
The diagnosis of the educational needs of the hearing impaired

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Abstract: The presented project aims at the examination of the relation of the deaf and hard of hearing people with the new technologies in Greece. The research was conducted through the construction and delivery of an online questionnaire to the members of two deaf organisations in Athens and refers to the motives, for the use of the internet services by deaf people. Particularly, the subject of this project is the comprehension of the needs and wishes of the deaf people regarding the new technologies capabilities as a means of information and communication and whether these capabilities contribute to the active social and economical participation of the people with hearing impairment. Hypotheses and questions are enounced, the survey tool is described as the survey progresses and finally the results of the survey are discussed. This discussion will consist of the basis for the formulation of psychological extensions and technological applications regarding the use of the internet capabilities by people with hearing impairment.

Keywords: deaf people; web education; educational material; internet; e-learning; e-commerce; ICTs; social integration; new technologies; e-diagnosis; educational needs; hearing impaired; humanistic computing.

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1 Introduction

People with hearing impairment are exposed as persons, as organised communities in communicational problems, which can be reduced or enhanced due to the brainstorming of information (Kersting, 1997). These people, due to their impairment, cannot manage the communication mediums in their whole, resulting to their anew social relegation, because knowledge and access to information is momentousness in today's society for the social-economical status of each person (Akach and Woodford, 2000).

Internet and its services reduce substantially the differences between hearing people and hard of hearing people, because in this case, information is primarily offered visually and less sonically (Swain and French, 2004). A hard of hearing person can have access to information of the same depth and plurality as a hearing person. WWW is the most manifold and popular service of the internet. It is an in-built platform for the further use of other services of the internet, namely a multimedia service (Sanger, 2006).

The field of information offered through the internet, spreads from text, to image, to audio documents and complex video. The information offered is available in different media presentation forms, as a result of the technological convergence between the content of older communicational mediums (text, image, audio and video). For the people with hearing impairment that is the step for complete access to the information society (Bozinis and Iakovou, 2005; Caldow, 2004).

Various websites have appeared lately, globally, which are contracted and managed by people with hearing impairment. These websites concern deaf people and their environment and their content varies, including discussions, press reports, links, social services, communication capabilities, instructions for TV shows with subtitles and

researches and scientific papers. One of the most important features of the internet is interactivity.

The user, in addition to the classic communicational mediums, can participate in the information offering its updating and handling, so that the user emerges as a producer and as an information dealer.

The primary target user group are the deaf people who need e-learning tools and educational material for the e-commerce and new technologies sector (Riley and Riley, 2003; Drigas et al., 2004b; Lytras, 2007a; Lytras and Sicilia, 2005). Until very recently, e-learning systems were unavailable to students with hearing impairment. However, the user-friendly multimedia-based telecommunication and information services of the internet can be used as a standard electronic platform to support primarily the main procedures of distance, lifelong and continuing training for the deaf people (Drigas et al., 2004a; Bose, 2004). The set of the communication and information services are adjusted to their special needs via the means of sign language and this is a certain method towards the general improvement of the educational and training services provided for the deaf people (Hughes et al., 2004; Henderson et al., 2005).

The basic objective of the DELFE project (Drigas et al., 2004b) is the support of the equal rights of deaf people for their access and real attendance in the professional training. The final aim is the creation of a passage for these individuals into the new professional fields via their training with specialised knowledge and skills in the use of the continuously developing sectors of e-learning and electronic trade (e-commerce). Specifically, this knowledge and experience will constitute a supply for their lifelong training and education (Twining, 2007).

Specifically, in the sectors of e-learning and e-commerce, an important blossoming in the work market is observed and new places of work in the enterprising sector are continuously created. Consequently, the target group (deaf people) that faces problems of social exclusion and unemployment will have multiple profits from the pilot action of distance and long life training into the new information and knowledge tools and strategies.

2 Deaf people and the internet

The internet has proven to be a boon for people with disabilities. But just as it is important to design buildings with accessibility in mind, the same is true for the internet. Flexibility is the key to accessibility. It is important to keep in mind that people will be using a variety of technologies to access your home page. Keeping your page accessible means keeping such options open in an age of intelligent http/WWW servers, which can query clients about their feature-lists.

It must be mentioned that as in the case of people without hearing impairment, where the majority of the people that do not use the internet capabilities, in deaf people, this reality is more apparent due to the lingual and reading weaknesses of many deaf people.

However, considering the homepages for the deaf people, it is ascertained that a certain percentage is very active in the internet uses, a percentage that consists the statistic population of the present research, according to the questionnaire that was constructed and delivered.

The main research question that was aimed to be clarified though the present research, based on an empirical approach, is how people with deaf impairment can or are

willing to manage concepts and capabilities through the internet, such as e-learning, e-commerce and e-government (Lytras, 2007b).

What is more, the relationship between the deaf people and the computer is going to be explored as well as the width, the motives and the character of this relationship. Finally, it is worth to mention that in what concerns the internet and deaf people, there are too few references in the international literature, which approach this concern from another point of view or include the people with hearing impairment (Molla and Al-Jaghoub, 2007).

3 Research questions and hypotheses

As it was mentioned in the previous paragraphs, the internet has one major advantage concerning the deaf people, in addition to the traditional means of communication, because its use serves the need of information as well as the need for their social-economical integration.

The hypotheses that are examined refer to centric theoretic concepts, such as integration, information, internet use and its extensions, such as communication.

Hence, the following hypotheses were structured accompanied by their reasoning, which were set under examination via a questionnaire.

- H1 Deaf people have sufficiently gained competencies for the use of computer and the internet.
- H2 Deaf people do not have the lingual competencies for using the capabilities offered through the internet.
- H3 Deaf people can be informed through the internet about various subjects.
- H4 Deaf people with access to the internet mostly use it as an information source.
- H5 Sign language consists the most opportune way for facilitating deaf people in the use of the internet.
- H6 Deaf people have minimum knowledge of the capabilities and applications of e-learning, e-commerce and e-government.
- H7 Deaf people show special interest in future training in the applications of e-learning, e-commerce and e-government.
- H8 Deaf people believe that the use of new technologies is highly important for their occupational integration and improvement.

4 Methodology

4.1 Participants

The online questionnaire was filled-in by a representative sample of 53 deaf people anonymously, including 31 women and 22 men, who are members of two of the largest deaf organisations in Athens and internet users.

In the first page of the questionnaire, it was highlighted that the questions concern only deaf people and not hard of hearing people, in order to define the respondent group from the beginning.

We must not exclude the possibility that the questionnaire was filled-in by other people, a fact that affects not only this survey but all surveys.

The degree of the usage relationship of the internet and the deaf people is hard to detect, because through the internet only the people who use it can be approached.

Before the conduction of the survey there were no statistical data concerning the population of the deaf internet users.

4.2 Instruments

For the examination of the hypotheses and questions, the written questionnaire method was designated, which is considered more appropriate for the recording of positions and opinions of a large number people, as is the case in this survey. The questionnaire is a well-structured tool of empirical social research, which consists of close and open-ended questions.

4.3 The online survey

The survey was conducted through a questionnaire, which was presented and filled-in at an internet website and which could alternatively be sent by e-mail.

The method of the online questionnaire was chosen based on the purposes of the research approach, which is related with the use of the internet and therefore should be directly referred to the target group, which the deaf users of the internet.

Moreover, the advantages of the online survey regard on the one hand, low cost and on the other, the capability of direct processing of the research data. A disadvantage could be considered the fact that the deaf people consists only a minor percentage of the Greek population, from which comparably only a small part has access and uses the internet services.

4.4 Construction

In general, the construction of each questionnaire must serve the examined circumstances and must be appropriate for the statistic population that is respondent. Particularly, during the examination of the deaf people, complex and abstruse meanings must be avoided. Therefore, simple, close-ended questions were used and formulated in order to avoid the effect of the deficient lingual and reading capabilities variable in the answers given by the deaf people.

From a database comprising 50 questions, we have chosen, together with a group of experts, 14 simple questions, which were considered appropriate as far as their lingual structure and their notional content were concerned.

In two successive pilot applications on deaf people with similar psychometric elements with the population we are concerned with, improvements were made as well as changes and deletions of certain questions depending on their difficulty and understanding level.

4.5 The online tool

For the conduction of the online survey, the N.C.S.R. 'DEMOKRITOS' Research Center developed an online panel site tool (OPST), which consists of a simple series of modules in the application for online research.

4.6 Data collection

The questionnaire was published in the DELFE website. Apart from the online filling in, there was also the alternative choice of sending the questionnaire via e-mail. The online survey took place from March 2005 to September 2005.

4.7 Results

The data processing was simplified through the used online tool because it comprised the largest part of this process. Moreover, with the help of the online tool, the initial data were enhanced in the SPSS statistic analysis program for further processing.

4.8 Statistic elements for the survey sample

The sample of the research was 53 deaf people [31 women (58%) and 22 men (42%)], which is generally considered a balanced percentage.

The younger deaf people of the sample (16–25 years old) took part in the online survey. This fact enforces the position that the age is a variable of great importance regarding the relationship of the deaf people with the internet. 56% of the sample has attended only a school for the deaf, but a large percentage of the sample has education of a higher level.

The ascertainment that the largest percentage of the deaf people that took part in the survey are unemployed, is explained, partly due to their young age, but is also a clear indication of the difficulties that the deaf people confront in order to gain access to employment.

5 Hypotheses discussion

The hypotheses and research questions must sufficiently satisfy the problematical of the present research, that is, which are the educational needs of the deaf people regarding the internet and its applications.

- H1 The deaf people have sufficiently gained the abilities to use the computer, but in the case of extended and productive use of the internet, they present medium to low ability.
- H2 Deaf people do not have the lingual competencies to use the offered internet capabilities. A large percentage of the sample (34%) does not speak foreign languages, a fact which is an obstacle for their relationship with the new technologies.

- H3 Deaf people can be informed through the internet about various subjects. One can confirm from the graph data that deaf people use the internet services typically. The observation that the internet is chosen as a means for entertainment, probably means that the internet is considered as more attractive compared with television or the written press, where there is no capability of subject presentation either in sign language or with the use of multimedia.
- H4 Deaf people with access to the internet mostly use it as an information source. The results from this graph enhance the above hypothesis. Over 80% of the deaf people of the sample believe that they are more efficiently informed and that they communicate easier and faster with the use of the internet.
- H5 Sign language consists the most opportune way for facilitating deaf people in the use of the internet. The results of the survey confirm that the combination of sign language and multimedia is a very important factor and one that will probably contribute to a more massive use of the internet by the deaf people.
- H6 Deaf people have minimum knowledge of the capabilities and the applications of e-learning, e-commerce and e-government. From the graph data, one can confirm that the difficulties that the people have accessing and using the internet, are the main factors that deaf people cannot comprehend and therefore participate in e-learning, e-commerce or e-government.
- H7 Deaf people show special interest in future training in the applications of e-learning, e-commerce and e-government. Whereas, deaf people do not have the knowledge or have not been trained in order to participate in e-learning, e-commerce or e-government, they are willing to be trained in the use of these technological capabilities and their applications in common economical, social and professional aspects.
- H8 Deaf people believe that the use of new technologies is highly important for their occupational integration and improvement. Especially, regarding the professional evolution of the deaf people that use the internet, 70% of the sample believes that these technologies will help them efficiently.

6 Conclusions

As it is mentioned above, the present survey aims to make clear the deaf people's place in society regarding the use of the internet and the new technologies and whether these new technologies can comprise a means for the integration of the deaf people in the social, economical and professional life.

What we know today is that the informing and communication of the deaf people has been improved significantly with the use of the internet. Better communication means greater participation in social life, because through the communication with other people, one can participate in social changes more easily. On the other hand, better informed means understanding and awareness of the surrounding air, ideas, values and the orientation of the society. The extensions and the applications of the internet, which offer an open communicational frame of interaction, allow the deaf people's clean contact with

all the possible receivers, whether they are deaf or not, putting an definitive end to deaf people's social blockade and exclusion from social life and activities.

References

- Akach, P. and Woodford, D. (2000) *Deafness: A Guide for Parents, Teachers and Community Workers*, United Nations Educational, Scientific and Cultural Organization, ED-2000/WS/33, UNESCO Document.
- Bose, R. (2004) 'Information technologies for education and training in e-government', Paper presented at the *International Conference on Information Technology: Coding and Computing*, 5–7 April, Las Vegas, USA.
- Bozinis, A.I. and Iakovou, E. (2005) 'Electronic democratic governance: problems, challenges and best practices', *Journal of Information Technology Impact*, Vol. 5, No. 2, pp.73–80.
- Caldow, J. (2004) 'E-democracy: putting down global roots', *Institute for Electronic Government*, IBM.
- Drigas, A.S., Vrettaros, J. and Kouremenos, D. (2004a) 'Teleeducation and e-learning services for teaching English as a second language to deaf people, whose first language is the sign language', *WSEAS Transactions on Information Science and Applications*, Vol. 1, No. 3, pp.834–842.
- Drigas, A.S., Vrettaros, J., Kouremenos, D. and Stavrou, L. (2004b) 'E-learning environment for deaf people in the e-commerce and new technologies sector', *WSEAS Transactions on Information Science and Applications*, Vol. 1, No. 5, pp.1189–1196.
- Henderson, V., Grinter, R.E. and Starner, T. (2005) 'Electronic communication by deaf teenagers', Technical report, Georgia Institute of Technology.
- Hughes, G., Hudgins, B. and MacDougall, J. (2004) 'Remote sign language interpretation using the internet', Paper presented at the *2nd Annual Conference on Communication Networks and Services Research*, 19–21 May, Fredericton, Canada.
- Kersting, S. (1997) 'Balancing between deaf and hearing worlds: reflections of mainstreamed college students on relationships and social interaction', *Journal of Deaf Studies and Deaf Education*, Vol. 2, No. 4, pp.252–263.
- Lytras, M.D. (2007a) 'Teaching in the knowledge society: an art of passion', *International Journal of Teaching and Case Studies*, Vol. 1, Nos. 1/2, pp.1–9.
- Lytras, M.D. (2007b) 'The semantic electronic government: knowledge management for citizen relationship and new assessment scenarios', *Electronic Government, An International Journal*, Vol. 3, No. 1, pp.5–17.
- Lytras, M.D. and Sicilia, M.A. (2005) 'The knowledge society: a manifesto for knowledge and learning', *International Journal of Knowledge and Learning*, Vol. 1, Nos. 1/2, pp.1–11.
- Molla, A. and Al-Jaghoub, S. (2007) 'Evaluating digital inclusion projects: a livelihood approach', *International Journal of Knowledge and Learning*, Vol. 3, No. 6, pp.592–611.
- Riley, T.B. and Riley, C.G. (2003) 'E-governance to e-democracy: examining the evolution', *International Tracking Survey Report*, No. 5.
- Sanger, L.M. (2006) 'The future of free information', *Digital Universe Journal*, No. 2006-1, Digital Universe Foundation.
- Swain, J. and French, S. (2004) 'Disability and communication: listening is not enough', in Barrett, S., Komarony, C., Robb, M. and Rogers, A. (Eds.): *Communication, Relationships and Care: A Reader*, pp.220–234.
- Twining, P. (2007) 'Discussing ICT, aspirations and targets for education: international perspectives', *International Journal of Knowledge and Learning*, Vol. 3, Nos. 2/3, pp.154–170.

Appendix: graphs - figures

Figure 1 Capability of using the computer's applications (see online version for colours)

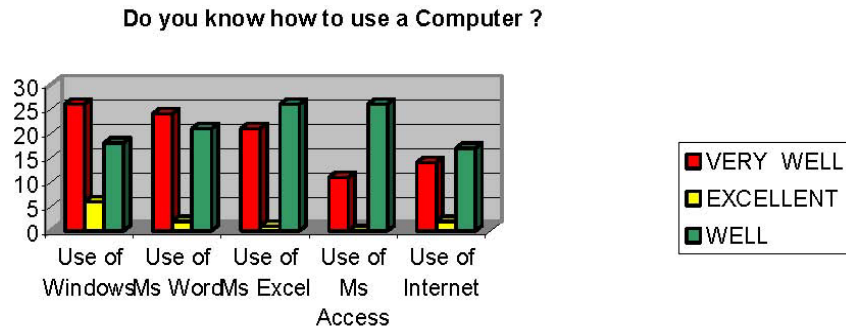


Figure 2 Knowledge of foreign languages (see online version for colours)

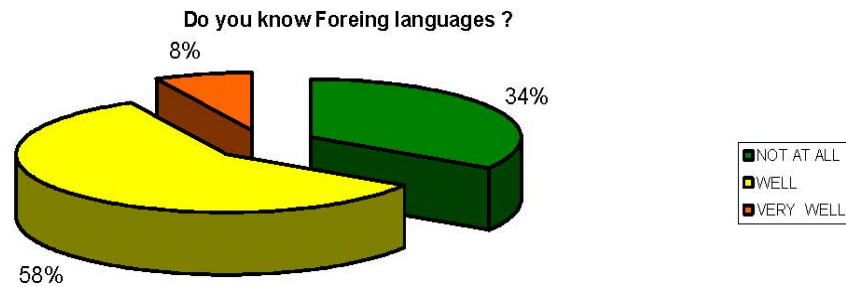


Figure 3 Interests regarding the internet (see online version for colours)

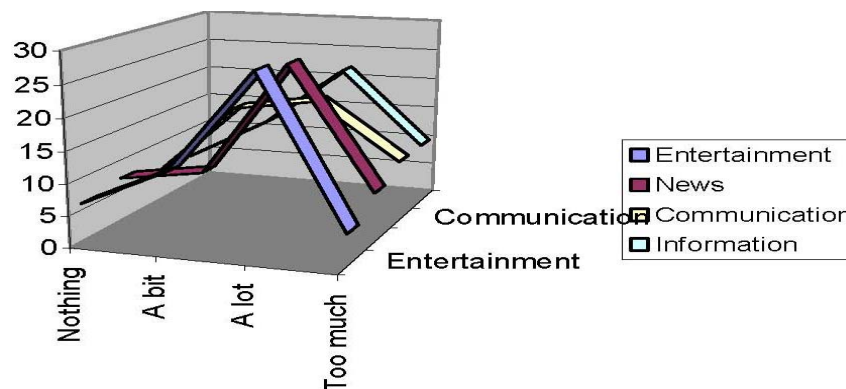


Figure 4 The internet as an information and communication medium for the deaf people (see online version for colours)

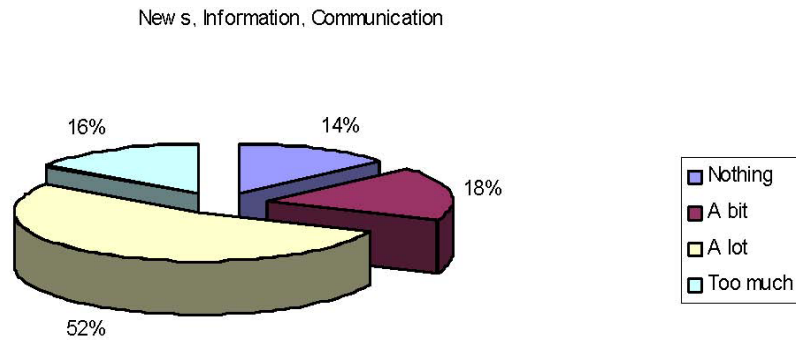


Figure 5 The contribution of sign language, multimedia and text in the use of the internet by deaf people (see online version for colours)

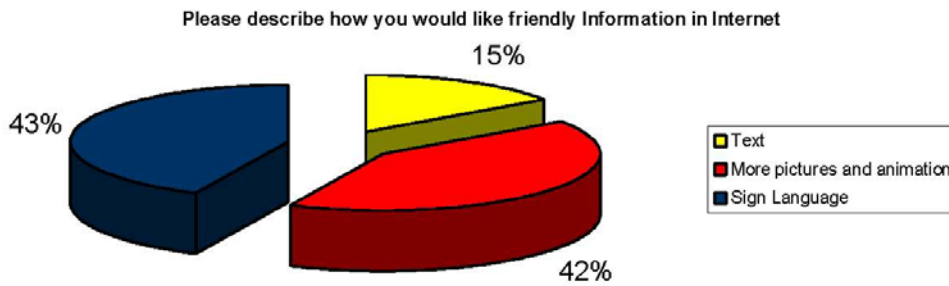


Figure 6 The familiarity of the deaf people with e-learning, e-commerce and e-government (see online version for colours)

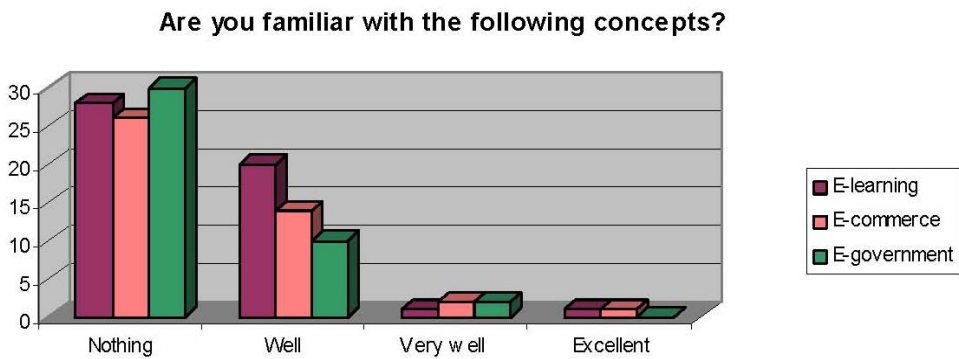


Figure 7 The deaf people's interest in e-learning, e-government and e-commerce (see online version for colours)

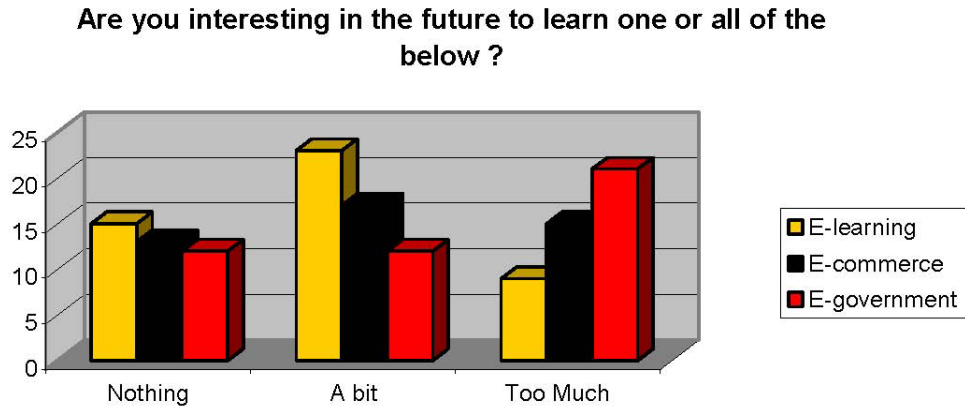


Figure 8 The contribution of the ICTs in the professional integration and evolution of the deaf people (see online version for colours)

Do you believe that the e-learning, e-commerce, e-government and other e-services would help you in your job?

