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Developing a Training Model using Orca (Assistive Technology) to Teach IT for Visually Impaired Students

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Abstract—*The Visually impaired students do not have equal access to learning tools and applications like sighted students. Many researchers developed various tools and applications with the help of technology to provide maximum help to visually challenged students. The Assistive technologies are playing a very important role in training and development of learning process of visually impaired students. In spite of many developments in technology, there is still a huge requirement of development in teaching IT Skills to train and give assistance to visually challenged students in their learning process. It is necessary now to have Training Models to train the visually impaired students to give full access, participation and equality like sighted students while learning IT skills. The present research develops and tests a training model of the underlying observational learning processes by which modeling-based training interventions influence IT skills of visually impaired students. The model has been tested successfully to train undergraduate visually impaired students, using ORCA (assistive technology). The training model provides a complete theoretical amount of mechanisms by which modelling-based interventions affect training outcomes, which should enable future research to evaluate the effectiveness of training model to impart IT skills to visually impaired students.*

Keywords*: Visually impaired, assistive technology, observational learning, modelling-based training*

1. INTRODUCTION

To improve accessibility and quality of education technology there is huge requirement of training models among visually impaired students to impart training for their cognition process and learning styles. Availability of assistive technology on desktop/laptops helping visually impaired people to learn the things easily. Lot of research has been going on in this area and it is a continue process. It develops and tests no. of different type and noble theoretical model for learning processes. Therefore, it is necessary to develop such training model to develop visually impaired students computer skills. The learning process of visually impaired students will be improve due to use of such training modules in various education institutes as well as in organizations. Such training models might be used to understand why a particular training intervention is more effective than others, and how the intervention can be further improved.

2. OBJECTIVE OF RESEARCH

The objective of this research is to develop and perform an initial test of a new training model to impart IT training to visually impaired students to trace the influence of modeling-based interventions on training outcomes through their effects on observational learning processes. The

Proposed IT training model attempts to (1) To conduct an opinion survey related to Orca, an open source screen reader currently used by Visually impaired students who are learning to use various software using Orca screen reader (2) Teachers who teach visually impaired students how to use computers using Orca Screen reader (3) Heads of the institutions of the schools of visually impaired students who are the decision makers for the choice of technology.

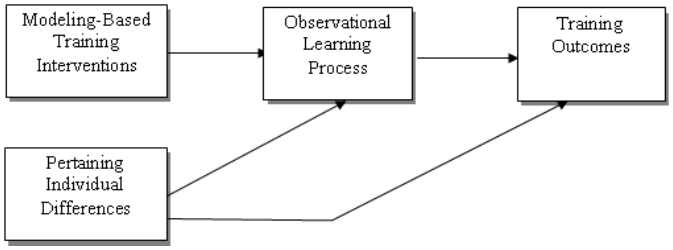

Fig. 1: Conceptual Framework of Training Model

3. RESEARCH TRAINING MODEL AND HYPOTHESIS

Fig. 1 presents the conceptual framework within which the proposed training model is formulated. Based on social cognitive theory (Bandura 1986), the framework argues that modeling-based training interventions will improve training outcomes through their effects on observational learning

processes. As visually impaired students individual differences may affect training outcomes either directly or indirectly through observational learning processes.

Observational learning processes are theorized to influence training outcomes, and to mediate the effects of modeling-based training interventions. The theoretical rationale for the model draws upon observational learning research from both within and beyond the computer skill domain. The model is specifically intended to apply within the domain of modeling-based approaches to IT skill training using ORCA (Assistive Technology). Fig. 2 further specifies each element of the training model examined in this study as well as hypotheses relating them.

3.1 Training Outcomes

The present training model experiment students and teachers into control group and treatment group. The students in the control group were taught using the regular trial and error method by a teacher who was not trained to use the proposed model. In the case of the treatment group, the students were taught using the proposed training model by the teacher who was trained to use the training model.

3.2 Declarative Knowledge & task Performance

How individuals learn cognitive skills suggests that knowledge evolves from and initial declarative or propositional form, through knowledge compilation, toward an automatic, proceduralized form (Anderson 1982, 1985; Glaser 1990; Kanfer and Ackerman 1989;Kozlowski et al.2001; Kraiger et al.1993; Martocchio 1994; May and Kahnweiler 2000; Olfman and Mandviwalla 1994). Declarative knowledge is defined by Anderson (1985, p.199) as “knowledge about facts and things.” Information content is obtained in the declarative phase either by verbal specifications of task objectives and instructions, or trainees “may observe demonstrations of the task, may encode and store task rules, and may derive strategies for the task” (Kanfer and Ackerman 1989, p.660).The declarative knowledge phase thereby establishes an initial cognitive representation of the task. As visually impaired learners advance toward procedural knowledge about how to perform a cognitive activity, they develop and refine knowledge.

4. COMPONENTS OF TRAINING MODEL:

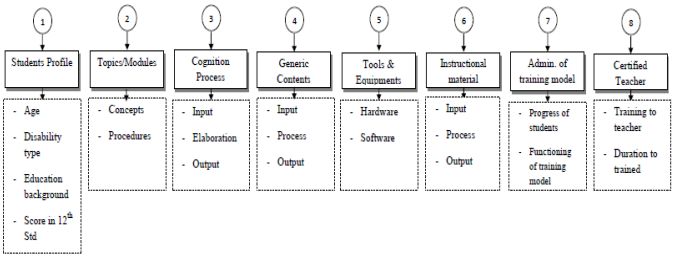

Fig. 2: Components of Training Model

5. METHOD

5.1 Participants

A training program using ORCA screen reader, the electronic spreadsheet Microsoft Excel for Windows, was set up for IT training course. Interview Schedules were used to collect primary data from Heads of Institutes, teachers and students. And the Observation Method was used to see how visually impaired students learn computers in the schools. The researcher conducted interviews personally with 10 Heads of institutes, 12 teachers and 26 students. Some interviews were conducted over the telephone and Skype video calling facility while some were conducted personally.

5.2 Procedure

Experts were identified and consulted to understand the details of developing a training model that can be used to teach abstract concepts as well as skills which normally need visual inputs. Convenient random sampling method was used to choose three experts from each of these strata and their expertise was used to develop the training model. This model which has been developed by the researcher has been tested for teaching both categories of the topics for the students in the control and treatment group. The topics chosen to be taught using the training model are: Computer fundamentals, Graphical User Interface (GUI) Concepts, File Manager and Word processor.

6. ANALYSIS OF DATA

Average test scores of Control Group and Treatment group in experiment

Table 1: Average test scores

Name of Group	Average Attendance	Average Student Rating	Average Module Test Scores	Average Final Exam Scores	Average Teachers Rating	Total Duration Allocated	Actual Duration
Control Group	100	7.5	54	57.5	10	50	50
Treatment Group	100	8.75	67.5	74.25	10	50	45

There were two sets of respondents. The first set consisted of the respondents who were taught without using the training model and the second set consisted of the respondents who were taught basic IT skills course without using the training model.

They were subjected to a Module test and Final test. As seen in Table 1, the attendance for both the groups was 100%. The average student rating for satisfaction level on a scale of 1 to 10 for the Control Group was 7.5 and for the Treatment Group it was 8.75. Satisfaction level of teachers of both the groups was 10. It can be see that the test scores of module test and the final test score of the Treatment Group is higher than the

Control Group. The time taken by the Treatment group is 5 hours less than the allocated time, whereas the Control Group finished the course in exactly the allocated time. This indicated that the model is effective and efficient.

6.1 Statistical Analysis of Test hypothesis:

H_0: There is no significant difference between the average test scores of the students of control group and the treatment group

H_1: There is a significant difference between the average test scores of the students of control group and the treatment group

The Student Paired T-test was thought to be the most appropriate for finding the difference in the mean scores of the control group and the treatment group. The test score for the above mentioned parameters was obtained and recorded by the researcher.

Table 2: Student Paired T- test

Student T-Test									
Comments									
Input	N of Rows in Working Data File	20							
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.							
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.							
Paired Samples Statistics									
		Mean	N	Std. Deviation	Std. Error Mean				
Pair 1	s_1	52.8500	20	6.97571	1.55982				
	s_2	58.3500	20	4.31978	0.96593				
Paired Samples Correlations									
		N	Correlation	Sig.					
Pair 1	s_1 & s_2	20	0.646	0.002					
Paired Samples Test									
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	s_1 - s_2	-5.50000	5.32620	1.19097	-7.99274	-3.00726	-4.618	19	0.000

6.2 Paired Sample Statistics

t Value = - 4.618 with p value 0.001 with a division of 5 % level of significance and alpha = 0.05. The p value is < 0.05. There is a significant difference between the test scores of the students from the Control and the treatment groups. Thus the hypothesis H1: 'There is a significant difference between the average test scores of the students of control group and the treatment group' has been accepted. It was found that there is a significant difference in the average test scores. This means that the average test scores of the students of the Treatment Group are higher than the scores of the students in the Control Group.

7. RESULTS

Table 3: Profiles of the Group

	The Profiles of the Treatment Group	The Profile of the Control Group
Profile of Students		
No. of students	05	05
Age	17 to 18 yrs	17 to 18 years
Prior Knowledge of Computers	Just How to start & Shut down computer	How to start and shutdown computers and simple internet browsing skills
Average Score in XII std	60.5%	58%
No. of Students from Commerce Stream	02	04
No. of Students from Arts Stream	03	01
Profile of Teachers		
Qualification	B.Com and Diploma in Computers	BA, B.Ed. and Diploma in Computers
Training	Trained to use the Proposed Training Model	No training was provided related to the Training Model
No. of years experience	2 years	2.2 years
Duration of Experiments/course	50 hours (5 hours daily) for 10 days	50 hours (5 hours daily) for 10 days

8. CONCLUSION

The findings of opinion survey of Head of the Institutions, Teachers and the Students, the researcher concludes that although there is a significant amount of research available to impart knowledge and skills in other subjects like, Science, Mathematics, History, Geography, Languages etc.. However, there is very little research being done to impart knowledge related to teaching IT skills to visually impaired students. Teachers follow more of a 'trial and error' method and not a standard researched training model. They do not consciously take into consideration the learning styles and cognition process of a visually impaired student while imparting IT knowledge and skills to them. However, they agreed that different students have different learning styles; therefore, it will be helpful to provide a researched method to handle students with different learning styles. Students found it difficult to understand the topics related to Graphical User Interface (GUI). There is need for a well-researched Training Model to impart IT skills to visually impaired students to reduce the learning curve.

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