner.

“...it is a visual part of a website. “Background color, fonts, links, buttons, forms etc. of the web site, these are available on the user interface. ...”

“The user interface is all of the designs such as menus, images, background, and user language on homepage.”

CONCLUSIONS AND SUGGESTIONS

The research findings reveal that teacher candidates generally describe the concept of usability as the items ensuring the satisfaction of the user. It is necessary to teach teacher candidates trained as a web designer in the courses to be delivered that usability concept will not only be achieved by ensuring satisfaction of the user but also fast access to the information searched and introduction of accurate information in websites will increase the acceptability. When the message concept descriptions of teacher candidates are analyzed, the teacher candidates

mention both contents and alerts and define the message concept comprehensively. The teacher candidates mostly mention interface design but not content design when the design concept is asked in the field of HCI. When the teacher candidates are asked to define the human computer interaction, it is determined that they largely attach importance to the software concept and less importance to the hardware concept due to the concept of software. Within the scope of the research, the last concept which teacher candidates were asked to describe is the concept of interface. Teacher candidates describe the concept of interface as the screens ensuring the human – computer interaction.

When the teacher candidates' descriptions regarding human-computer interaction and respective basic concepts are analyzed, it was determined that they generally made descriptions conforming to the literature. (Gerlach & Kuo;1991, Boehm-Davis; 2008, Zhang & Li; 2004). Software developed by the teacher candidates within the scope of the courses can be tested and message design, interface design and usability can be reviewed by various user audiences; and teacher candidates can be assisted to adjust their design by giving feedbacks in order to enhance the experiences of the teacher candidates in the field of HCI.

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