VIGILANCIA TECNOLOGICA

Título de publicación	Referencia	Datos relevantes	Conclusiones	Bibliografía adicional
1. Clothing matching for visually impaired persons	**Autores:** Shuai Yuana YingLi Tiana Aries Arditib **Fuente:** Department of Electrical Engineering, The City College of New York, New York, NY, USA bArlene R Gordon Research Institute, Lighthouse International, New York, NY, USA **Palabras clave:** Blind, color blind, computer vision, clothing matching, color matching, pattern analysis, visually impaired	Matching clothes is a challenging task for many blind people. In this paper, we present a proof of concept system to solve this problem. The system consists of 1) a camera connected to a computer to perform pattern and color matching process; 2) speech commands for system control and configuration; and 3) audio feedback to provide matching results for both color and patterns of clothes. This system can handle clothes without any pattern, as well as clothing with multiple colors and complex patterns to aid both blind and color deficient people. Furthermore, our method is robust to variations of illumination, clothing rotation and wrinkling. To evaluate the proposed prototype, we collect two challenging databases including clothes without any pattern, or with multiple colors and different patterns under different conditions of lighting and rotation. Results reported here demonstrate the robustness and effectiveness of the proposed clothing matching system.	We have presented an efficient computer visionbased system to match clothes with multiple colors and complex patterns to assist visually impaired and blind people by distinguishing both pattern and color information. To handle complex texture patterns and lighting changes, we combine techniques using the Radon transform, wavelet features, and co-occurrence matrix for pattern matching. Our algorithm for color matching is based on normalized color in HSI color space and is able to detect multiple colors including red, orange, yellow, green, cyan, blue, purple, pink, black, grey, and white. To make the algorithm more efficient, we further developed a simple edge-based pattern detection method. The pattern matching is only performed for the images with texture patterns. The evaluation results on clothes datasets demonstrate that our method is robust and accurate for clothes with complex patterns and multiple colors. The matching outputs are provided to the user in audio (speech or sound). “Fashion sense” and personal preferences for matching would be obviously useful things to add to our system since they can vary so much over different cultures, time and personal taste. In the practical assistive system, a configuration step could be added to allow the user to select a number of preferences, such as acceptable or appropriate color and/or pattern matches.	-American Foundation for the Blind. (2004). Statistics and sources for professionals. Retrieved October 30, 2004, from www.afb.org/info document view.asp?documentid=1367. -“10 facts about blindness and visual impairment”, World Health Organization: Blindness and visual impairment, 2009. http://www.who.int/features/factfiles/blindness/blindness facts/en/index.html. hhttp://www.associatedcontent.com/article/1788762/how blind people match clothing.html, How Blind People Match Clothing? -M. Akhloufi, W. Ben Larbi and X. Maldague, Framework for Color-Texture Classification in Machine Vision Inspection of Industrial Products, IEEE, International Conference on System, Man, and Cybernetic (2007). -T. Caelli and D. Reye, On the classification of Image Regions by Color, texture and shape”, Pattern Recognition (1996). -D. Charalampidis and T. Kasparis, Wavelet-Based Rotational Invariant Roughness Features for Texture Classification and Segmentation, IEEE Trans on Image Processing 11(8) (August 2002), 825–837

Título de publicación	Referencia	Datos relevantes	Conclusiones	Bibliografía adicional
2. Clothing-Selection Habits of Teenage Girls Who Are Sighted and Blind	**Autores:** Al Kaufman **Fuente:** Por: Kaufman, Al, Journal of Visual Impairment & Blindness, 0145482X, Aug2000, Vol. 94, Fascículo 8	Research has indicated that appearance plays a major role in how others perceive a person (Eicher, Baizerman, & Michelman, 1991; Hoult, 1954), as well as how the person perceives himself or herself (Sweeny & Zionts, 1989; Winakor, Canton, & Wolins, 1980). Clothing plays a major role in almost all aspects of people's lives, from work to school to friendships. Little research has been done on the clothing of teenagers who are blind. The majority of sighted teenagers rely mostly on friends and magazines as influences on what clothing is fashionable (Koester & May, 1985) and most frequently shop for clothing with their friends (Peters, 1989). Although many adolescent girls who are blind have sighted friends, they often spend most of their time at each other's houses (Rosenblum, 1997), rather than shopping. Others just stay home alone (Wolffe & Sacks, 1997). Consumers who are blind are also not influenced by clothing depicted in movies, television (TV), and magazines as most sighted consumers are. At a period when children are rebelling against their parents, most adolescent girls who are blind rely on their parents for advice on fashion because they cannot see what is fashionable themselves (Mangold & Mangold, 1983). If, as the literature indicates, clothing is a vital influence on teenagers' acceptance by peers and self-concepts (Callen & Cloud, 1992; Peters, 1989; Sweeny & Zionts, 1989; Winakor et al., 1980), then wearing fashionable clothes may influence sighted teenagers' acceptance of teenagers who are blind. To determine whether this assumption is correct, one must first examine the clothing-selection habits of adolescent girls who are blind and determine if they are different than those of sighted adolescent girls. The study reported here compared the clothing-selection habits of adolescent girls who are blind with those of sighted adolescent girls to determine the differences in the two groups' selection processes and whether there is a need for special instruction in this area for adolescent girls who are blind.	As expected, the sighted girls ranked visual media, such as movies, magazines, and TV, as more important influences than did the girls who were blind, and the girls who were blind listed more auditory media, such as radio, friends, and Talking Books as more important influences than did the sighted girls. Both groups ranked almost all the potential influences much lower than was predicted on the basis of the findings of other studies on teenagers' clothing-selection habits (Horowitz, 1982; Koester & May, 1985). It may be that attitudes have changed during the ten-year gap between this study and previous studies, that the question was poorly worded, or that the media influences were so subtle that the respondents did not realize they were strong. The findings of this study demonstrate the need for more research in this area to determine if fashionably dressed teenagers who are blind are more readily accepted by their sighted peers than are those who are not dressed fashionably. Although it is clear that there were some differences in the clothing-selection habits of the two groups in this study, more research is necessary to determine if these differences are true in the general populations of teenagers who are blind and sighted.	-Callen, K., & Cloud, R. (1992). Perceived clothing deprivation: Influence on self-esteem and perceptions of school climate for middle school females. Unpublished manuscript, Virginia Polytechnical Institute, Blacksburg. -Eicher, J., Baizerman, S., & Michelman, J. (1991). Adolescent dress, Part II: A qualitative study of suburban high school students. Adolescence, 26, 679-686. -Horowitz, T. (1982). Excitement vs. economy: Fashion and youth culture in Britain. Adolescence, 17, 627-636.

Título de publicación	Referencia	Datos relevantes	Conclusiones	Bibliografía adicional
3. Fashion for the blind	**Autores:** Michele A. Burton **Fuente:** Fashion for the blind. Por: Burton, Michele A., ACM SIGACCESS Conference on Computers & Accessibility, Jan201 **Palabras clave:** Assistive technology; blind, clothing design, color identifier, fashion, low visión, vision impairment	Clothing is a universal aspect of life and a significant form of communication for both the wearer and observer. However, clothing is almost exclusively perceived visually begging the question: "How is beauty in fashion interpreted by those with vision impairments?" We conducted face-to-face interviews and a diary study with eight legally blind participants to gain the perspectives of those with vision impairments on what makes clothing attractive and appealing. Our primary focus was gathering their point-of-view on beauty in clothing but all of the participants also discussed accessibility challenges of clothing and fashion. We report our findings on the major aspects of clothing's appeal to blind wearers as well as the challenges with lack of access and assistive technology. These findings have far-reaching implications for future research within fashion design, interaction design and assistive technology.	FUTURE WORK Based on our findings, there are multiple avenues for extended research. We will explore embedding technology into clothing via smart textiles in a manner that is functional (such as providing relevant auditory feedback) but also fashionable (with an emphasis on soft fabrics, contrasting patterns, and interesting embellishments per our findings). We will also explore how the fashion choices of others can be communicated via other sensory outputs such as sound. We are also interested in assistive technology projects including a virtual How Do I Look application where users may ask the opinion of others; accessible garment care instructions; a reliable pattern and color identifier; and descriptive on-line shopping websites which include easy to understand color and shape descriptions. This future work has the potential for a tremendous impact in the lives of those with vision impairments	- Barnard, M. (2002). Fashion as communication. London: Routledge. - Camilleri, Izzy. (n.d.) IZ Adaptive Clothing. Retrieved May 2, 2011 - Löppönen, P., Haaksiluoto, P., & Tikka, V. (n.d.). //Mukana. Retrieved March 31, 2011, from Sauma: http://www.saumadesign.net/mukana.htm -McDaniel,T.,Panchanathan, S. (2006). A visio-haptic wearable system for assisting individuals who are blind. -

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4. Designig an accessible clothing tag system for people with vision impairments.	Autores: Michele A. Williams Kathryn Ringland Amy Hurst Fuente: Designing an accessible clothing tag system for people with vision impairments. Por: Williams, Michele A., Ringland, Kathryn, Hurst, Amy, ACM SIGACCESS Conference on Computers & Accessibility, 10/21/2013 Palabras Clave: Blin; clothing tags; fashion; vision impairments	Many clothing characteristics (from garment color to care instructions) are inaccessible to people with vision impairments. To address this problem, clothing information is gathered from sighted companions, and later recalled using low-tech solutions such as adding safety pins to clothes. Unfortunately, these low-tech solutions require precise memory (such as recalling a pin's meaning) and provide limited information. Using an iterative design approach, we prototyped several alternative technology solutions and tested them with five people with vision impairments. We are working towards an interface that provides detailed information in a streamlined interaction, focusing our future efforts on a wearable RFID tagging solution.	While this preliminary study was limited by a small sample size, we are able to extract many useful findings and requirements for improved accessible tagging systems. Easy to install and tactually discernable. Safety pins do not provide much information, but they are a simple and quick method to mark clothing and easy to detect. Fast to access. As noted with the Web forms, the interaction must take just a few seconds. Customizable. Information needs vary based on vision ability, memory, and also activity (i.e., doing laundry vs. packing for vacation). Portable. Clothes move around i n t he home, and ar e stored i n many places. Tags should be able to move with them. Affordable. People with disabilities often require specialized devices that can be expensive. For example, one of our participants had the ID Mate Omni that retails for $1,299 [7]. Low-cost technology is needed. Standalone and integrated. Since smartphones are not ubiquitous, a low-cost standalone device is desirable. Based on our findings, we are developing a standalone reader with low-cost Arduino RFID hardware and a 3-D printed plastic case. Bluetooth capabilities will wirelessly detect the tag and either play a pre-recorded voice message or allow for a new recording. We plan to create a custom application to read tags, and continue evaluating these with individuals with vision impairments.	-Color Identifier American Federation for the Blind. http://www.afb.org/section.aspx?FolderID=2&SectionID=7 &TopicID=330&SubTopicID=97& DocumentID=3647 - Bigham, J.P., Jayant, C., Ji, H., et al. VizWiz!: Nearly Real-time Answers to Visual Questions. UIST, (2010), 333 342. - Burton, M.A., Brady, E., Brewer, R., et al. Crowdsourcing Subjective Fashion Advice Using VizWiz: Challenges and Opportunities. International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS), (2012). - Burton, M.A., Neylan, C., and Hurst, A. Preliminary Investigation of t he L imitations F ashion Presents t o Those with Vision Impairments. Fashion Practice 5, 1 (2013). -Nanayakkara, S., Shilkrot, R., and Maes, P. EyeRing: a finger-worn assistant. Proceedings of the 2012 ACM annual conference extended abstracts on Human Factors in Computing Systems Extended Abstracts, (2012), 1961 1966. - En-Vision America - Assistive Technology for the Blind and Low-vision Community. En-Vision America. http://www.envisionamerica.com/products/id mate/&#46- - Pierce, B. What is a Spitball? National Federation of the Blind.http://nfb.org/images/nfb/publications/b ooks/kernel1/k ern0513.htm

Título de publicación	Referencia	Datos relevantes	Conclusiones	Bibliografía adicional
5. Fashion Visionary	**Autores:** Galina Espinoza Jennifer Frey **Fuente:** Fashion Visionary. Por: Espinoza, Galina, Frey, Jennifer, People, 00937673, Vol. 55, Fascículo 6	Focuses on Denise Lasprogata, who began a clothing line, DEE DEE, which contains clothing labels in braille for the blind after her friend Jody Sack was blinded in a care accident.	The youngest of three daughters of Vincent, 56, a retired salesman, and Janis, 55, a real estate and insurance agent, Lasprogata graduated from Vanderbilt University in 1995 with a degree in psychology, then worked at a variety of jobs--waitress, yoga teacher, child-care provider--while planning her business. She spent the past five years volunteering as a personal shopper for the blind, learning braille and raising some of the $500,000 in investment capital needed to launch her company. In addition to expanding DEE DEE--for Valentine's Day she plans to issue coordinating underwear sets with the French saying Touche Moi (Touch Me) in braille--the unmarried Lasprogata, who shares a two-bedroom Manhattan apartment with a roommate, is urging the Federal Trade Commission to make braille a requirement on clothing labels. "It's a pretty cool idea," says FTC spokesman Mitch Katz. Tragically, Jody Sack never knew about the clothing line she inspired. In the summer of 1998, while at a rooftop party, Sack lost her footing on a fire escape and fell to her death. Lasprogata was devastated: "For someone to have survived [a car wreck] and then suddenly pass away--nobody could believe it." She takes comfort knowing that Sack would have wholeheartedly celebrated her success. "She always inspired me to go for it," Lasprogata says. "If it wasn't for her, I don't know if I would have done any of this."	-PHOTO (COLOR): Braille dots "invite touch," says Lasprogata (with consultant and customer Rachel Graff). -PHOTO (COLOR): Lasprogata tracked down special heat-sensitive paper for her clothing labels. -PHOTO (COLOR): "I'm starting small and thinking big," says Lasprogata (at her Manhattan flat with pals Amanda Sheronas, and Salma Shawwaf).

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6. User Centred Design and Development of an Educational Force-Feedback Haptic Game for Blind Students.	**Autores:** Petridou Maria Blanchfield Alabadi Brailsford **Fuente:** Proceedings of the European Conference on Games Based Learning. 2011, p465-475. 11p. 1 Color Photograph, 11 Diagrams. **Palabras clave:** Component computer games force-feedback haptic technology Novint's Falcon virtual learning environments visually impaired people	Integrating game technology into education and learning has had some significant impact on children's learning and cognitive processes by helping to make learning an even more enjoyable experience. The use of technology in the education of blind children has also shown positive and beneficial effects. The emergence of haptic technology and the opportunity of creating interfaces for non-visual audio-haptic interaction have opened the door to digital graphics and 3D models by blind users. This paper describes the development of a design framework of an educational force-feedback game for blind and visually impaired students to enable them to practise and learn about 3D objects in free space. Ultimately this is a step in the process of developing games that enable blind students to playfully learn the more complex mathematical concepts that appear to need a visual understanding such as geometry and the use of graphs. The design of this game has been derived from the end users' expectations and requirements. The final aim is to use the same rendering pipeline that is used in the haptic exploration of real objects. A user centred design approach is used to prepare a detailed specification of virtual learning environment (VLE) and review prototype development using the Novint's Falcon. The involvement of educators and parents in the design process is crucial and beneficial but in order to understand and identify the end users' needs and expectations and therefore implement concepts optimally, it is vital to involve the target users themselves in the design process. This paper thus presents results of experiments with blind users and interviews with them, their parents and teachers to establish the design framework. It goes on to discuss the initial findings gathered from the testing phase made on the manipulation and recognition of primitive 3D objects by a focus group and highlights the improvements that need to be made. An initial experiment with the game interface is also introduced.	This paper presented a the design of a Haptic Virtual Learning Environment for children with low and no vision which was derived from their own expectations and suggestions. This first phase of the project pointed out the importance of the collaboration of all stakeholders. Having students, educators and parents and brainstorming on their preferences created a domino-like effect of novel helpful and valuable ideas that provided the research group with the appropriate knowledge to design a VE that will fulfill end-users expectations. Involving users throughout the design and the development is important and useful as the research team receives immediate feedback from the end-users. The involvement of blind students requires careful consideration and adaptation of techniques. The users are able to offer valuable insights into the design and evaluation of haptic technology. Not only is this process beneficial for the design team, but also for the students as they have an important opportunity to voice their opinions. Also, one of the overall goal of this game, is to transform tasks that are particularly confusing and challenging to blind students, to an enjoyable and playful learning environment.	- Hasser C.J., Goldenberg K.M. and Rosenberf L.B. (1998) "User Performance in a gui pointing task with a lowcost force-feedback computer mouse" In Proceedings of the Asme Dynamic Systems and Control Division: Presented at the 1998 Asme International Mechanical Engineering Congress and Exposition. – Anaheim California: American Society of Mechanical Engineers. - Petridou, M., Blanchfield, P., Brailsford, T., (2011) "Involving the User with Low or No Vision in the Design of an Audio-Haptic Learning Environment for Learning about 3D Shapes: The First Approach", Submitted to the 3rd Computer science and Electronic Engineering Conference, Essex, UK, July 2011.

Título de publicación	Referencia	Datos relevantes	Conclusiones	Bibliografía adicional
7. Information Technology Literacy of Blind Elementary School Students: A Mexican Perspective	**Autores:** Fajard Flores Silvia Berenice Michel García Aniluz Pulido, J. R. G. **Fuente:** International Journal of Learning. 2008, Vol. 15 Issue 6, p103-109. 7p. 4 Color Photographs, 2 Charts. **Palabras Clave:** Blind Students Disability Information Technology Special Education	Elementary schools in Mexico offer children information technology resources in order to promote computer literacy. Children use interactive materials from Web portals such as Enciclomedia and Red Escolar, designed for school work in the computer labs. However, blind children integrated to regular schools face themselves with a different scenario, since they have special requirements of assistive technology in order to use computers as their classmates do. This paper describes the issues involved in the information technology education of blind children integrated to regular elementary schools in the state of Colima, Mexico.	Integration is meant to consider every area on the academic development of children with disabilities; however, in Mexico, children who are blind are in disadvantage from their non-disabled classmates regarding the use of technology, which could eventually leave them behind in opportunities since they will need to continue to use computers during their following academic years. Teacher training in the use of hardware and software is crucial, specially when it comes to assistive technology to support children who are blind. According to Kappen (2005), technology will only be useful to students when teachers learn to use it and then to adapt it to the needs of every student. The results of this study revealed the issues in the information technology education of blind children integrated to regular elementary schools in the state of Colima, and may be used to compare the situation with other states in Mexico.	- Escandón Minutti, M. (2004). La Educación Especial y la Integración Educativa en México [Special Education and Educational Integration in Mexico]. Seminario Educación Inclusiva en México: Situación Actual y Desafíos para el Futuro. México, D.F. - Hatlen, P. (2003). The role of schools for the blind in inclusive education. The Educator. International Council for Education of People with Visual Impairment (ICEVI). Vol. 16, Issue 1 - INEGI [National Institute of Statistics, Geography and Informatics] (2000). Condición y tipo de discapacidad nacional. XII Censo general de Población y Vivienda 2000. Available on the Web: http://www.inegi.gob.mx/est/librerias/tabulados.asp?tabulado=tab_di01b&s=est&c=11516

Título de publicación	Referencia	Datos relevantes	Conclusiones	Bibliografía adicional
8. O que os olhos não veem o coração não sente? Investigando experiências de compra por deficientes visuais no varejo de roupas	**Autores:** Marcelo de Rezende Pinto Rodrigo Cassimiro de Freitas **Fuente:** REGE - Revista de Gestão Volume 20, Issue 3, July–September 2013, Pages 387–405 **Palabras clave**: Deficientes Visuais, Experiência de Compra, Varejo de Roupas.	Apesar da expressividade numérica da população de Pessoas Portadoras de Deficiência (PPD), pode-se perceber que, no campo da pesquisa sobre o consumidor em organizações varejistas, é notória a ausência de pesquisas a respeito das questões envolvendo este público. Essa constatação fica mais marcante quando se levam em consideração os trabalhos que abordam os deficientes visuais. É justamente em razão dessa lacuna existente na literatura que surgiu o interesse de conduzir uma pesquisa a partir da seguinte problemática: Como os deficientes visuais vivenciam no varejo suas experiências de compra de produtos, serviços, artefatos e imagens simbólicas relacionados ao vestuário? Como aporte teórico, considerou-se a literatura referente à abordagem experiencial e simbólica do consumo. Para a obtenção dos dados, optou-se pelo método de entrevista pessoal em profundidade com 11 portadores de deficiência visual. Como resultado, pode-se destacar que os consumidores deficientes visuais pesquisados definiram suas experiências de compra como algo mais do que situações aparentemente comuns, ao mesmo tempo em que expressaram diversos valores por meio do consumo, celebrando sua ligação com a sociedade como um todo. A partir dessas constatações, foi possível entender melhor as experiências de compra desses consumidores.	Por fim, é útil enfatizar um último ponto. Por se tratar de uma pesquisa inicial relacionada ao entendimento das experiências de consumo de deficientes visuais, o trabalho apenas “arranha” a problemática concernente às experiências de compra por parte dos deficientes visuais no ambiente de varejo. Além disso, o universo das PPD ainda precisa receber maior atenção dos pesquisadores dos mais diversos campos do conhecimento. Dessa forma, ao final deste artigo fica a sensação latente de que novos e mais abrangentes estudos precisam ser conduzidos. Portanto, registra-se aqui o convite aos pesquisadores do consumidor de enveredarem por esta seara de investigações.	- AMARO, Luiz E. da S.; MEIRA, Paulo R. dos S.; CAMARGO, Shirlei M.; SLONGO, Luiz A. O Varejo e os Portadores de Deficiência Visual. In: ENCONTRO DE MARKETING, 3., 2008, Curitiba. Anais... Curitiba: ANPAD, 200 - BAKER, S. Consumer normalcy: understanding the value of shopping through narratives of consumers with visual impairments. Journal of Retailing, v. 82, n. 1, p. 37-50, 2006. - In: BARBOSA, L.; CAMPBELL, C. (Org.). Cultura, Consumo e Identidade. Rio de Janeiro: Editora FGV, 2006 - DESJEUX, D. O Consumo: Abordagens em Ciências Sociais. Maceió: EDUFAL, 2011.

Título de publicación	Referencia	Datos relevantes	Conclusiones	Bibliografía adicional
9. The Development of Knowledge about the Earth and the Day/Night Cycle in Blind and Sighted Children Using Acoustical Rendition of Documents Visual Elements	**Autores:** Kalliopi Eikospentakia, Dimitrios Tsonos, Georgios Kouroupetroglou, Stella Vosniadou **Fuente:** Procedia Computer Science-Volume 65, 2015, Pages 484-491	During this study we planned an alternative teaching process, designed and based on inclusion, for tutoring the basic concepts of Observational Astronomy (OA) in an elementary school, taking into consideration the difficulties faced by both congenitally blind and sighted students. Following basic design-for-all principles, during a forty-five minutes teaching process, in which ten congenitally blind and ten sighted students participated, the educational material was presented in both visual and acoustic modalities, using an interactive whiteboard. An interview was then followed with each student in order to investigate their understanding of the scientific concepts of OA. The results of this study showed that congenitally blind and sighted students, after this alternative teaching process, experienced less difficulty in understanding the concepts of OA.	The results supported our hypothesis that the alternative teaching process combining documents' visual and acoustical presentation through an interactive whiteboard would be equally effective for both students group and particularly would help the congenitally blind students much more so that their performance would be similar to sighted students'. According to the results, both congenitally blind and sighted students didn't have difficulties in understanding the scientific explanation for the shape of the earth. The majority of the participants (9/10 of the congenital blind students and 8/10 of the sighted students) have understood the spherical shape of the Earth and from their answers to the critical five questions seemed to have also understood the scientific explanations. These findings lead us to believe that the alternative teaching process was as effective as to equalize the performance of congenitally blind and sighted students and to eliminate any problems that may be faced by both groups to understand difficult scientific information.	- Nussbaum J. Children's conception of the earth as a cosmic body: A cross age study. Scientific Education 1979;63:83-93. - Nussbaum J, Novak JD. An assessment of children's concepts of the earth utilizing structured interviews. Science Education 1976;60:535550. - Larsson A, Hallden O. A structural view on the emergence of a conception: emergence of a conceptual change as radical reconstruction of contexts. Science Education 2009;94:640-664 - Vosniadou S, Brewer W. Mental models of the Earth: A study of conceptual change in childhood. Cognitive Psychology 1992;24:535-585.

Título de publicación	Referencia	Datos relevantes	Conclusiones	Bibliografía adicional
10. 3D Literacy Aids Introduced in Classroom for Blind and Visually Impaired Students.	**Autores:** Jang Hee Harianto Rachel Ananda Chen Emily Lim Yeon Soo Jo Wonjin Moon Myoung-Woon Lee Heon Ju **Fuente:** Journal of Blindness Innovation & Research, 2016, Vol. 6 Issue 2, p1-1. 1p. 8 Color Photographs. **Palabras Clave:** 3D Printer elementary education literacy tactile graphics	There is currently a lack of literary resources for blind and visually impaired students. This is mainly due to the fact that customized learning materials are often difficult, time-consuming, and expensive to produce. Without customized writing tools, these students are not provided sufficient opportunities to learn educational materials in school. Specifically in Korea, it is challenging for blind or visually impaired students to adequately study the underlying principles of Hangul, the Korean alphabet. The lack of customized writing tools makes it strenuous for these students to practice writing Hangul characters and develop a solid grasp of the language. In this study, we introduced three dimensional (3D) literacy learning aids aimed at engaging blind and visually impaired students in practicing their Hangul literacy skills in both reading and writing. After noticing that students between the ages of three and five at the Seoul National School for the Blind lacked the necessary practice to write their own name or other basic characters in Hangul, we developed learning aids using 3D printing technology to help them acquire stronger writing skills. As a volunteer, Jang Hee I noticed that students lacked the fundamental gripping power essential to developing Hangul writing skills. This shortfall in grip power not only hindered the development of writing skills, but in turn also *impaired* the ability of the students to communicate effectively with the visual world.	Through this study, we have successfully introduced 3D printing technology to make literacy aids for blind and visually impaired students. Based on the positive response we received from students, and the improvement evident in their writing skills, 3D educational tools for visually impaired students were a valuable asset to their learning. We have also adjusted the design of our 3D literacy tools based on the feedback from students about the comfort and size of the tools so as to best meet the needs of blind or visually impaired students in the future. From this study, several things about the design of 3D literacy aids can be concluded. One of the most important aspects is that in order to construct the highest quality of 3D literacy aids, it is necessary to consider both the layer thickness of the material as well as the speed at which to move the extruder in the 3D printer. With the positive feedback from this study in using 3D printed literacy aids for the Korean alphabet, it will be insightful to improve the tool and then apply the technique to other educational applications, such as the English alphabet or teaching students how to recognize traffic signs. The 3D printing technology used in this study reveals a variety of opportunities to integrate blind and visually impaired students with the visual world at an early age.	*-Grice, N., Christian, C., Nota, A., & Greenfield, P. (2015). 3D printing technology: A unique way of making Hubble Space Telescope images accessible to non-visual learners. Journal of Blindness Innovation and Research, 5(1). doi: 10.5241/5-66* *-Reynaga-Peña, C. G. (2015). A microscopic world at the touch: Learning biology with novel 2.5D and 3D tactile models. Journal of Blindness Innovation and Research, 5(1). doi: 10.5241/5-54* *-Jo, W., I, JH., Harianto, R. A., So, J. H., Lee, H., Lee, H. J., & Moon, M. W. (2016). Introduction of 3D Printing Technology in the Classroom for Visually Impaired Students. Journal of Visual Impairment & Blindness, 110(2), 115.*

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11. Non-visual Landscape Planning for People with Vision Problems	**Autores:** Koskina Angeliki Hasanagas Nikolas **Fuente:** MLA (Modern Language Assoc.) Koskina, Angeliki and Nikolas Hasanagas. Non-Visual Landscape : Landscape Planning for People with Vision Problems. ibidem-Verlag, 2014.	Landscape is the impression given by a place. The five senses construct five landscapes: there is not only the visual landscape but also non-visual landscapes such as smell, touch, sound ('sound-scape'), and taste landscapes. The visual landscape is experienced by most people, while the remaining four non-visual landscapes mainly construct the non-visual world of the blind. In their innovative study, Angeliki Koskina and Nikolas Hasanagas explore this non-visual world on an empirical basis. What landscapes do blind people prefer? Is the natural or built environment most attractive for them? How differently do blind people perceive the'landscape'compared to sighted people? Which feelings does the landscape evoke in blind people, and which values do they attach to these feelings? How satisfied do they feel with the urban or natural landscapes where they live? Spatial Planning and Land-scape Design for handicapped people constitute a much-discussed academic and social issue. Koskina's and Hasanagas'study in the Anthropology of Senses and in Landscape Sociology can be used as an aid tool for planners and designers as well as researchers in various areas such as Architecture, Medicine, Social Sciences, or Psychology.	The need for socialisation plays a primary role in the landscapes of non-blind people and the blind. Another significant landscape aspect for both groups is the ecological dimension. The aspect of residence especially seems to be more important for the blind interviewees because they do not move about as much as non-blind people.	-Ananiadou-Tzimopoulou, M .(1992) Landscape Architecture. Design of urban places. Critical approach and theory, contemporary tendencies in landscape design (orig.Greek) Vol. A. Publ. Ziti. Thessaloniki -Bolou, M. and Gkouveris, V. (2000) New horizons for kids with visión problems. Guide of immediate action (orig.Greek). Thessaloniki. Publ. Iera Mitropolis of Thessalonik

Título de publicación	Referencia	Datos relevantes	Conclusiones	Bibliografía adicional
12. Short term memory and working memory in blind versus sighted children	**Autores:** Ans Withagen Astrid M.L. Kappers Mathijs P.J. Vervloed Harry Knoors Ludo Verhoeven **Fuente:** Research in Developmental Disabilities Volume 34, Issue 7, July 2013, Pages 2161–2172 **Palabras clave:** Children; Memory; Short term memory (STM) Working memory (WM)	There is evidence that blind people may strengthen their memory skills to compensate for absence of vision. However, which aspects of memory are involved is open to debate and a developmental perspective is generally lacking. In the present study, we compared the short term memory (STM) and working memory (WM) of 10-year-old blind children and sighted children. STM was measured using digit span forward, name learning, and word span tasks; WM was measured using listening span and digit span backward tasks. The blind children outperformed their sighted peers on both STM and WM tasks. The enhanced capacity of the blind children on digit span and other STM tasks confirms the results of earlier research; the significantly better performance of the blind children relative to their sighted peers on verbal WM tasks is a new interesting finding. Task characteristics, including the verbal nature of the WM tasks and strategies used to perform these tasks, are discussed.	The present study investigated the performance of blind versus sighted children on various STM and WM tasks. We found significantly better performance for the blind children relative to the sighted children on all memory tasks, both STM and WM. This finding is in line with those of Raz et al. (2007) who suggested that visually impaired individuals have superior memory abilities because they have trained themselves serial strategies to compensate for the absence of visual information. This superior ability is further thought to be the result of actual brain reorganization in blind people, whose brains become more adapted to spatial, sequential, and verbal information (Cornoldi & Vecchi, 2000). Although the participants in our study were children, the reorganization of their brains may already have taken place – at least in part. Lacking sight, blind children must develop serial strategies to identify objects in the environment and remember this information along with route information (Millar, 1994). According to Raz et al. (2007), blind people exercise their memories more often than sighted people. This hypothesis is confirmed by the results of other studies showing superior STM and LTM skills in blind adults relative to sighted adults (e.g. Röder and Neville, 2003 ; Röder and Rösler, 2004). This superiority is already visible in blind children around the age of 11 years.	-A. Amedi, N. Raz, P. Pianka, R. Malach, E. Zohary Early 'visual' cortex activation correlates with superior verbal memory performance in the blind Nature Neuroscience, 6 (2003), pp. 758–766 - Baddeley Working memory Oxford University Press, London (1986 - A.D. BaddeleyThe episodic buffer: A new component of working memory? Trends in Cognitive Sciences, 4 (2000), pp. 417–423

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13. A Theory-Based Physical Education Intervention for Adolescents with Visual Impairments.	Autores: Haegele, Justin A. Porretta, David L Fuente: Journal of Visual Impairment & Blindness Jan/Feb2017, Vol. 111 Issue 1, p77-84. 8p.	The article discusses research which determined whether social cognitive theory-based intervention has functional relation with the physical activities of adolescents with visual impairments. Topics discussed include review of related literatures, information on the program called Plan for Exercise, Plan for Health, instruments used to measure physical activity, and limitations of the study findings.	The results of this study suggest that the theory-based intervention did not have a functional relation with participants' physical activities. Negative findings, such as those found in this study, can provide valuable insight into the effectiveness of programs and provoke further research. Although negative, the findings presented here bring up the possibility that findings reported previously (Cervantes and Porretta, 2013) may have represented a type 1 error. Surely, additional research is necessary to explore that possibility. With the lack of physical activity research related to adolescent-aged individuals with visual impairments (Haegele & Porretta, 2015), and the influence that physical activity has on health-related outcomes (for instance, obesity), further research is needed for this population.	-Bandura, A. (2001). Social cognitive theory: An agentic perspective. Annual Review of Psychology. 52(1), 1–26. -Cervantes, C. M., & Porretta, D. L. (2013). Impact of after-school programming on physical activity among adolescents with visual impairments. Adapted Physical Activity Quarterly, 30(2), 127–146 -Guo, F., Li, Y., Kankanhalli, M. S., & Brown, M. S. (2013, October). An evaluation of wearable activity monitoring devices. In Proceedings of the 1st ACM international workshop on personal data meets distributed multimedia (pp. 31–34). ACM

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14. BLIND STUDENTS' LEARNING OF PROBABILITY THROUGH THE USE OF A TACTILE MODEL.	**Autores:** VERÔNICA YUMI KATAOKA AIDA CARVALHO VITA **Fuente:** Journal Plus Education / Educatia Plus. May2016, Vol. 14 Issue 1, p243-251. 9p. **Palabras clave:** Statistics education research; Teaching sequence; Basic probability concepts; SOLO taxonomy	The objective of this paper is to discuss how blind students learn basic concepts of probability using the tactile model proposed by Vita (2012). Among the activities were part of the teaching sequence 'Jefferson's Random Walk', in which students built a tree diagram (using plastic trays, foam cards, and toys), and pictograms in 3D (using the toys) to represent the possible ways in which Jefferson can visits his five friends and the expected frequencies of visits. The analysis of students' answers was based on the SOLO taxonomy, and developed from initial prestructural responses to final responses that were classified at the relational level. The study suggests adaptations of	We realize the evaluation of learning of basic concepts of probability by blind students should also take into consideration the evaluation of the Vita's (2012) tactile model, because of the curricular adaptations required in order to make it possible for these students to learn these mathematical concepts. In this context, our first point is that the curricular adaptations to which we refer are adjustments in the tasks and the artifacts of the tactile model, the temporality of the implementation of the tasks, and the educational method.	-Biggs, J., & Collis, K. (1991). Multimodal learning and the quality of intelligent behavior. In H. Rowe (Ed.), Intelligence, reconceptualization and measurement (pp. 57–76). Mahwah, NJ: Lawrence Erlbaum Associates. -Brasil: Ministério da Educação (1998a). Secretaria de Educação Especial. Parâmetros Curriculares Nacionais: Adaptações curricu -Brasil: Ministério da Educação (1998b). Secretaria de Educação Especial. Parâmetros Curriculares Nacionais: Matemática [National Curriculum Parameters: Mathematics]. Brasília: MEC/SEF.

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15. A Survey on Document Image Processing Methods Useful for Assistive Technology for the Blind	Autores: Robert Keefer Nikolaos Bourbakis Fuente: International Journal of Image & Graphics. Jan2015, Vol. 15 Issue 1, p-1. 35p.	This paper offers a review of the state-of-the-art document image processing methods and their classification by identifying new trends for automatic document processing and understanding. Document image processing (DIP) is an important problem related with most of the challenges coming from the image processing field and with applications to digital document summarization, readers for the visually impaired etc. Difficulties in the processing of documents can arise from lighting conditions, page curl, page rotation in 3D, and page layout segmentation. Document image processing is usually performed in the context of higher-level applications that require an undistorted document image such as optical character recognition and document restoration/preservation. Typically, assumptions are made to constrain the processing problem in the context of a particular application. In this survey, we categorize document image processing methods on the basis of the technique, provide detailed descriptions of representative methods in each category, and examine their pros and cons. It important to notice here that the DIP field is broad, thus we try to provide a top-down/horizontal survey rather a bottom up. At the same time, we target the area of document readers for the blind, and use this application to guide us in a top-down survey of DIP. Moreover, we present a comparative survey based on important aspects of a marketable system that is dependent on document image processing techniques.	In this paper, we present a comparative survey of DIP techniques based on several aspects of an overall system design. Our purpose in performing such a survey was to determine which methods were most useful in the development of techniques to support a mobile reading device for the visually impaired. Thus, our intent was to determine the current state-of-the-art and understand areas in which improvements are required to support our efforts. That is why our survey has a horizontal development rather a vertical one in many different image-processing areas. Thus, we intend in the near future to select the "better" performing methods in each specific domain and attempt to combine them into a synergistic recipe that will be tested for document processing for the visually impaired.	-World Health Organization (2010), http://www.who.int/blindness/Vision2020 report.pdf -J. Liang, D. Doermann and H. Li, "Camera-based analysis of text and documents: A survey," Int. Journal on Document Analysis and Recognition 7, 84–104 (2005). -L. Swartz, S. Ready, D. Jared and R. Street, "Bound document imager," U.S. Patent No. 6,056,258 (2000). -S. Pollard and M. Pilu, "Building cameras for capturing documents," Journal Document Analysis & Recognition 7(2–3), 123–137 (2005).

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16. The 'EyeCane', a new electronic travel aid for the blind: Technology, behavior & swift learning.	**Autores:** Maidenbaum, Shachar Hanassy, Shlomi Abboud, Sami Buchs, Galit Chebat, Daniel-Robert Levy-Tzedek, Shelly Amedi, Amir **Fuente:** Restorative Neurology & Neuroscience. 2014, Vol. 32 Issue 6, p813-824. 12p.	Purpose: Independent mobility is one of the most pressing problems facing people who are blind. We present the EyeCane, a new mobility aid aimed at increasing perception of environment beyond what is provided by the traditional White Cane for tasks such as distance estimation, navigation and obstacle detection. Methods: The 'EyeCane' enhances the traditional White Cane by using tactile and auditory output to increase detectable distance and angles. It circumvents the technical pitfalls of other devices, such as weight, short battery life, complex interface schemes, and slow learning curve. It implements multiple beams to enables detection of obstacles at different heights, and narrow beams to provide active sensing that can potentially increase the user's spatial perception of the environment. Participants were tasked with using the EyeCane for several basic tasks with minimal training. Results: Blind and blindfolded-sighted participants were able to use the EyeCane successfully for distance estimation, simple navigation and simple obstacle detection after only several minutes of training. Conclusions: These results demonstrate the EyeCane's potential for mobility rehabilitation. The short training time is especially important since available mobility training resources are limited, not always available, and can be quite expensive and/or entail long waiting periods.	We presented the EyeCane and showed its practical use for distance estimation, navigation and obstacle detection, which are all major tasks in mobility rehabilitation for the blind, and its advantages over the use of a White Cane alone for these tasks. Importantly, success was achieved after a minimal training time and in a natural environment, indicating the EyeCane's potential applications for practical rehabilitation.	- Amedi, A., & Hanassy, S., (2012). Infra Red based devices for guiding blind and visually impaired persons, US Patent 2,012,090,114. - Auvray, M., Hanneton, S., Lenay, C., & O'Reagn, K. (2005). There is something out there: Distal attribution in sensory substitution, twenty years later. J Integr Neurosci, 4(04), 505-521. - Auvray, M., Lenay, C., & Stewart, J. (2009). Perceptual interactions in a minimalist virtual environment. New Ideas Psychol, 27(1), 32-47. - Abboud, S., Hanassy, S., Levy-Tzedek, S., Maidenbaum, S., & Amedi, A. (2014) EyeMusic: Introducing a "visual" colorful experience for the blind using auditory sensory substitution. Restor Neurol Neuros, 32.2, 247-257.

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17. Use of a Smartphone for Leisure and Communication by People with Blindness a nd Motor Disabilities	Autores: Lancioni Giulio E Singh Nirbhay N. O'Reilly Mark F. Sigafoos Jeff Campodonico Francesca Alberti Gloria Fuente: Journal of Visual Impairment & BlindnessMar/Apr2017, Vol. 111 Issue 2, p181-186. 6p.	The article discusses research which investigated the possibility of teaching three participants with blindness and motor disabilities to manage independent leisure engagement and communication with distant partners via a smartphone. Topics discussed include review of related literatures, description of the studyy participants, data sources and analysis, and the suggestion of further research into additional arrangement conditions to make smartphones suit the needs of people of blind people.	The results indicate that the smartphone with the activation of the voice recognition function and the specific arrangements of the contacts unit and the media player suited participants with blindness and extensive motor impairment who were verbally skilled, and allowed them to manage leisure and communication events independently (McDougall, Evans, & Baldwin, 2010). These data represent an important extension of earlier evidence on the effectiveness of a computeraided program to provide leisure or communication opportunities to persons with multiple disabilities (Hatakeyama, Watanabe, Takahashi, Doi, & Fukuda, 2015; Lancioni et al., 2013, 2014, 2016).	- Al-Mouth, N., & Al-Khalifa, H. S. (2015). The accessibility and usage of smartphones by Arab-speaking visually impaired people. International Journal of Pervasive Computing and Communications, 11, 418 – 435. - Azenkot, S., & Lee, N. B. (2013). Exploring the use of speech input by blind people on mobile devices. Proceedings of the 15th International ACM SIGACCESS Conference on Computers and Accessibility. doi: 10.1145/2513383.2513440 - Barlow, D. H., Nock, M., & Hersen, M. (2009). Single-case experimental designs: Strategies for studying behavior change (3rd ed.). New York: Allyn & Bacon.

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18. Selecting and Purchasing Clothing: The Experience of Visually Impaired People in Hong Kong	**Autores:** Frency, Ng Sau Fun **Fuente:** Journal of Visual Impairment & Blindness. Jan2000, Vol. 94 Issue 1, p34. 8p. 6 Graphs.	This study analyzes the decision-making process for selecting and purchasing clothing of 81 people in Hong Kong who are visually impaired. Data were collected through personal interviews. The results show that problems such as unsatisfactory sales services and insufficient clothing information still exist for people with visual impairments (both the group with blindness and the group with low vision), and also reveals that people who are visually impaired have different views on the relative importance of selection criteria for purchasing clothing than do their sighted peers. Making satisfactory clothing purchases is likely to be difficult for people who are visually impaired because most clothing stores are designed and equipped for sighted consumers (Rusalem, 1972). Canter et al. (1974) showed that visually impaired people have preferences regarding the texture, style, and fabric of clothes but that it is difficult for this group of consumers to shop for clothes. Because people who are visually impaired often cannot identify the style or other qualities of clothing by themselves, they generally need the advice of other people, such as friends or relatives, to select or purchase clothes (Ricketts, 1975). In addition, before they can choose appropriate clothing at a store, visually impaired people first need to know current trends and styles and what is socially appropriate in different situations. They have to be able to choose among the available products to find what they need	This study showed that the BD and LV consumers have different views on the relative importance of selection criteria for purchasing clothing. It also revealed that both groups of respondents encounter a number of problems related to selecting and purchasing clothing. Both BD and LV consumers had similar problems, but a higher proportion of BD consumers were dissatisfied with the clothing items they purchased. To address this issue, retailers could provide some special sales staff to assist consumers in identifying the fabric, style, and care instructions for the clothing that is available for sale. A long-term solution would be to develop an inexpensive device to help these groups of consumers identify information that they need to make appropriate purchases independently.	-American Foundation for the Blind. (1970). A step-by-step guide to personal management for blind persons. New York: Author. - Canter, P., Cole, M., Fox, C., Hatlen, B., Hatlen, P., & LeDuc, J. (1974). Skills Center, San Pedro, California: Living Skills Center for the Visually Handicapped - Corn, A. L, & Koenig, A. J.. (1996). Foundations of low vision. New York: AFB Press. - Engel, J. F., Kollat, D. T., and Blackwell, R. D. (1973). Consumer behavior. New York: Holt, Rinehart & Winston. - Goldstein B. E. (1989). Sensation and perception (3rd Ed.). Belmont, CA: Wadsworth Publishers.

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19. Ergonomic aspects of design of a cap with electronic obstacle detector for use by visually impaired people	Autores: Nascimento, N Salvado, R Araújo, Borges, F.	Data from the 2000 census show that in Brazil, about 14.5% of the population carries some form of disability. The Northeast is the region with the highest percentage of people with disabilities: 16.8%. Thus, there are about 148,000 blind people in Brazil and approximately 2.4 million people who claim to have great difficulty seeing. The Northeast region concentrate around 57,400 people who declared themselves blind [1]. This large group of citizens needs assistive technologies to allow an autonomous mobility in urban environments and an autonomous access to public facilities. According to the Technical Assistance Committee of the Special Secretariat for Human Rights (Presidency of Brazil), assistive technology includes products, resources, methodologies, strategies, practices and services that aim to promote functionality related to the activity and participation of persons with disabilities or reduced mobility, promoting their autonomy, independence, quality of life and social inclusión. The most common assistive technology product among visually impaired people is the cane, which allows detection of lower obstacles, helping this way an independent walk. For a very short minority, it is complemented by a guiding dog. Nowadays, there exist several smart canes that include electronic devices for helping and guiding mobility.	One may conclude the optical sensor is efficient to detect frontal obstacles at 50, 100 or 150 cm distance. Moreover, the differentiation of the alarm signal for obstacles at 50, 100 or 150 cm distance are clear and helpful. The large majority of volunteers have easily and quickly learned how to use the sensor cap. They appreciate the possibility to independently activate each of the two actuators. Most of volunteers use both actuators. The sensor cap might have a lower price than other similar products of assistive technology. This makes the sensor cap more affordable which might enhance its dissemination among the visual disabled people. By this way, the sensor cap might facilitate urban mobility, improve autonomy and help social inclusion of a large number of citizens. This work shows how design might promote social inclusion and might reduce stigmas, helping visual disabled people to live better.	- IBGE, 2000. IBGE – Instituto Brasileiro de Geografia e Estatística. Relatório do Censo Demográfico 2000: Características gerais da população, resultado da amostra. Access on 30 /01/2011 - CAT, 2000. CAT - Comitê de Ajudas Técnicas. Acess on 25/01/2011. - IFCA – International Forum Concept Award (2009). Access on 30/01/2011. - Bassette, F. (2009). Sensores podem substituir bengalas para cegos. Folha de São Paulo / Universo Online (UOL). Acessado em 22 de abril de 2011, em

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20. Collaborative Action Research Approach Promoting Professional Development for Teachers of Students with Visual Impairment in Assistive Technology	**Autores:** Argyropoulos, Vassilios Nikolaraizi, Magda Tsiakali, Thomai Kountrias, Polychronis KoutsogiorgouSofia-Marina Martos, Aineias **Fuente:** Journal of International Special Needs Education. 2014, Vol. 17 Issue 1, p33-43. 11p. **Palabras Clave:** Action Research Assistive Technology Digital Educational Games Visual Impairmen	This paper highlights the framework and discusses the results of an action research project which aimed to facilitate the adoption of assistive technology devices and specialized software by teachers of students with visual impairment via a digital educational game, developed specifically for this project. The persons involved in this collaborative scheme were general and special education teachers, experts in IT, researchers and students with and without visual impairment. The findings of the study indicated that the digital educational game constituted for teachers a fertile ground for consolidation of their knowledge in assistive technology and for collaboration with their students. It is also argued that such applications could prove very useful means for students with visual impairment, encouraging them to use assistive technology since the environment of these applications is designed to be simple, friendly and amusing.	Finally, it is worth noting that all teachers who participated in the present project found that computer games may be a very useful tool for their instructional material (see Table 1) and realized that they should learn how to use specialized software and hardware efficiently in order to teach their students through a variety of media. This may have a great impact on instruction and effectiveness because according to Pivec (2009), digital games do have a place in the classroom, but as a tool to be utilised by creative teachers and not to replace teachers as suggested by some. This case is more demanding in special education because notions such as integration, accessibility and usability are always at stake. Technology and its implementation in general and special education are constantly changing. It seems that assistive technology needs to be one of the main components in teacher-training programmes (Smith, Kelley, Maushak, Griffin-Shirley, & Lan, 2009), otherwise the vast majority of teachers who teach students with disabilities will consider themselves to have inadequate knowledge regarding this field. It seems that a well organized pre-service programme for special education concerning assistive technology would constitute an ideal means for differentiation and response to intervention (Artiles & Kozleski, 2010; Barnes & Harlacher, 2008)	- Abner, G. H., & Lahm, E. A. (2002). Implementation of assistive technology with students who are visually impaired: Teachers' readiness. Journal of Visual Impairment & Blindness, 96, 98–105. - Alves, C. C. F., Monteiro, G. B. M., Rabello, S., Gasparetto, M. E. R. F., & Carvalho, K. M. (2009). Assistive technology applied to education of students with visual impairment. Rev Panam Salud Publica, 26(2), 148–152. - American Printing House for the Blind. (2008). Annual report. Retrieved from http://www.aph.org/about/ ar2008.pdf