

Olga Kisseleva

**FROM “WORLD WIDE VIP” TO “TUTOR”
AND VICE VERSA**



Figure 1: a person with Down Syndrome using TUTOR in Guggenheim Museum

TUTOR project is a work in progress I developed in 2006-2007 in Bilbao and in San Sebastian (Spain) within the framework of DISONANCIAS.

DISONANCIAS is an interdisciplinary project founded in 2005 by Xabide Group to promote the relationship between artistic creativity and technological innovation and to establish a new dialogue between the business world (and its technological environment), the artist world (and its creative development) and society, the ultimate beneficiary of the results of innovation. During 2006-2007 I was artist in residency in LEIA Scientific Foundation. As a part of the Integrated Safety Unit, I was asked to carry out research on safe environments to integrate disabled people with the aid of advanced design and simulation tools under the Design for All concept.



Figure 2 : a person with Down Syndrome using TUTOR at his workplace

TUTOR PROJECT: OBJECTIVES AND STRUCTURE

Design for All implies that environments, products and services are treated in such a way that everybody, irrespective of age, gender, capabilities and cultural baggage, can participate with equal opportunities in our society. It approaches the concept of “safety” from an integrative point of view that uses one variable of business management combining Safety and Health at Work, Industrial Safety and Environmental Safety. The main goal of the project was the development of intelligent tutors for disabled people and the integration of multimodal tools and emotional analysis to ease its use.

The integration problem of people with disabilities in the everyday life can be properly solved with the development of Intelligent Tutoring Systems (ITS) in portable platforms. The main feature of these kinds of tutors is the adaptation to the users need. This becomes essential when working with people with special needs. Moreover, they try to get positive effects for the user: improving the individual performance, increasing the communication and worker capability, growing the health and security factors .

On the other hand, complementary tools are integrated in these tutors who are based on pattern matching (images and speech) and human emotional feeling analysis. These capabilities improve the system reliability when working with handicapped people, sweeping away the frontiers. A critical aspect in the integration of this kind of products exists due to the specific ergonomic adaptability necessary (hardware and software) to meet the special needs of the people involved. The

development is focused on achieving real industrial reliable and healthy product that fulfils standard approval criteria. The accessibility and adaptability the immediate environments of handicapped people are closely connected to the design and ergonomic development of devices, systems, products or services, to the architectonic and city planning design and the development of software, as well as, in some cases, to these components redesign. For the same tool or device the variability of the handicapped group requires the development of different applications to adapt their use to the different groups that could obtain benefits from using it. In this sense, the devices of access to terminals and communication devices try to solve different kind of problems:

- Mobility, skill and coordination problems of people with physical disabilities,
- Vision, hearing and language problems of the people with sensorial disabilities,
- Intellectual, language, understanding and memory problems of people with psychical disabilities.

Intelligent Tutor Systems apply Artificial Intelligent (AI) techniques and methodology to the development of computer based learning systems in order to construct intelligent systems for education. The "intelligent" term is related to the capacity of dynamic adaptation to the learning process. A ITS focuses education as a process of cooperation between tutor and student in which the tutor tries to teach concepts to the student. In general, the process is guided by the tutor, who must analyse the behaviour, the knowledge and the satisfaction of the student. The tutor has to determine and apply the more appropriate teaching strategies at every moment. These strategies must answer a series of questions to ensure that the learning process is carried out successfully.

These questions are: what to explain, what detail level is necessary, when and how to interrupt the student and how to detect and to correct errors. The four basic components that classically are identified in a ITS are: Domain Module, Pedagogic Module, Student Model and Dialogue Module.

The adaptation and integration of linguist engineering and intelligent tools in the system is necessary when cognitive disabilities appear. In these cases, the ergonomic directives as well as the specific necessities of these persons are fundamental in the development of appropriate tools. It is not possible to apply a general approach due to the variability of needs that this collective exhibits. However, there are some physical and psychological common characteristics in people with Down Syndrome: heavy and fine mobility altered, smaller capacity to stay out, difficulty to anticipate or to understand consequences of their conduct, better visual perception and retention than auditory, greater response time, difficulty in understanding a number of instructions given in sequential form. The adaptive ergonomics must adapt to the personal characteristics mentioned before. Complex task

should be divided in brief and simple messages and the information should be presented in more than one media (multi-sensorial). The development of the vocal interface palliates the difficulties to interact with the system. The system developed in this way is adapted to the users, easy to use, interactive, friendly, error tolerant and it provides the required explanations eliminating unnecessary complexities and adapting the explanatory level to the knowledge and skills of the user.



Figure 3 : acces to Guggenheim Museum is organised for wheelchair, but nothing is made for people with mental disability

GUGGENHEIM TUTOR: SCOPE AND DESIGN

The main objective of Guggenheim TUTOR project was the development of an Intelligent Tutoring System, integrated on wireless portable devices (PDA, mobile phone,...) and adapted to the Museum's environment. The mobile tutoring system will help in the tasks people with Down Syndrome (DS) perform in their everyday life. Due to the characteristics of the people that is going to use these devices, it is absolutely necessary to design a interface that shows the following features: friendly, comfortable, flexible and ergonomically adapted to their cognitive characteristics. The objective of this project was to provide these users with a cognitive tool that contributes to the improvement of their autonomy, quality of life as well as help in the prevention of accidents.

The research team was interdisciplinary. In this project collaborates the company that contracts the disabled people (GUREAK ARABA S.L. (GUREAK Group), LEIA Foundation - CDT (UDS), Disonancias (Xabide Group) and the University of the Basque Country (UPV/EHU) – GAL-

LAN, LIPCNE, IXA research groups and the group of Computational Intelligence. The collaboration of the different groups and research labs allows to consider wide range of technologies that covers the necessities of this project.

This project was carried out in six phases:

- Phase 1: Analysis and definition of the Intelligent Tutoring System.
- Phase 2, Development of a prototype of the tutor.
- Phase 3: Workshop and evaluation of the prototype.
- Phase 4: Analysis and development of the mobile platform.
- Phase 5: Development and integration in the mobile platform.
- Phase 6: Exhibition and final evaluation.

The architecture of the TUTOR is composed of the following modules:

1. Domain Module: it contains the knowledge of the subject that is being taught. This module is completely configurable that allows to include new information.
 2. Pedagogical module: this is the component where the different teaching strategies are included together with the learning session control methods for selecting and sequencing the suitable strategies and didactic resources. This module adapts the teaching to the characteristics of the learner.
 3. Student Model: This component represents the beliefs that the system has of the knowledge that the student has acquired during the instruction process. In addition it represents other personal information like cognitive skills, motor abilities, etc. The person that is helps the user when performing the tasks can interact with this model and perform the appropriate changes when s/he detects new skills or problems.
 4. Dialogue Module: It defines the communication interface of the system with the user. On the one hand, it is responsible for translating the messages of the system to a representation understandable by the user. On the other hand, it transforms the inputs of the student to the internal representation that the system handles.
 5. Dialogue Toolkit: A toolkit has been developed with the aim of providing the system with intelligent behaviour including speech treatment motor and face recognition motor. In addition, a set of intelligent tool prototypes has been developed aimed at people with disabilities: (syllabics, communicators, voice controlled tools and face recognition applications). These tools contribute to make the tutor accessible to people with motor disabilities. This toolkit is controlled by the Dialogue Module Manager.
- In the development of the ITS XHTML marking language has been used due to its de facto standard character and its extensibility and also JAVA a multi-platform language. Both XHTML and JAVA will facilitate the exportation of the tutor modules to mobile platforms.



Figure 4 : a person with Down Syndrome using TUTOR in Guggenheim Museum during the workshop

CONCLUSION: RESULTS AND FUTURE WORKS

During 2006 a Guggenheim TUTOR has been developed and presented in the Museum during the workshop organised in March 2007. Throughout year 2007 has been made its integration on mobile platforms. An analysis of the support necessities for the people that suffers Down Syndrome when they come to the Museum. The results of this analysis are: their own and distinguishing characteristics (cognitive skills, motor functions, attention, perception, intelligence, memory, language, behaviour, sociability, etc). In this project, the tasks that have been selected for inclusion in the TUTOR are tasks performed during the Contemporary art Museum's visit. In the same way, the physical and cognitive requirements of the tasks are different and complementary. All this has allowed an open and modular design that will facilitate the insertion of new tasks in the TUTOR.

In addition, a bibliographical review and study of the state-of-the-art in the areas of accessibility and usability has been carried out. As a result, standard norms and guides applicable to this project have been identified: ergonomics for people with disabilities and software and hardware ergonomics. The aim of this study was to identify the application requirements to the ITS considering the characteristics of the group of people with Down Syndrome and the tasks to teach. The multidisciplinary composition of the project team (software/hardware developers, experts in ergonomics and people that work with people with Down Syndrome) has allowed to reach the TUTOR.

It helps in the integration of this people in the cultural environment. The developed prototype exhibits the following characteristics

- Configurable and flexible system that allows people without sound technical knowledge to define tasks for different people and different environments.
- Well-balanced system that allows the user to face important challenges: the completion of the task with a help level adapted to the characteristics of the user in order to gain a greater autonomy and knowledge.
- Graphical system that allows by means of images to easily visualize the tasks and the steps to perform.
- System that allows the user to initiate the work again at any moment, to ask for external help and to ask for a complete guide.



Figure 5 : Olga Kisseleva's « DG-Cabin » during the TUTOR workshop in Guggenheim Museum shows how a museum visitor can be « tele-commanded » by multimedia tools

The TUTOR has been designed to be configured in an easy handling web application. The application manages the tasks to perform and the necessary subtasks at different levels explained in a clear and concise way. The tasks and subtasks are represented with the following information: title, brief explanatory text, graphics, sounds, images and videos.

Since 1999 when I created her first work with mobile phone, I see mobile devises like a kind of

contemporary prosthesis which accompanies us everywhere.

This dependence is the basis of her new project heading ironically World Wide VIP. To belong to these planetary elite, it is necessary to be in possession of three essential accessories - a mobile phone, a credit card, and a EU/Swiss passport (soon a simple chip). These three small electronic objects are able to connect us constantly to the world and to open all the doors to us. The problem, it is when we lose one of them: we become almost disable!

In TUTOR project, thanks to the multimedia « tutors » which are constantly available via their mobile phone, the handicapped people approach normal people, but normal people become increasingly handicapped with the fur and as they lose their old reflexes being pressed more and more on these crutches electronic. I presented my multimedia TUTOR in the context of my personal show, which put in scene the handicapped people using the tutors via their portable telephone in situations of the everyday life. A manner also of sensitizing the valid public, by a mirror effect, with its own statute of assisted.

Olga Kisseleva

Russia, born in St.Petersburg, 1965

Professor, Director, Art&Science Program

University of Paris 1 Pantheon-Sorbonne

Faculty of Arts

www.kisseleva.org

olga.kisseleva@univ-paris1.fr



Figure 6 : Olga Kisseleva testing TUTOR before the show

Graduated from St. Petersburg University, Olga Kisseleva belongs to the first generation of Russian intelligentsia after Perestroika, which helped to bring down the Berlin Wall and cast aside the iron curtain. From the middle of the 90s, on the invitation of the Fulbright Foundation she found a roof for her work in the research group which dealt with the development of digital technologies. In 1996 she is getting her PhD. Olga Kisseleva's exhibitions include: Centre Pompidou (Paris), KIASMA (Helsinki), Guggenheim Museum (Bilbao), National Centre for Contemporary Art (Moscow), ARC (Paris), Reina Sofia (Madrid), Art Institute (Chicago), Venice, Istanbul, Dakar, Tirana and Moscow Biennials.