MEDINFO 2007
HISA Ltd Australia
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An e-Learning Experience in a Biomedical Research and Public Health Institute

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Abstract

This paper evaluates the current state of educational activities in biomedical informatics, bioinformatics and convergent technologies from the Department of Medical Bioinformatics of the National Institute of Health "Carlos III". It raises the possibility of designing several didactic virtual activities. It establishes the key elements that define the structure and educational methodology necessary for the success of a virtual course. They highlight the importance of collaborative work, the need of the implementation of new methods of communication and the design of new learning activities and new evaluation criteria. It also establishes the need of an e-learning platform for distance on-line learning. The implementation of e-learning in the Institute of Health "Carlos III" has opened the possibility of adapting diverse courses traditionally taught face-to-face to be taught on line. Also new courses have been designed. Health management, research methodology, biosecurity, studies of epidemiological outbreaks, bioinformatics or biomedical informatics are some examples of the wide range of topics offered.

Keywords:

education, e-Learning, medical bioinformatics

Introduction

The Area of Biomedical Informatics (BIOTIC) was founded in 1998, as an answer to the increasing need of the Institute of Health Carlos III (ISCIII) to establish an expert team, with the mission of developing and researching new informatics tools to facilitate the use and understanding of new approaches to genomic based medicine. The ISCIII is a National Public Research Institution that provides scientific support to all the National Health System of Spain. One of its appointed tasks is to promote research in biomedicine and health sciences, being its main goal to develop and provide scientific and technical services to the National Health System and to society in general. In this respect, the BIOTIC team which is composed of biologists, chemists, pharmacists, informatics experts, statisticians and experts in education and e-learning is entrusted with the research and development of informatics tools that aid in the understanding and use of new approaches to genomics based medicine[1]. This multidisciplinary group also facilitates the knowledge of new technologies such as Nanotechnologies, Biotechnologies, Information Technologies and Cognitive Sciences (NBIC) and their convergence for the treatment of biomedical information and their application in research, clinical practice and public health [2].

The relevant role that BIOTIC plays in the research areas mentioned above has made it possible to develop and carry out an important educational and training activity. These programs address the training needs of different collectives such as personnel in hospitals, public health schools, research centers, scientific societies, universities, associations of health professionals, technological centers and national centers. Some of this activity is done through BIOTIC's participation in the Education Node of the National Institute of Bioinformatics (INB). This initiative funded by Genoma España, has as its main objective the training of bioinformaticians for their integration in genomics and proteomics research groups.

Methods

Researchers in the area of BIOTIC regularly attend courses and congresses related with bioinformatics, microarrays, genomics and health, biomedical informatics and convergent technologies to be up to date on their areas of specialty.

Courses developed by BIOTIC have been traditionally taught face-to-face. The teaching methodology implemented focuses on the analysis of the learning needs and the profile of the students and it depends on the characteristics of the program to be taught. Once the needs have been identified, the next steps are to design the learning contents and to define the criteria for performance as well as to prepare and/or adapt available resources (technical, human and material) to adequately carry out the specific educational program.

The instructional methods are mainly of two types: exposition of the information and exercises or practical activities with feedback. Practical activities apply theoretical concepts, which are determined by the learning objectives of the education program. The area of BIOTIC bases its work in three main axes:

- Technology and innovation: the new technologies are revolutionizing the research and education fields.
- Sustainability: trying to make new technologies to become part of the student's everyday work.
- Promote an enterprising scientific nature.

The key elements that define the teaching methodology carried out are based on the transfer of knowledge through [3]:

- Planning and design of the teaching program based on curricular models validated through scientific research.
- Evaluation of the students' previous knowledge and their expectations about the course.
- Use of the didactic methods that are most adequate for the objectives of each program.
- Application, through the available materials and tools, of the knowledge and skills obtained.
- Evaluation activities are carried out to see if the students have learnt the concepts.
- Evaluation of the teachers and the quality of the course.

In general, the lack of specialists and experts that can lead these processes, together with the lack of an economic, didactic, technical and management plan, can drive any program to its failure. With the objective of implementing this educational model, the ISCIII acquired a tele-educational platform (WebCT). At the same time the National School of Public Health of the Institute created the e-learning commission, of which BIOTIC is a member.[4]

The tele-education platform WebCT (Web Course Tools) has all the basic characteristics required for distance learning systems through networks. The WebCT enables knowledge management directed towards teaching online through the Internet and requires some minimum technical requirements, basically the same that are needed to connect to the Internet. The WebCT permits to establish interaction spaces through the communication tools that it offers (e-mail, chat, forum, shared blackboard, etc...). It also permits to define different roles and functions to the participants (teacher, student, technical administrator, etc.), the publication of learning contents, building of glossaries, evaluation tests or exams, design of individual and group activities, links to databases and digital libraries, among other resources.

Implementing virtual education demands previous training of the future on-line teachers both at the technological and didactic level. In response to this increasing interest, the area of Biomedical Informatics suggested and developed and now teaches a course for training online teachers. This is an alternative educational solution that also meets the strict scientific and academic requirements necessary to respond to the training needs of the professionals of the ISCIII. It was thought that it was important that the whole course be taught through the WebCT platform so that students (future online teachers) would experience themselves the advantages and disadvantages of e-learning. This way they could get the skills and abilities specifically needed for teaching online which include technological, didactic and curricular training. It was essential for the students to apply the acquired knowledge by designing an online course in their professional field based on a curricular perspective.

The teaching in virtual environments has to be established under pedagogical models that promote education processes through the implementation of communication techniques, creating spaces that make possible active, creative and critical participation of the agents involved.

Results

The results of the evaluation of the courses taught by the Area have been highly positive. The circle of centers and universities in which the researchers in BIOTIC teach is getting wider and some of these courses have been awarded with a "Mention of Quality".

One of the main achievements of the course recently taught by the Area of Biomedical Informatics about online training for the professionals of the ISCIII is the development of several courses or Masters related to the professional specialty of the students [5]. Most of the students worked in groups of 2 or 4 members.

Discussion and conclusion

It is important to approach e-learning education with an open mind for virtual environments and not with a face to face teaching mentality. Online teachers have to be familiar with both Information and Communication Technologies (ICT) and pedagogic strategies for virtual environments. They should be aware of the possibilities and limitations of these technologies in virtual environments. They should have knowledge of group work techniques adapted to the virtual environment and knowledge of the different learning theories applicable to virtual surroundings. It is important not to confuse means with the ends: the technology should be at the service of education and not the other way around.

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