

Use of Assistive Technology Resources for Low Vision Students

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Abstract. Background: Access of low vision students to school should also be secured through the use of assistive technology resources. Assistive resources are any devices used to enhance visual functioning. Objective: The aim of this study was to check and analyze the use of assistive technology by low vision students. Material and Methods: A descriptive study was conducted and interviews were applied. The sample comprised 19 low vision students. Results: Of the low vision students 52.6% declared to use far optical resources. Information Technology was the better-accepted resource in use as 73.7% declared to work with software's like DosVox, Virtual Vision, Jaws and Windows Magnifier. Conclusion: It is preoccupant to see that those low vision students are using Information Technology only at the specialized institution while computer labs are available in regular schools and could be used for the introduction to the use of this important resource.

Keywords: Low Vision, Rehabilitation, Assistive Technology, Information Technology, Educational Technology, Visually Impaired Persons.

1 Introduction

Vision is the sense that supplies information about the environment, and it is capable of organizing other sensorial information. The visual deficiency can dramatically affect life experiences, limiting routine duties in the every day life thus compromising life quality [1]. According to the 2010's Demographic Census, the IBGE (Instituto Brasileiro de Geografia e Estatística) data bank shows 45.6 million people having some kind of disability in Brazil. This figure corresponds to 23.91% of the Brazilian population. From those, 12.7 millions (6.7% of total population) have at least one serious disability with prevalence of visual disability on 3.5% of the population [2]. Service restriction for low vision results in a detection difficulty of visually impaired children and consequent lack of ophthalmologic assessment to investigate the need for assistive technology and orientation for efficient use of vision either in or off school [3]. Low vision is visual acuity less than 6/18 and equal to or better than 3/60 in the better eye with best correction (WHO, 2003). Vision of 20/70 to 20/200 is considered moderate visual impairment, or moderate low vision. Vision of 20/200 to

20/400 is considered severe visual impairment, or severe low vision and 20/500 to 20/1000 is considered profound visual impairment, or profound low vision [4]. People with low vision need to know strategies, resources and equipment to facilitate daily activities and learning to read and write [5]. The role of interdisciplinary team habilitation and rehabilitation foster this knowledge. Assistive technology is an interdisciplinary field of knowledge comprising products, resources, methodologies, strategies practices and services that aims to promote functionality for low vision people with regard autonomy and independence [6]. Information technology applied to students with disabilities can be defined as computers with programs that allow accessing the digital environment, promoting individual life and educational and social inclusion [7]. Low vision students may have difficulties with their daily activities, even when they use both optical resources, to magnify the image, and no optical resources which can be material adaptation and changes in the environment [10]. These students can benefit from the combined use of classical and Information Technology resources, such as screen magnification software and speech synthesis systems [11]. The aim of this study was check and analyze assistive technology, with a special focus on the Information Technology, used by low vision students in their daily activities.

2 Material and Methods

A transversal descriptive study [12] has been conducted and data collection instrument used was a questionnaire applied to low vision students during a personal interview. Questionnaire was made up with discursive and multiple choice questions, elaborated from an exploratory study specifically developed. This methodology was justified because aimed to obtain frequency and values for the variables under focus also providing knowledge on the ensemble of low vision students engaged into Vision Rehabilitation Services. Data were collected from March to August of 2010, part by the Visual Habilitation and Rehabilitation services at Ribeirão Preto's Association of Visual Disability (ADEVIRP) and part by the Center of Studies and Research in Rehabilitation Prof. Dr. Gabriel Porto of Medical Sciences Faculty of Campinas State University (CEPRE/FCM/UNICAMP). This study was approved by the Research Ethics Committee of the Medical Sciences Faculty of Campinas State University: process number 1077/2009.

3 Results

The population was composed of 19 low vision students at ages between 12 and 17 years old, average of 14.7 years, with 52.6% female and 47.4% male. Far vision acuity in the better eye ranged within 20/60 to 20/1000 and near acuity ranged from 0.8M to 3.2M. Most of the students (94.7%) reported having congenital low vision and only 5.3% had acquired low vision. The main causes for low vision included: Congenital Cataract, Leber Congenital Amaurosis, Retinopathy of Prematurity, Optic Atrophy, Macular Retinochoroiditis due to Congenital Toxoplasmosis and Coloboma. As indicated in Figure 1, most of the students, 78.9%, present a moderate low vision,

15.8% profound and only one (5.3%) was classified as severe. Considering the best eye, far visual acuity ranged from 20/60 to 20/1000 and near visual acuity from 0.8M to 3.2M. About resources, 52.6% declared to use far and near optical aids classified as glasses, telescopes and hand magnifiers. About non optical-aids, 57,9% declared to use large print items and contrast. Information Technology was the best-accepted resource in use as 73.7% declared to work with softwares like DosVox, Virtual Vision, Jaws and the tools available in Windows. Students declared to be introduced and trained in the use of Information Technology resources only at the Habilitation Services but not at the regular school.

*FC= far correction for the acuity of the best eye. / *NC= near correction for the acuity of the best eye.

Subject	Visual Acuity		Low vision degree	Use of optical resources		Use of non optical resources	Use of IT resource
	FC*	NC*		FC*	NC*		
1.	20/100	1.0M	Moderate	No	No	Large print	Dosvox Windows magnifier
2.	20/700	1.2M	Profound	Glasses	Glasses	Large print	Dosvox
3.	20/100	2.0M	Moderate	Glasses	Glasses	Large print	No
4.	20/1000	1.6M	Profound	Glasses	Glasses	No	Dosvox
5.	20/100	1.0M	Moderate	No	No	Large print	Windows magnifier
6.	20/70	0.8M	Moderate	No	No	No	No
7.	20/200	2.0M	Moderate	No	No	Large print	Virtual Vision
8.	20/70	0.8M	Moderate	Glasses	Glasses	Large print	No
9.	20/100	1.2M	Moderate	Glasses	Glasses	Large print	Dosvox
10.	20/400	3.2M	Severe	No	Hand magnifier	No	Jaws
11.	20/70	0.8M	Moderate	Glasses	No	No	No
12.	20/200	1.2M	Moderate	Telescope	Hand magnifier	Large print High contrast	Virtual Vision
13.	20/70	0.8M	Moderate	Glasses	Glasses	No	Virtual Vision
14.	20/100	0.8M	Moderate	No	No	Large print	Virtual Vision

Fig. 1. Characterization of the student population considered in this study

Subject	Visual Acuity		Low vision degree	Use of optical resources		Use of non optical resources	Use of IT resource
15.	20/100	0.8M	Moderate	Glasses	Glasses Hand magnifier	Large print High contrast	Virtual Vision
16.	20/70	0.8M	Moderate	No	No	No	Windows magnifier
17.	20/70	1.0M	Moderate	No	No	No	Virtual Vision
18.	20/640	1.0M	Profound	No	No	Large print	No
19.	20/70	1.6M	Moderate	Glasses	Glasses Hand magnifier	No	Dosvox Windows magnifier

Fig. 4. (Continued)

It is possible to assume that 47.4% of the low vision students reporting as not using far correcting optical resources might be avoiding this use due to typical teens psychological factors. It is known that, especially in adolescence, group acceptance is a determinant factor in the behavior therefore the use of goggles or aesthetically weird resources that differs from conventional might cause discomfort on self-esteem and self-acceptance resulting from the condition of individual with special needs [13]. Regarding the use of IT resources, the majority (76.7%) makes use of specific software for the visually impaired as Dosvox, tools of Windows, Virtual Vision and Jaws. About these resources, [8] states that since the creation of the Braille System in 1825, probably no technological advance overcame the impact of computers in the quality of life of people with visual impairments.

4 Conclusion

This study showed that a large number of low vision students do not use optical resources either for near or far but they do have those resources available and this is

because the resources do not provide adequate amplification of images present in their activities. Although optical resources are portable and liable to be used in any kind of environment, psychological factors might be associate to the resistance on their use, mainly by the teenagers because of this may affect the acceptance within the group. Information Technology resources, on the contrary, is something present in daily life in computers, automatic bank cashiers, games and represent a method of fast and confidential access. It is preoccupant to see those low vision students using Information Technology only at the specialized institution while at regular schools Information Technology labs are available and could be used for the introduction to its use. Information Technology is a valuable resource for the teaching-learning process that could bring the low vision student to a status of comparable level with sighted students and also access to daily activities.

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