| | | |
|---|---|---|
| Name of the Author | : | **GARIMA MISHRA** |
| Enrolment No. | : | **806/13** |
| Title of the Thesis | : | **"A STUDY ON ICT ENABLED DEVICES FOR DIFFERENTLY ABLED: AN EXLPORATORY RESEARCH"** |
| Degree to which it is submitted | : | **DOCTOR OF PHILOSOPHY** |
| Major Field | : | **HUMAN DEVELOPMENT AND FAMILY STUDIES** |
| Faculty | : | **HOME SCIENCE** |
| Major Advisor | : | **DR. U. V. KIRAN** |
| University | : | **BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY** |
| Year of Submission | : | **2016** |

# ABSTRACT

Disability is part of the human condition – almost everyone will be temporarily or permanently impaired at some point in life, and those who survive to old age will experience increasing difficulties in functioning. The United Nations Convention on the Rights of Persons with Disabilities (CRPD), adopted in 2006, aims to "promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for their inherent dignity". It reflects the major shift in global understanding and responses towards disability.

In present scenario, the society where we live in is called a Global Society and the gradual development of Information and Communication Technologies (ICT) contributes to its change and development. Disability is inevitably associated with several limitations with regard to electronic accessibility and individuals with various forms of disability cannot be excluded from technological evolution. Therefore, it is imperative that they benefit from such technologies, should fulfill the needs of the differently abled and should promote their digital inclusion, communication and autonomy.

In today's society, where information plays an important role, being able to use Information and Communication Technologies opens up opportunities for holding more responsible social positions. It is also more convenient for governments, institutions, public and private enterprises to provide information services. Moreover, ICT offers great opportunities of social inclusion. Technological development can enable differently abled to improve their quality of life. They can accomplish tasks that would be impossible to do without the computer, such as: writing a letter, communicating, drawing a picture, etc. Moreover, the digitalization of many public services such as education (school, university), shopping, banking, library, or even sending a letter allows people with disabilities to live in much the same way as those who are not disabled. They can acquire an "independent life" and achieve social integration. However, the prospective promised with the digital era often has not become the reality for most people with disabilities.

Assistive technologies can also reduce the effects of impairment by improved activity and greater participation, to promote inclusion of differently abled. Access to ICT and assistive devices for students with disabilities may require more (and more costly) resources than are provided for other students. Different technology are adopted or adapted for use by students with hearing, vision, communication, physical and intellectual disabilities. Technological issues arise in two ways for students with disability. First, the emphasis has been on the costs of providing services to people with disability in the form of assistive technologies. Second, with the introduction of ICT as a new mode of pedagogy, access to computers enables differently abed students to participate more fully in learning activities.

Across the world, differently abled people have poorer health outcomes, lower education achievements, less economic participation and higher rates of poverty than people without disabilities. This is partly because people with disabilities experience barriers in accessing services that many of us have long taken for granted, including health, education, employment, and transport as well as information. These difficulties are exacerbated in less advantaged communities. Therefore, the need was felt to conduct a study on "ICT enabled devices for differently abled; an exploratory study" with the following objectives:

1. To explore the ICT enabled and assistive devices available for differently abled through market and institutional survey.

2. To validate and standardize the schedule for assessing accessibility, purpose and barriers in using ICT and assistive devices.
3. To assess the utilization of ICT enabled and assistive devices for differently abled.
4. To assess the purpose of using various ICT enabled and assistive devices by differently abled.
5. To identify the barriers in the usage of ICT enabled and assistive devices by differently abled.
6. To develop and test the prototype of the identified device for the differently abled through customization.

The research design adopted in the present study is an exploratory cum experimental research. The investigation was carried out in seven phases.

- In the first phase; various markets in Uttar Pradesh were identified and explored to check the availability of ICT and assistive devices for differently abled.
- In the second phase; educational institution for differently abled was identified and various ICT and assistive devices were explored for them.
- In the third phase, a pilot study was conducted in one of the educational institute for disabled, by selecting a sample of ten from each category of disability (visually impaired, hearing impaired and locomotor impaired) to make a total of thirty respondents.
- In the fourth phase, a tool was developed to assess the extent of use, purpose of use and barriers in using ICT and assistive devices. The tool was developed based on literature review, market survey and pilot study.
- In the fifth phase, the developed tool was validated with the help of fifty experts in the related and allied fields. The reliability of the scale was also tested on thirty respondents from each category of disability.
- In the sixth phase, data was collected (using self structured and standardized tool) from differently abled in the identified institution offering higher education courses.
- In the seventh phase, on the basis of results obtained from the survey conducted on visually impaired, a prototype was developed.
- In the eighth phase, the developed prototype was tested on visually impaired respondents.

For the present study, sample was purposively drawn from an educational institute offering higher education for differently abled students located in Lucknow district of Uttar Pradesh. Multistage purposive sample technique was adopted to select the total of 180 sample. Respondents were selected from three categories of disability. Fifty respondents were selected from visually impaired, forty respondents from hearing impaired and ninety respondents from locomotor impaired.

The data was coded, tabulated and analyzed using appropriate statistical techniques i.e. mean, SD, t-test, frequency and percentage was administered to analyze the data accordingly using PAS software. From the result obtained, a set of criteria was developed for designing the selected tool and modified prototype design of smart cane. The feature proposed in the developed solar smart cane comprises of a white cane with adjustable height, grip for effective control over smart cane, sensor assembly for obstacle detection, micro controller to control the device, speaker and vibrator to provide voice and vibration feedback and solar cell to provide electrical energy to the system for functioning.

Developed and customized prototype has been tested on total thirty visually impaired respondents and their feedback was taken in terms of improvement of the device. Improvement of the device has been assessed on using five point likert scale with a difference of 20 percent; no improvement to cent percent improvement. Result revealed that seventy percent respondents reported that the solar smart cane is 100 percent better in detecting the directon of the obstacle and 63.3 percent people felt that developed cane has more features. Sixty percent respondets reported that developed cane is 100 percent better in energy saving as the solar cell has been used to provide electrical energy to the system where as more than fifty percent respondents reported that soalr smart cane is easy to handle and comfortable than existing smart cane.

Results obtained from exploratory part of research indicate that ICT had great influence on differently abled person's life. Significant differences were found in the usage of ICT and assistive devices between male and female respondents from the category of visual impairment and locomotor impairment while among hearing impaired persons, no significant difference was found. It was also observed that female users of ICT are more active in using communication technologies than male users. It is also evident that respondents from all the categories face barrier in using some ICT and assistive devices. For visually impaired, smart cane was not very

user friendly device as many limitations were found during survey. Thus, a prototype called solar smart cane for blind user users, was developed and tested. Solar smart cane is an obstacle detecting device that provides vibration and voice feedback to the users. ICT enable and assistive devices for differently abled found to be very prominent in assessing uses of ICT and assistive devices, purpose of using ICT and assistive devices, barriers in using ICT and assistive devices and kind of ICT and assistive devices to improve quality of life of the people.