

# E-Training to Enable Inclusion of Young People with Intellectual Disabilities in Working Environments

Emanuela Mazzone<sup>1</sup>, Emmanuelle Gutierrez<sup>2</sup>, Carmen Barrera<sup>1</sup>, Jesus G. Boticario<sup>1</sup>

ADENU Research Group, Artificial Intelligence Department, UNED

calle Juan del Rosal, 16

Madrid 28040, Spain

+34 91 3989388

<sup>1</sup>{emazzone, cbarrera, jgb}@dia.uned.es, <sup>2</sup>emmanuelle@sidar.org

## ABSTRACT

Young people with intellectual disabilities are still considered a marginalised part of society, even if they are nowadays increasingly included into working environments. This increase is due both to new legislation regulations that enable companies to contract such category of workers more easily and to educational and training centres that prepare them at a professional level. Digital technologies and e-learning systems have great potential to support this process. The project AMI4INCLUSION, funded by the Spanish government, studies the integration of e-training platforms with ambient intelligent technologies in order to facilitate the inclusion of users with intellectual disabilities into working environments.

## Keywords

Accessibility, instructional design, Artificial intelligence, e-learning, e-coaching, intellectual disabilities

## INTRODUCTION

Intellectual disabilities can be of different nature and types, so that nowadays tend to be less and less classified and labelled in a rigid manner. In their definition of intellectual disabilities, the American Association of Intellectual and Developmental Disabilities [1] stresses the link between limitations in social, conceptual and practical skills with the community and cultural environment the individual is part of and all the related factors to take into account when dealing with the disability. Most people with intellectual disabilities, when diagnosed on time, have the opportunity to be supported with appropriate programmes and achieve a sufficient level of independence in everyday life activities.

Being able to have access to education and work is a right for every citizen and an opportunity to reach a satisfactory standard of life and integration in society. People with disabilities, who need special assistance and support to

access those services, are at a higher risk of being marginalised and excluded from society. To prevent this effect, the number of programmes and governmental actions towards reducing this risk is nowadays growing.

A study conducted in 2008 [3] across a few European countries has revealed an increase in the employment of people with disabilities with some sort of on site training but with overall insufficient levels of specific support in the working environment and life-long training for the worker. Amongst the surveyed countries, United Kingdom proves to be the one with highest percentage of companies that provide support for workers in their first three months in a new company (77%), whilst Spanish companies come first in terms of providing continuous training, yet only 40% of them do so.

E-learning and e-coaching services have a great potential to support users with intellectual disabilities and facilitate their professional development by providing accessible and adaptable learning in educational and working environments. The aDeNu research group of the national university of distance learning in Spain specialises in investigating and developing online interfaces and learning contents adapted to people with functional diversities. The group has developed a flexible, standard based and operational framework based on user modelling through a combination of knowledge based and machine learning techniques [an example can be read in 2]. To achieve a suitable level of accessibility and usability the design focuses on users' needs and users are directly involved when defining the requirements for such adaptive and personalised systems [4, 5].

## THE AMI4INCLUSION PROJECT

Ami4inclusion is a project funded by the Spanish programme for research on science, development and technological innovation. The main purpose of the project is to enable the inclusion of young people with intellectual disabilities into working environments by developing an e-training system that will support the workers throughout their professional development. This process includes the identification of a better way to integrate e-training services with ambient intelligent technologies and help the users in

*LEAVE BLANK THE LAST 2.5 cm (1") OF THE LEFT  
COLUMN ON THE FIRST PAGE FOR THE  
COPYRIGHT NOTICE.*

their learning, training and coaching tasks. The integration of the different services in a single Training and Monitoring System (TMS) will consider usability, accessibility and adaptation for users with intellectual disability. The Ami4inclusion project aims to prove the feasibility of the TMS in providing:

- High degree of independence of people with intellectual abilities to facilitate inclusion in working environments, family and social life;
- Life-long training (e-learning);
- Support for integrating young people with intellectual disabilities into working environments through coaching in a virtual environment (e-coaching);
- Training for teachers and coaches in using and exploiting the potential of the system;
- Training and technological support to companies involved in the inclusion of people with intellectual disabilities in their working environments.

### **The Promentor Programme**

The context of the project is the Higher Education course for 'Training for the Inclusion of Young People with Intellectual Disabilities in Working Environments', provided by the Promentor Programme promoted by the Prodis Foundation in agreement with the Autonomous University of Madrid. It is a two-year course within the Faculty of Professional Training for Teaching and Education, where students with intellectual disabilities, aged between 18 and 30, are trained to enter working environments. As the resources are unfortunately limited, the number of students accepted into the course needs to be restricted to an average of 15 students per year. One of the selection criteria is to have a group of students with a wide range of disabilities, including Down Syndrome and other developmental and cognitive impairments, in order to promote inclusion and diversity within the group itself.

Amongst the subjects taught in the educational programme, together with specific practices and working tools, particular emphasis is given to develop social, emotional and relational skills of the future workers in order to enable a complete process of integration in the social working system. For the first stage of the project the focus is on the module dedicated to organising tasks and archiving files, one of the most common jobs the students will carry out during their working experience. Lessons are normally structured in two parts, one more oriented to theoretical and conceptual teaching, the other to applying the acquired concepts in practice.

For the practical part of the class, students are asked to carry out the tasks that are part of typical working activities by using the same tools and objects as in a simulated situation. They work individually or in pairs, using pigeon holes, file cabinets, document trays, folders, commercial envelopes, bills, orders and all the types of documents they will be asked to handle in their future jobs. The educational

strategy is very much targeted to the specific needs of the group, and social interaction, between the students and the teacher, and amongst the students, is considered crucial for their professional and personal development.

### **E-TRAINING SYSTEM**

The general knowledge on the context of use acquired from the analysis of similar case studies has been tuned to the specific user group by observing and participating in their classes and through discussions with the teachers and coaches. Interaction with the users has allowed identifying user needs and requirements that can be satisfied by the e-training system. The effort that the students have in achieving results in their learning and training is extraordinary: for them, being able to succeed and be accepted in the working environments means to be able to increase their sense of independence, responsibility and belonging. This high motivation also leads them to handle standard computer software at a sufficient level; therefore the introduction of an accessible and adaptive e-training system represents an extra support. The benefits derived from this service are directed to both the teacher the learners and are summarised as follows:

- Facilitate the communication between teachers and learners;
- Record learners' progress;
- Provide personalised and adapted profiles updated in real-time;
- Provide personalised feedback;
- Provide content in an accessible and adaptable way;
- Integrate e-learning platform with intelligent ambient technologies;
- Increase learner/worker self-esteem and sense of belonging/integration, including the feeling of not being excluded from nowadays technological life.

Focussing on the specific scenario of the selected module, one of the organising tasks the students receive training on is to order documents alphabetically. This task implies a set of concepts and elements to include in the instructional design that considers the learning contents and educational strategies. The system intends to support students in reinforcing the theoretical concepts they are taught in the class and in practising the related exercises. The integration with ambient technologies will allow the e-training system to be connected to the physical objects the students use in their practical activities.

An example of a scenario is represented by the worker ordering documents and locating them in the appropriate trays. The documents will be provided with RFID tags and the trays where they need to be located will have a RFID reader. The system is then able to provide feedback to each user actions and update the personal profile with all the types of interaction of that specific user with the integrated system.

From the previous higher-level requirements, more specific functionalities have then been elicited according to levels of intervention.

*Technological support:*

- Accessible visual enhancement;
- Use of audio communication and help;

*Contents presentation:*

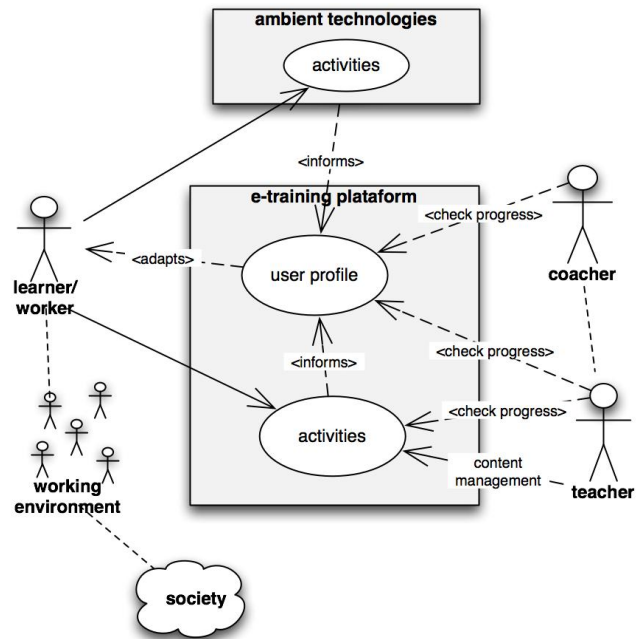
- Use diagrams and schematic conceptual representation;
- Graphical and pictorial information as support to textual, including references to shortcuts and tools used in the classroom;
- Positive language;
- Simplify contents but avoid childish references.

*Educational strategy:*

- Facilitate repetition of concepts and selection of exercises;
- Continuous evaluation of the users' understanding of contents and tasks;
- Provide immediate feedback on actions and possibility to recover from errors;
- Building self-confidence by starting with simple and achievable task and gradually increasing level of difficulty gradually;
- Avoid automatic responses from the system that could negatively affect the student's learning;
- Adapting timing and tasks sequence according to personal cognitive and concentration skills.

By supporting and enhancing the training of people with intellectual disabilities the e-training system aims to enhance their inclusion in working environments in a efficient and successful way. The benefits from the intervention of the e-training system are not only directed to the users of the system but to a broader part of the community they live in.

The figure below (fig. 1) simplifies the model of interactions amongst the e-training system and the different components and actors that are involved in its context of use.



**Figure 1. Model of interactions**

**FUTURE WORK**

At this stage of the project, a prototype of the e-training platform for the selected task needs to be implemented and tested in the classroom environment with the users. Future work for a later stage of the project will cover other topics of the course and developing the e-coaching service in the working environment, including more interactive and collaborative functionalities of the e-training platform.

At the same time, an adapted version of a Recommender System is under investigation. This service will provide users with personalised and punctual messages, prompts for specific actions to be carried out, that will ease the use of the system or their work in general. These recommendations will be designed with the educators and coaches in order to provide a more agile and supportive tool and consequently improve the workers' performance and confidence in the working environment.

**ACKNOWLEDGMENTS**

We thank students, workers, teachers, and coaches from the PROMENTOR programme and Prodis foundation who welcomed us in their training course, providing valuable information and a remarkable experience. Authors would also like to thank the Spanish government for supporting aDeNu projects, in particular AMI4INCLUSION (TS1-020100-2008-322) and A2UN@ project (TIN2008-06862-C04-01/TSI).

**REFERENCES**

1. American Association of Intellectual and Developmental Disabilities <http://www.aamr.org>
2. Boticario J G., Santos O C., "A Standards-based Modelling Approach for Dynamic Generation of Adaptive Learning Scenarios", Journal of Universal Computer Science, vol. 14, issue 17, 02/2009.

3. Jordán de Urrías, B., Beyer, S., Verdugo, M.A., Estudio Comparativo Sobre La Situación Del Empleo Con Apoyo En Europa (2007) <http://sid.usal.es/idocs/F8/FDO20844/jordan.pdf>
4. Rodríguez-Ascaso A., Martín L., Gutiérrez y Restrepo E., Finat C., Santos O C., Boticario J G., "Design and Use of an Online Community for Students with Disabilities. The UNED Experience ", EADTU's 20th Annual Conference 2008, Poitiers, France, 18/09/2008.
5. Rodríguez-Ascaso A., Santos O C., del Campo E., Saneiro M., Boticario J G., "Personalised support for students with disabilities based on psycho-educational guidelines", IEEE International Conference on Advance Learning Technology (ICALT 2008): Workshop on Advanced Learning Technologies for Disabled and Non-Disabled People (WALTD), Santander, Spain, 01/07/2008.