

# AUDIO HAPTICS FOR VISUALLY IMPAIRED TRAINING AND EDUCATION AT A DISTANCE

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Abstract: People who are blind have no access to visual graphic images and are at a substantial disadvantage in the learning process, particularly when studying in a distance learning situation with no specialist support. This project will provide an innovative method of delivering visual graphics to people who are visually impaired by the way of touch and sound using tactile diagrams with integrated sound files. Thus, the core theme of the project is to deliver graphic intensive e-learning course content material by sound and touch through the medium of “*Talking Tactile Technology*”.

Keywords: Software Engineering. Models, Methods and Tools.

## 1. INTRODUCTION

There are some 450 + million people in the EU. Depending on the source, the % of people who are recorded as blind or visually impaired varies from around 1.5% to 4% of the population depending on age and/or ethnic grouping. Taking a conservative 2% as a reasonable average on this basis there would be some 9 million people who have some level of visual impairment. During their lifetime people who are visually impaired are entitled to have an equality of access to information, education and training.

Digital networks are making the world shrink. The opportunities offered by the internet to create ‘global e-classrooms’ enabling people to communicate and be educated without ever having to leave their work area is of a magnitude that will bring about an ‘education revolution’ that could dwarf the ‘industrial revolution’ in its effect on the way people live. The full potential of using web communities in an educational context has yet to be fully explored but one thing will remain ~ practically every academic or vocational subject taught contains a varying degree of graphical data – maps, diagrams, charts, graphs, pictures.

Easy to see on a computer screen for those with sight ... an impossibility for those without.

The conversion of these visual images into traditional tactile diagram formats opens the door to accessibility and inclusion but has in the past always needed the assistance, usually on a one to one basis, of a trainer to explain the tactile diagram or the addition of voluminous Braille notations. That may be OK in a conventional classroom but something different has to be done for an e-classroom.

The subjects may be diverse:

- Business studies; needing pie charts, bar charts, organisation charts, process and flow diagrams, office plans, computer usage, screen layouts for word or excel, etc. to name but a few.
- Biology; a subject with an enormous graphic content, muscle groups, skeletal structure, cell structure, circulation systems, lymphatic system, nervous system, and so on.
- Physics; molecular structure, principals of levers and moments, cantilevers, pulleys and mechanical advantage diagrams and many more.

Just these three typical and diverse subjects illustrate the range of materials that are presented in visual graphic form, not a problem if you can see ... impossible to access and understand if you cannot see. If one considers the range of subjects that can increasingly be taught at a distance through

networked e-learning the problem is compounded by an order of magnitude.

The amount of information contained in a normal tactile sheet is limited for a number of reasons:

- It is only possible to use a limited number of textures, due to the limitations of the human fingers ability to distinguish between the textures.
- Due to the size of tactile graphics, only a small amount of Braille can be entered on each sheet. Large amounts of Braille tend to make the tactile graphics difficult to read, and sometimes the users have to read all the explaining text on a different sheet causing even greater assimilation difficulties.
- If the user is not a Braille reader significant extra problems apply.

The report “Why accessible e-learning makes business sense” issued by the UK CIPD [Chartered Institute of Personnel and Development] in January 2005 records that a recent survey by CEDEFOP revealed that 55% of respondents agreed that e-learning would open up new learning opportunities for learners with disabilities and that 80% of trainers also believed that e-learning should be provided to learners with disabilities to improve access to learning.

## 2. AIMS OF THE PROJECT

The project Audio Haptics for Visually Impaired Training and Education at a Distance is developed with the support of the European Commission within the Socrates-Minerva programme (Ref. no. 227444 – CP – 1 – 2006 – UK – MINERVA-M).

The core theme of the project is to deliver graphic intensive e-learning course content material by sound and touch through the medium of “*Talking Tactile Technology*”.

The overall objective of the project is to improve accessibility to visual graphics by non visual means and to allow autonomy of use by the individual in a distance learning environment.

Specific objectives are:

- Research and evaluate the problems of delivering distance learning materials containing visual graphics to the blind or visually impaired;
- Develop appropriate system improvements to allow the autonomy of the use of talking tactiles in a distance learning environment;
- Design and produce 3 sets of graphic intensive pilot course materials for use in a distance learning environment, test and evaluate as proof of concept;

- Produce common guidelines for creating talking tactile materials for European trans national standardization;
- Create an effective dissemination programme to ensure ongoing benefit can be achieved for our target group.

The main target group is learners who are blind or visually impaired studying on distance learning programmes, with the secondary benefit to education and training providers.

Partners of the project are:

The Royal National College for the Blind - Hereford, UK, coordinating Institution

Partners:

1. Dublin City University - Dublin, Ireland
2. IBOS - Hellerup, Denmark
3. SREP - Bucharest, Romania
4. BFI - Graz, Austria
5. University of Pavia - Pavia, Italy.

## 3. PEDAGOGICAL AND DIDACTICAL APPROACHES

It is believed they can be easily assimilated into existing curriculum processes and content as they are all based on the application/adaptation of visual graphics in common usage across Europe.

Once this project establishes the definitive techniques in design and use, with advice and guidance it is expected that all training providers will be able to supplement their existing materials with talking tactiles to support the target group and that production of the talking tactile materials could be carried out within the provider’s resource centre for little in the way of additional equipment.

It is a highly relevant and practical project that has the potential to become a European standard for the target group and indeed to go on to become a wider globally adopted system, thus meeting the prime strategic priorities of adaptation of the European education and training system to become a world reference.

The technology of using tactile diagrams with integrated sound files is new, the Royal National College for the Blind from UK has been pioneering the pedagogical principal and style of content over the last 3 years. In conjunction with the School of Educational of Anglia Ruskin University [formerly Anglia Polytechnic University] an initial evaluation was carried out in 2004 with children in primary and junior schools in the UK.

Talking Tactiles can support existing teaching practise, the prime duty of the talking tactile is to give autonomous accessibility to visual graphics, in this way it will enhance existing curriculum materials. In mixed classrooms a student who is visually impaired will have access to visual graphics by sound and touch working alongside his or her peers who will be using sight to access the subject matter. This element will give full inclusion to those who are blind or visually impaired. In a distance learning situation the student who is blind or visually impaired will again have equality of access, whilst their peers may be studying a visual image and reading accompanying text the learner who is blind or visually impaired will be able to access the same level of information by touch and sound.

#### 4. PROCESS OF THE PROJECT

It is expected that the overall project results will permit a wider choice of subjects to be provided and a much improved method of lesson content delivery achieved to the ultimate benefit of the target learner group in the normal day to day working of each partner, partner associates and others adopting this system.

The second element is the development of suitable tactile diagrams with integrated sound files that can be used without 'one 2 one' assistance from a teacher or trainer together with operational software to support these programmes. A simple objective but one that is considered will need a substantial amount of software and lesson content development to create the style of tactile and sound file script that will offer complete autonomy of use.

It is considered this element will explore pedagogical methods to answer the problems found in the first [research] element. Following on from this the third element is a prolonged period of evaluation with learners, analysis of feedback and any necessary fine tuning of the process. It is expected that once the problems are understood and the style / method of talking tactile creation is evaluated and proven this process could become a foundational program across Europe for improving outcomes of people with visual impairment in a distance learning situation.

From the training section of the website all providers will have free access to codes of good practice, pilot didactic materials, methodology principals and practical guidance on creating and using talking tactiles in such situations. It is expected that most existing visual graphic curriculum materials could be easily adapted to use with talking tactiles by providers, it is also the intent that at least the RNC will provide a transcription service to assist this process if required.

During the international meeting held in Copenhagen, on July 7-8, 2007, the partners decided that the main topics for the tactile materials should be:

1. Europe – that is focusing on the following aspects of each European country:
  - General aspects (geography, size, neighbours, etc.)
  - A few phrases in the national language
  - The type of government
  - National and regional dishes
  - National sports
  - The most renowned 5 tourist attractions
  - Educational system
  - Historical personalities
  - EU integration date
  - National currency
  - Religion
  - Ethnical minorities
  - Regional maps
  - Public transport
  - National flag
  - National airline (if any)
2. Sexual education
3. Excel tables (ECDL)

#### 5. RESULTS AND PRODUCTS OF THE PROJECT

The prime output from the project will be a methodology of delivering visual images in a non visual format that is touch and sound for use in the education and training of people with a visual impairment. This project will be specifically directed at supporting such individuals in a distance learning environment.

- The project will produce 3 sets of pilot or sample lesson content materials for use as proof of concept.
- The research report will give findings, evaluation and analysis of the problems of teaching / training people who are visually impaired in a distance learning environment.
- The project website will give the project objectives and findings and will give specific advice to distance learning providers on the benefits of this new teaching system and how they can create their own adaptive programs for our target group.
- Through the website and supporting paper documentation there will be produced a set of common standards and guidelines for the design and production of talking tactile materials to promote transnational standardisation.

The Romanian Society for Lifelong Learning will lead the workpackage on Evaluation of the system/methodology and coordinate the activities of

testing, user feedback and produce an assessment report on the operating system.

## 6.CONCLUSIONS

This project will offer a significant advance to the objective in that it will stem the risk of an “ever

widening gap between those that have access to the new knowledge and those who do not”

This project will provide a new and innovative method of delivering education to those who are blind or visually impaired, where there is a use of visual graphic curriculum materials.