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DEVELOPING THE SKILLS OF VISUALLY IMPAIRED IN PROGRAMMING LANGUAGES

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ABSTRACT
Programming skills are strongly emphasized in IT field. In order to compete with the sighted peers, the differently abled students must shine in the programming field. The problems in programming education are even more prominent in the case of programming novices who are visually impaired. Some of educational problems are similar to general problems in programming education and some are specific in the case of visually impaired students and require a suitable approach in order to be resolved. The main purpose of the study is to improve the skills of visually impaired in programming languages so that they can compete with great confidence in IT sector. The experimental study was conducted and it was proved that if the students were properly trained with all the assistive devices, specially designed for them, their knowledge and skill increases in the programming field.

KEYWORDS: Visually Impaired, Skill development, Information and Communication Technology(ICT), Job Access With Speech(JAWS).

INTRODUCTION
Skill development is an extremely important for an individual in a country like India. Every student who goes through higher education will be well served if he or she has additional skill acquired along with his/her studies. It enhances the employability opportunities. India has several models in place for promoting vocational education. However quality of vocational education imparted and skill imbibed need to be strengthened **(Mantha, 2010).** As India moves progressively towards becoming a 'knowledge economy', the skill development plays a major role in the economic environment. Skills and training increase productivity and incomes, and facilitate everybody's participation in economic and social life. In India, skill acquisition takes place through two basic structural streams - Formal and Informal. The formal structure includes: (i) higher technical education imparted through professional colleges (ii) vocational education in schools at the post-secondary stage (iii) technical training in specialized institutions (iv) apprenticeship training **(Prem Kumar Jha(2005)**).

At present, we live in a world of Technology. Information and Communication Technology (ICT) has become one of the basic building blocks of modern society. Information and Communication Technology is defined as a "diverse set of technological tool and resource used to communicate and to create, disseminate, store and manage the information"(**Blurton, 2002**). These technologies include Computers, Internet, broadcasting technologies (radio and television) and telephone. Computers are constantly used to improve the efficiency and effectiveness of education at all levels (in both formal and non-formal sector).

Today, Technology has not only opened the educational doors for normal children but also for the children with disabilities. The advent of ICT (Internet, Assistive Devices like JAWS, Magic Magnification, Angel Reader, SARA and Mobile devices) has opened the possibilities for differently abled to keep in touch with the world. Usage of ICT has enabled the differently abled to maximize independence, productivity and participation in academic programs and employment. Learning through ICT offers several advantages over traditional schooling. ICT is useful in improving a person's quality of life by enhancing effectiveness of teaching, developing life skills; complementing learning in special needs education, and exploring other related issues. ICT provides differently abled persons with an improved quality of life and offers the possibility of accessing knowledge by adapting digital media to the nature of their disabilities.

LITERATURE REVIEW

The literature review reveals that only few research works have been undertaken in this area. The following significant points emerged from the review of literature :-

➢ **Clark(1991)** and **Ryan(2001)** has emphasized that the skill development can improve the educational and employment level of the differently abled. So the skill development is very essential for the differently abled.

➢ **Micheal Turcano(2005), Fitzgerald(2011), Johan Borg(2011)** have studied the usage of ICT for skill development of differently abled. The role of ICT for employability and vocational skill development plays a major role in the review of literature.

➢ **Sudha Dinakar,B.(2005), Bocconi, S.(2007), Zaharudin,R.(2011) and Emily, C.(2011)** have studied about the ICT devices and how it is being used or can be used by the Visually Impaired people. They have also found the difficulties faced by the people while using these devices.

➢ **Smriti Swarup(2009), Schold, Gebhardt & Tobias(2010)** have made an extensive study to find the attitude of the teachers towards integration and towards the usage of ICT devices in the classroom for the differently abled students.

➢ The studies conducted by **Reema Chauha(2006), Konstantinos,P.(2009) and Jayne Bowen(2010)** reveals that the self esteem of the differently abled people is generally low when compared to normal person. **Jayne Bowen(2010)** has proved that the Visually Impaired girls are found with higher level of self esteem when compared with boys. The review of literature shows that high self-esteem helps in improving the confidence level of the differently abled.

NEED FOR THE STUDY

In this world of technology, where there are several opportunities in the IT field, the Visually Impaired can make proper use of ICT devices designed especially for them and can get job in the IT sector by increasing the skill in that field. Deepak Kaistha, Managing partner of Planman Consulting, in his study suggests that by bringing innovation and considerable amount of customer understanding, the differently abled have proven themselves to be valuable to any organization. With commendable retention rate to their credit, differently abled employees exhibit a high level of concentration and focus. The effort is definitely worth the money and time invested in hiring and training such personnel [6]. Thus if proper training is given to them for developing their skill in IT field, they can get better job with high salary.

Programming skills are strongly emphasized in IT field. In order to compete with their sighted peers, the differently abled student must shine in the programming field. There are several well-known aiding tools that are used to make computer usage available to visually impaired

➢ JAWS
➢ HAL Screen Reader
➢ COBRA
➢ Window Eyes

This particular topic is chosen for the study in order to improve the skills of Visually Impaired in programming languages so that they can compete with great confidence in IT sector.

OBJECTIVE OF THE STUDY

1. To find the extent of ICT impact on skill acquisition of the differently abled students.
2. To identify the factors that facilitate/hinder the use of ICT in training programmes.

SCOPE OF THE STUDY

This research study aims at developing the skill of Visually Impaired in programming languages which will increase the job opportunities among the students in IT sector (where there is lot of job opportunities). This will also increase the self-esteem of Visually Impaired students in the society.

METHODOLOGY

An experimental study was done to find the impact on skill acquisition of the differently abled students. The training program was conducted in **Model Resource Centre for Disability Services (MRCDS)** of Loyola College, Nungambakkam, Chennai. The second and final year students in the College were selected for the training programme. The quasi experimental study was done to find the impact of the training programme. 15

students were taken for control group and 10 students were taken for treatment group. No treatment was given to the control group.

The training programme was conducted in C Programming Language for 10 students in treatment group. It was conducted for 15 hours. Both theory and practical sessions were conducted. At the beginning of the programme, pre-test was conducted and the data was stored. The students used MS-Word document to store the answers for the question in the pre-test.

The students were given the course material in audio format and in MS-Word format (.doc file). The word document can be easily read through JAWS (Job Access With Speech) Software. The C Programmes (for the practical session) were also given in Braille so that the students can understand programming concept in an easy way. Besides these, the students were using audacity (to convert audio files to .mp3), Angel Reader(for recording) and ipod. The programme was conducted using ICT tools(Computer, JAWS, Angel Reader, head phone) which made the students to learn the concept easily.

At the end of the session, an achievement test was conducted. The test consists of two parts(multiple choice questions and a program to be done practically). The students stored the answers in MS-Word document. The written test was used to check the knowledge level of Visually Impaired students in ANSI C. The practical program was used to measure the skill of the student. Viva conducted after the test by the researcher was used to analyze their ability in ANSI C.

Finally, the collected information was analyzed statistically. Paired Sample t-test was conducted in SPSS for analysis. The following table shows the experimental scores of Visually Impaired students:

Table : Experimental Scores of Visually Impaired students

		Mean	N	Std. Deviation
Pair 1	c_pre_mark	5.6000	15	2.87518
	c_post_mark	5.0000	15	3.52767
Pair 2	t_pre_mark	6.0000	10	2.98142
	t_post_mark	16.4000	10	3.27278

		N	Correlation	Sig.	t	df	Sig. (2-tailed)
Pair 1	c_pre_mark & c_post_mark	15	.931	.000	1.406	9	.193
Pair 2	t_pre_mark & t_post_mark	10	.808	.005	-16.822	9	.000

The above table shows mean and standard deviation value of the students in pre-test and post- test for both control and treatment group.

Inference:
The mean scores of pre-test and post-test of the treatment group are compared. The increase in mean value shows the progress of visually impaired students after the course. There is a strong positive correlation (0.808). It indicates that the students who did well in the pre-test also did well in the post-test. The significance (2-tailed) value is less than 0.05. This shows that there is significant difference in the scores of the students in the treatment group before and after course. This clearly shows the progress of the student at the end of the programme.

The mean scores of pre-test and post-test of the control group are compared. The constant value shows that there is no progress in the control group. The significance (2-tailed) value is greater than .05. This shows that there is no significant difference in the scores of the students in the control group.

Interpretation:
If the Visually Impaired students were given proper training using ICT devices, their skill increases. The increase in the knowledge increases the self esteem and the confidence level of the students for their future life.

FINDINGS

Objectives	Research Questions	Findings	Conclusion	Recommendation
To find the extent of ICT impact on skill acquisition of the differently abled students.	What is the impact of training programme on the Visually Impaired students?	The increase in the mean value from 5.6 to 16.4 after the training programme shows the progress of students in post test. At the end of training program, the feedback of the students were i) Got more confidence in the programming languages ii) Need more time to learn the programming techniques iii) Want to work as Software Engineers in Companies iv) C Programming is very interesting	The training programme increased the confidence level of Visually Impaired students in the Programming Languages. More time is needed to train the students in C program.	Necessary aids must be given to the students to make them learn any skill effectively and efficiently. The increase in knowledge increases the self esteem of the students.
To identify the factors that facilitate/hinder the use of ICT in training programmes.	What are the factors that hinder the use of ICT in training programme.	In the training programme, it was observed that the students, who have studied maths upto their higher secondary education, find it easy to learn the concepts of C program. Only 3 students in this programme have taken maths in the school. Other students who have taken History and Commerce, found it hard to understand the concept. Thus more time and effort is needed by them to learn the programming skill.	Once the students understood the concept in programming language, their logical thinking ability increases and they found the programmes in C language easy to understand and to write of their own.	Students must also be trained in other programming languages including OOPS concept, so that they can enter into the software industries after their higher education.

CONCLUSION

The impact of skill acquisition of the Visually Impaired students and their self esteem who were using ICT in their education is found to be high. This is because the use of ICT devices makes the student independent, so their self esteem increases. Naturally, their knowledge and skill increases. The Visually Impaired students were interested in learning the programming language as it is in high demand now in the software industries. The students want to earn more in their life for improving their status level in the society. The experimental study proves that if the students were properly trained with all the assistive devices, specially designed for them, their knowledge and skill increases in the programming field.

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