



The Use of Assistive Technologies in the Recovery of Hearing-Impaired Children

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ABSTRACT

Hearing-impaired children cannot acquire language by perceiving and imitating sounds, being thus deprived of the spontaneous acquisition of speech. The use of assistive technologies in special schools contributes to the acquisition and development of language in pupils with hearing impairments who succeed in improving pronunciation, developing vocabulary, improving the feeling of autonomy, self-esteem, regaining certain abilities, the learning, recovery and compensation process becoming more personalised and efficient.

This paper aims at providing a new outlook on the use of assistive technologies in the recovery of hearing-impaired children, through the introduction of information and communication technologies in the education system. The study conducted is aimed at discussing the influence of the technological framework on language correction in children by means of speech therapy.

The results of the study point to the usefulness of assistive technologies in restoring language and speaking abilities, contributing to stimulating the pupils' interest in what is new, mitigating the risk of boredom, and increasing learning motivation.

KEYWORDS

hearing impairment, assistive technologies, computer, language, motivation

1. INTRODUCTION

The aim of alternative and support communication systems is to provide hearing-impaired children with the opportunity of a more complex development, which would allow them to acquire increased quality of life [5]. These children are unable to imitate or compare their own vocal pronunciations; they do not manage to develop spontaneous speech, since they require therapeutic stimulation, through the use of other types of (intact) sensations: visual or tactile. An effective verbal training method in these children equally involves computerised techniques, through which they perceive the "invisible" verbal parameters involved in classical interventions.

Hearing-impaired children can follow the display – on the computer screen – of a graphic transposition of their own sound emissions, understanding more quickly how the silent consonants are pronounced as compared, for instance, to the sound consonants [9]. The computer highlights the wrong contact points and assesses quantitatively the correctness of pronunciation (in percents).

1.1. Analysis of the impact of information technology on language development/ correction in hearing-impaired children

In order for the information technology to be completely effective, the development of these techniques should be assessed depending on the demands of the user – software created according to the child's level of intellectual development, age and the degree and type of impairment [8]. The development, presentation and integration of varied software should elicit the students' interest, requesting and formulating solutions, so as to correspond to the possibilities that foster communication with the student, allowing direct answers, stimulating them by means of the support sub-programmes or by suggesting creativity [10].

SMART Technology. The interactive SMART BOARD is a powerful education tool, which is able to transform any space into an interactive environment [3]. Extremely easy to use, the interactive SMART Board can be connected (through an USB port) to any computer; it can be run on various platforms (WINDOWS, UNIX, MAC), and it is connected to an overhead projector and projected onto the board. By means of the board sensitive surface, any application on the computer

can be activated and controlled by simply touching the board. Moreover, the set of markers available allows completing and making annotations or observations directly on the document accessed. The result can be saved, printed or emailed. The mouse function can be realised by merely touching the elements on the board. The Interwrite Workspace software manages communication between the interactive board and the computer; it coordinates its actions and offers, at the same time, a robust set of instruments which allow experiencing interactivity. This allows the use of the interactive electronic board in two ways:

- The White board mode – allows the use of the board without connecting an overhead projector to the computer, through the use of special electronic markers.
- The interactive mode – which uses rechargeable interactive pencils and requires the use of an overhead projector connected to the computer.

The interactive SMART Board is equipped with a panoramic screen, a touch-screen type of surface, which can be connected to the computer and displays the image of the computer screen by means of an overhead projector. Moreover, it is provided with a Pen tray and a control panel, which allow the teachers to use all the technological products available in the classroom.

The computer – top technology nowadays – constitutes the most complex means which reunites, in a unitary whole, audio-visual techniques and has the great advantage of creating comprehensive educational and instructive software, which helps and contributes significantly to increasing the efficiency of the teaching activity [7].

2. OBJECTIVE

The research conducted aims to further the general objectives of speech therapy research – improvement and innovation of speech therapy practices through the use of assisted therapy techniques.

In order to achieve this objective, the experiment aims to identify the specific impact of the use of speech therapy software by modelling speech therapy according to the classical and te-

chnological perspective [2].

Research objective. Identifying differences at the level of the results obtained through speech therapy, between the classical therapeutic model and the computer assisted model.

The study conducted is thus aimed at analysing the influence of the technological framework on correcting the children's language in relation to the two ways of organising speech therapy. For all the therapeutic situations thus defined, the content of the exercises will be the same, with differences at the level of the therapeutic strategies only.

2.1. Methodology. The study conducted aims at discussing the influence of the technological framework on correcting speech in children in relation to the two ways of organising speech therapy – classical and assisted therapy. The research aims to identify the differences at the level of the results of speech therapy between the classical therapeutic model and the computer assisted model.

The research sample. The experimental sample consisted of 64 hearing-impaired schoolchildren, aged between 7 and 10 years old, who manifest pronunciation difficulties (audiogenous dyslalia).

2.2. Results and Discussion

General hypothesis. Assisted speech therapy creates a psycho-stimulating context which is more favourable for language correction/ development.

Specific hypothesis. There are significant differences between the effects of classical speech therapy and those of assisted speech therapy at the level of the motivational stimulus for speech therapy.

Experimental sample – Variable Motivation to participate Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Motivation to participate 0 * Motivation to participate 12	32	100,0%	0	,0%	32	100,0%

Motivation to participate 0 * Motivation to participate 12 Crosstabulation

Count

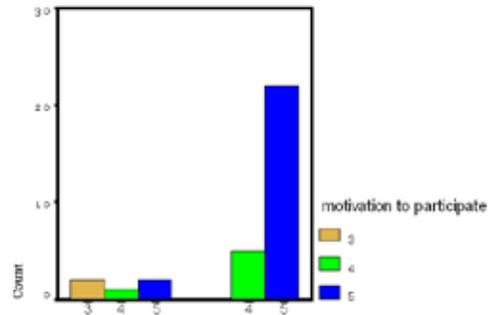
		Motivation to participate 12			Total
		3	4	5	
Motivation to participate 0	3	2	1	2	5
	4	4	5	22	27
Total		2	6	24	32

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11,773(a)	2	,003
Likelihood Ratio	8,563	2	,014
Linear-by-Linear Association	7,984	1	,005
N of Valid Cases	32		

4 cells (66,7%) have expected count less than 5. The minimum expected count is ,31.

Table 1 - Differences between the pre- and post-test situation in case of the experimental sample as regards the variable Motivation to participate



As it can be noticed in Table 1, in the experimental sample, following the assisted speech therapy, the subjects showed an upward tendency in the motivation to participate. The significant character of these changes is supported by criterion χ^2 ($\chi^2 = 11,773$, $p < .05$), which shows that there is a significant difference between the observed frequencies and the expected frequencies as regards the motivation to participate.

The therapy which involves the use of the speech therapy software determines the activation of some motivational impulses in the participants. The use of the computer as a learning support cultivates the children's interests in the therapeutic activity [1]. Systematically presenting and offering new, rich and well selected information, which can be reproduced in their natural environment and dynamics, the computer is likely to preserve the child's curiosity in ongoing knowledge acquisition, while increasing learning motivation [6].

Consequently, not only does the computer constitute a new means of communication, but it equally facilitates emotional states, transmits emotions, feelings, attitudes, contributing to improving the emotional life of the children. For children with communication difficulties, the image constitutes a support tool which provides knowledge and facilitates understanding. Images constitute a support tool for both oral and written communication. The images on the screen, fixed or mobile, are part of the child's world, shaping perception on their representations and facilitating communication. The images suggested to the children have to be selected depending on their interests and the specificities of the community they belong to, in order to foster dialogue between the cultural contexts (school and family) and in order to build a richer universe of reference [4].

Control Sample – Variable Motivation to participate Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Motivation to participate 0 * Motivation to participate 12	32	100,0%	0	,0%	32	100,0%

Motivation to participate 0 * Motivation to participate 12 Crosstabulation

Count

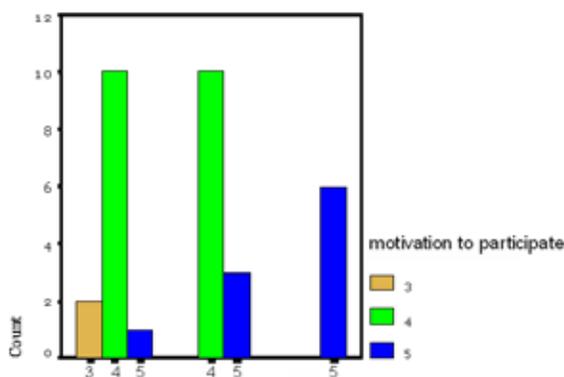
		Motivation to participate 12			Total
		3	4	5	
Motivation to participate 0	3	2	10	1	13
	4	4	10	3	13
	5	5	6	6	6
Total		2	20	10	32

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19,200(a)	4	,001
Likelihood Ratio	21,244	4	,000
Linear-by-Linear Association	13,587	1	,000
N of Valid Cases	32		

7 cells (77,8%) have expected count less than 5. The minimum expected count is ,38.

Table 2 – Differences between the pre- and post-test situation in the case of the control sample as regards the variable Motivation to participate



As it can be noticed in Table 2, in the case of the control sample, following the assisted speech therapy, the subjects showed an upward tendency as regards the motivation to participate. The significant character of these changes is supported by criterion χ^2 ($\chi^2 = 19,200, p < .05$), which shows that there is a significant difference between the observed and expected frequencies as regards the motivation to participate.

In the case of the classical speech therapy, the relational stimulation of the subjects in the control sample represented the main modality in order to increase the motivation to participate. The choice and the presentation of the materials used during the therapy, as well as the constant preoccupation with increasing confidence in their correction possibilities constituted the bases of motivational drive.

3. CONCLUSIONS

The present paper aims to provide a new outlook on the use of assistive technologies in the recovery of hearing-impaired children, through the introduction of information and communication technology in the education system.

The following conclusions can be drawn from the analysis of the results:

1. The usefulness of assistive technologies in the process of hearing recovery, provided that all psycho-pedagogue teachers acknowledge the fact that constant repetition of correct sound, syllable, word and sentence pronunciation leads to a drop in the interest and motivation to practise. This is precisely why we consider that the use of these technologies for therapeutic purposes leads to creating an atmosphere that is more aligned with the working realities involved in children development in the 21st century.
2. Assistive technologies contribute to facilitating the access of hearing-impaired people to education and information acquisition.
3. The use of assistive technologies contributes to stimulating the pupils' interest in what is new, mitigating the risk of boredom; it increases learning motivation, and maintains curiosity, training, practising and developing visual perception. Moreover, it increases attention span, develops memory, the ability to explore, select, and systematise the information received; it stimulates imagination and creativity, activating the student who becomes a subject of the learning process, and ensures a high degree of individualisation in the recovery process. Finally, it develops logical thinking and affectivity, and it stimulates socialisation.

Therefore, the use of assistive technologies in the case of hearing-impaired children constitutes a modern learning method which is essential in the recovery activity, considerably improving the results on the acquisition and development of communication skills.

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