Development of an E-Learning curriculum for basic training in Computer and Internet dedicated to disabled and students with special needs

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Access to and inclusion in TVET in Africa through new ICT-based solutions
The Research Unit of Technologies of Information and Communication (UTIC) of the University of Tunis was created in 2002.

The activities of UTIC are focused on two main topics:

- **E-learning and e-accessibility**
- **High performance and grid computing**
Research Topic 1

High performance and grid computing

- Parallel algorithms and scientific applications
- Grid and peer to peer technology
- Middleware and algorithmic for grid computing
- Deployment of large scale applications
Research Topic 2

- Improve efficiency of e-learning tools and environments
  ➔ **PERSO** project: automatic personalization of courses in e-learning systems

- Create a barrier-free learning environment for students with disabilities.

- Improve accessibility to ICT of people with disabilities and special needs.
  ➔ **WEBSIGN** project: an environment for communication with deaf people using sign language via the web.
Since 2000, the Research laboratory UTIC of the ESSTT (Ecole Supérieure des Sciences et Techniques de Tunis) is interested on e-learning environments.

It works on two aspects:

- Pedagogical aspects
- Research aspects
UTIC PRESENTATION (3)

PEDAGOGICAL ASPECTS

- Produces online courses
- Conducts pilot experiences on e-learning in Tunisia
- Analyses experiences and recommends new solutions, approaches and tools.

Interaction with research works
UTIC PRESENTATION (4)

RESEARCH ASPECTS

Aim: improve efficiency by introducing intelligence into e-learning environments

Propositions:
- Learning objects reusability
- Course personalization
- Tools to assist student and teacher (automatic answering system, editors, ...)

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4 projects under development:

1. Automatic generation of personalized course
2. Automatic approach for adaptive e-learning system
3. Automatic answering tool
4. A management system of Learning objects
E-learning

In today's information technology society, we are living a multi-domain revolution particularly in education and training thanks to the development of a new mode of education: e-learning.
E-learning vs. Accessibility

- Nowadays, e-learning benefits from the fastest growing of Technologies of Information and Communication to empower education and create very sophisticated environments.

- However, little attention has been devoted to making these technologies accessible to people with various disabilities.
The Convention of the United Nations on the Rights of Persons with Disabilities

- Adopted by the United Nations General Assembly on December 13, 2006
  → 8th Universal Convention on Human Rights and 1st of this millennium
  → Addresses the rights of 650 million persons with disabilities, impacting 2 billion persons including the family members of persons with disabilities
  → Historically the highest number of signatories for a UN Convention on its opening day—in this case, on March 30th, 2007

- 126 countries have signed it as of April 2008
- 20 have ratified it making it an enforceable legal instrument
The Convention of the United Nations on the Rights of Persons with Disabilities

14 out of the 32 nonprocedural articles of the Convention mention obligations with implications for ICT:

→ Obligations are generally defined in relation to a desired outcome, rather than in specific technical terms

→ Accessible communications well defined

→ Cover both public and private sectors
E-accessibility - The National Tunisian Context: A favorable environment

- SMSI, Tunis November 2005
- Decision from the President of the Republic of the 24 February 2007 related to making accessible the web sites of public institutions up to the end of 2009.

**Education**
- Decision from the President of the Republic 2005: Creation of a virtual curriculum dedicated to disabled and students with special needs.
The scientific community has recently been aware about the importance of accessibility of disabled people to information technologies, called e-accessibility.

This word is specifically used to describe tools and means allowing users regardless of their culture, language, age, disability to reach information and new technologies like Internet, without dependence or aid.
The W3C Web Accessibility Initiative (WAI) has been established to raise awareness of universal access. WAI develops guidelines which can help to ensure that Web pages are widely accessible.
Web Accessibility Initiative (WAI)

- One of five main areas of W3C work
- Addresses cross-disability user requirements for the Web
  - visual, auditory, physical, cognitive, neurological disabilities; ageing...
- Develops consensus-based technical solutions to meet user needs
- Supported by government, industry sponsors, W3C members
Three WAI Guidelines...

- Web Content Accessibility Guidelines (WCAG) → accessibility of Web sites, Web content, Web applications
- **Authoring Tool** Accessibility Guidelines (ATAG) → accessibility of software used to develop Web content → support for production of accessible content
- User Agent Accessibility Guidelines (UAAG) → accessibility of browsers and media players → interoperability with assistive technologies
Context of the project

- September 2007: generalisation of C2I in all academic institutions in Tunisia (virtual basic training in Computer and Internet)
- The virtual University of Tunis developed the curriculum composed of six courses
- All students, but disabled, can benefit from this virtual training
Context of the project

- Object of the project: the development of an accessible e-learning version of “C2i” dedicated to disabled and students with special needs.

- Conformity to AccessiWeb recommendations to ensure high level accessibility of the curriculum.
AccessiWeb

- AccessiWeb recommendations, defined by “Braillenet Association”, are constituted of 92 check points.
- The application of these check points produces accessible content which can be classified on three levels of accessibility: The first one called “AAA”, the second one is “AA” and the last one is “A”.

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AccessiWeb (2)

- The 92 criteria’s are based on the different WCAG recommendations.
- The 92 criteria "AccessiWeb" are divided into 3 groups corresponding to 3 levels label:
  - 55 criteria’s of Bronze (A),
  - 23 criteria’s of Silver (AA),
  - 14 criteria’s of Gold (AAA).
AccessiWeb (2)

These criteria’s are structured around 13 families of web elements:

- graphical elements
- frames
- links
- tables
- forms
- multimedia
- scripts
- colors
- accessible content
- navigation help
- information structure
- requested elements
- presentation of information
Examples of non conformity to accessibility guidelines

- images that do not have alternative text
- complex images (e.g. graphs or charts) that are not adequately described
- video that is not described in text or audio
- tables that do not make sense when read serially (in a cell-by-cell mode)
- frames that do not have "NOFRAME" alternatives, or that do not have meaningful names
- browsers and authoring tools that lack keyboard support for all commands
- browsers and authoring tools that do not use standard applications programmer interfaces for the operating system they are using
Methodology of work

- June 2007: starting the project
- Training and constitution of the team work (9 persons)
- Methodology: development, evaluation of accessibility criteria’s, correction, validation
- Test and Validation with two blind users
- Collaboration with the Virtual University of Tunis
The result

- The developed courses are totally accessible and are labelled “AAA” which represents the highest level of accessibility defined by the W3C.
Examples of conformity to accessibility guidelines

- All links are expressed explicitly which make blind student in comfort when navigating.
- All the illustrative images are accompanied by textual alternatives.
- The content is totally independent of presentation by using CSS technology.
- All the tables are explicitly described by caption and summary attributes in order to facilitate understanding of different lines.
- The help and courses plans are present in all the pages.
- A local search is integrated into the courses in order to facilitate information research.
Examples of conformity to accessibility guidelines

- Keyboards shortcuts (AccessKey) are programmed to accelerate navigation and replace the mouse (impaired and low vision people).

- Colors contrasts are strictly respected.

- Zoom in and Zoom out are integrated in the pages of the courses to give low vision student the possibility the chose adapted policy sizes.

- Heading, lists and consistent structure are used to organize all the pages.

- Different alternatives are provided when scripts, applets and plug-ins are inaccessible or unsupported.
Demonstration
UTIC Team

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Thank you for your attention