

# **DIETETICS-SOFTWARE PROGRAMS AND COMPUTER-BASED LEARNING**

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## **ABSTRACT**

Dietetics-software programs integrate the automation of many clinical nutrition and food-management functions. Clinical Dietetics activities such as nutrition screening, nutrition assessment, diet-order entry, patient food-preferences recording, specific diet pattern-calculations, nutrient analysis of meals, consult reporting etc, are usually provided by these programs. Consequently, they can be also utilized for computer-based learning of Dietetics in practice. In our opinion, University departments and Colleges that teach Dietetics must be involved actively not only in the evaluation of Dietetics software in order to select the most suitable to teach the students, but also to evaluate the extent to which it can be utilized on computer-based learning. In addition, the core ideas on which these programs are built must be presented to the students. The last years, a number of Dietetics freeware-programs (mainly in English) are available through the internet; some covering a number of basic functional and non-functional requirements. Students should be encouraged to “play” with them, add local foods and compare the diets prepared using freeware with the diets prepared using marketable Dietetics-software. On the other hand, direct communication and opinion-exchanges of the students and the professors with the professional Dietetics-software producers can possibly help the latter to improve the programs they put in the market by including more advanced tutorial sections.

## **KEYWORDS**

Computer-based learning, e-learning, dietetics software, dieticians, tutorials

## **INTRODUCTION**

The science of Nutrition studies the nutrients (carbohydrate, protein, fat, vitamins, minerals) focusing on how they are ingested, digested, absorbed, metabolized, stored and excreted. In addition, how the nutrition choices we make can affect our health. On the other hand, Dietetics is the profession that applies the science of nutrition into everyday practice (ChanLin, Huang and Chan, 2002).

Various computer-based learning courses employing modern techniques have been developed to assist learning, and support the dissemination of skills, and knowledge (Henry, 2001; ChanLin, Huang and Chan, 2002). The increasing technological capacity for multimedia, multimode communication and information presentation, as well as the easy access to an ever-growing body of information and new way of data representations has provided educators with exciting opportunities to enhance teaching and learning (Zhao, 1998; ChanLin, Huang and Chan, 2002).

In teaching nutrition and health issues, computer-based instruction provides various options. The multimedia and hypertext by its very nature allows users to search learning resources or databases to fulfil their learning curiosity and accomplish their learning tasks (Stover and Zink, 1996). In the area of health professions education, computer-based instruction has been implemented successfully in the training of professionals to improve clinical thinking skills (Shah, Geroge and Himburg, 1999). In addition, the success of computer-based learning has been demonstrated in the training of dieticians (Shah, Geroge and Himburg, 1999; ChanLin, Huang and Chan, 2002).

## **BASIC NOTIONS ON E-LEARNING OF DIETICIANS**

A fundamental skill for the dietician is the ability to take a diet history, to calculate nutrient intake and then use this information, together with an understanding of an individual's medical and history, to advice on dietary change (Herriot, Bishop and Truby, 2004). Dietetics software is expected to integrate the automation of many clinical nutrition and food-management functions. The clinical Dietetics activities of nutrition screening, nutrition assessment, diet-order entry, patient food-preferences recording, specific diet pattern-calculations, nutrient analysis of meals, consult reporting etc, are usually provided by these programs (Androulaki, Dimitropoulakis, Maraki, Markaki and Fragkiadakis, 2006).

Utilities such as complete automation of food production activities, service and distribution, inventory and cost management, recipe expansion, menu and recipe nutrient analysis, meal and diet-pattern development and implementation, diet card and tray ticket printing, quality service tracking, and annual management reporting can also be provided by certain of the Dietetics-software programs (Androulaki, Dimitropoulakis, Maraki, Markaki and Fragkiadakis, 2006).

Each Dietetics-software can be used in different cases and by different users. The user may be a registered dietician, a professor, a physician, a student, an athletic trainer etc. The most common places where Dietetics-software is used are the followings: 1. Dietetics offices; 2. Beauty centres; 3. Hospitals, clinics, physician offices; 4. Universities and Colleges; 5. Gyms and athletic centres; 6. Food-packaging establishments; 7. Mass-catering establishments etc. With the growing number of nutrient-calculation software-packages on the market, potential users including the higher education institutions are faced with the increasingly difficult task of determining which system best meets their needs (Wise, 1998; Wise, 1999; Androulaki, Dimitropoulakis, Maraki, Markaki and Fragkiadakis, 2006).

In a computer-based nutrition course, the student's use of computer and Internet technology to facilitate learning is utilized. With emphasis on learning nutrition concepts, the use of visual representation is critical in creating real-life experience that allows students to relate the materials with daily food intake. In addition to learning content, the access to digital resources also permits exploration of different information resources. The learning materials must cover the introduction of various nutrients, and how they influence human health. The daily requirement of each nutrient, its deficiency symptoms, food sources and nutrition compositions of foods must also be provided with fruitful visual information. By viewing the pictures showing the quantity per serve of each food and its nutrients content, students can become able to relate the visual representations with the food intake (ChanLin, Huang and Chan, 2002).

The e-learning lessons must provide a menu-based learning interface, allowing students to enter the information stream at a variety of points. Students can be requested to record their food intake and self-analyze their nutrient status based on their own nutrition requirement. This level of authenticity is necessary to sustain students' interest and activity in the hypertext environment. Students can in parallel further search for relevant information, pertinent to their learning goals, through the wealth of information and learning resources available on the Internet (Wilson, 1996).

With the links to digital resources, students must be able to access various information related to nutrition provided by government agencies, schools, institutions, and hospitals. In addition to basic learning content, the e-learning facilities must provide students with on-line discussion opportunity for communicating and sharing ideas. Students must be also encouraged to post their questions or responses related to nutrition topics (ChanLin, Huang and Chan, 2002; Zubas, Heiss and Pedersen, 2006).

At the end of the e-learning courses, tests are usually given. In example, students can be asked to analyze according to the situation given whether there is a nutrient deficiency in a particular case-study. To solve the problem, students can use the nutrition components of each food provided in the dietetics software, calculate the nutrition intake of each food, and then check the daily food intake in the case-study, against the suggested requirements. In addition, students can be asked to design a dietary plan for an athlete, or pregnant woman, or a child. Then they will have to choose various food sources and

evaluate whether their food plan meets the suggested nutrition-requirements. In addition to the above tests, the affective responses regarding their reactions toward the instructional materials can be also collected and analyzed, using a relevant questionnaire, at the end of each course (ChanLin, Huang and Chan, 2002; Herriot, Bishop and Truby, 2004; Zubas, Heiss and Pedersen, 2006).

## **PROBLEMS IN FURTHER ESTABLISHING E-LEARNING OF DIETICIANS**

At most European countries Nutrition/Dietetic students undertake a 4-year BSc (Hons) degree course or a post-graduate programme consisting of both academic and practical components. The primary objectives of the practical dietetic training, carried out mainly in hospitals and supervised by experienced dietetic practitioners, are to enable students to acquire practical skills and to translate theoretical knowledge into effective clinical practice (Herriot, Bishop and Truby, 2004).

Many students find the transition from the academic environment of a university to the clinical environment of a hospital difficult, especially with regard to patient contact. Students occasionally mention various reasons for this, including unfamiliarity with the medical record system and a lack of exposure to the clinical environment and therefore real patients (Herriot, Bishop and Truby, 2004). An idea would be the e-learning programs to simulate some of the conditions the students are going to face in the hospitals and also contain extended tutorials on how to log a medical/nutrition record. This approach can upgrade the preclinical training of dietetics students, saving time and money as well.

The main aim of the higher education institutions is to expand and evaluate the body of knowledge, whereas the main aim of the hospitals is to provide a service to those who need it, whether patient or student. This discrepancy and tension also exists in dietetics education and training within the institutions and the hospitals. However, it is possible to integrate the development of knowledge, in parallel with acquiring skills and attitudes (Jud 2004). Dietetics software and e-learning techniques can possibly comprise an important link, to facilitate the integration of the above mentioned “academic” with the “practical” approach.

In our opinion, University departments and Colleges that teach Dietetics must be further involved actively in the evaluation of Dietetics software, in order to select the most suitable and include it in the e-learning resources that use to teach their students. The core ideas on which these programs are built must be analytically presented to the students. The last years, a number of Dietetics freeware-programs (in English mainly) are available through the internet. Students should be encouraged to “play” with them, add the well-characterised local foods and compare the diets prepared using freeware, with the diets prepared using marketable Dietetics-software. On the other hand, direct communication and opinion-exchanges of the students and the professors with the professional Dietetics-software producers can possibly help the latter to upgrade the programs they put in the market, by including more tutorial functions (Androulaki, Dimitropoulakis, Maraki, Markaki and Fragkiadakis, 2006).

Specific aspects of the reactions of the students towards e-learning of dietetics must be further studied also. Occasionally, students report that they like the self-paced nature of the tutorials, yet some feel they may be moving too quickly through the information. Some students report that by e-learning they feel they skipped-over more information, compared to traditional lectures. Since e-learning provides an open and interactive platform, it should allow the student to make choices when they miss information or become confused with the material presented in the online environment. Adequate computer skill is of course considered critical for the success of online learning (Zubas, Heiss and Pedersen, 2006).

Some studies indicate the difficulties on the exact measurement of the extent to which students are finally able to practise what they have electronically-learned effectively. Further analytical research would be very valuable for investigating the impact of e-learning on actual dietetics skills (Herriot, Bishop and Truby, 2004; Upton, 2005).

Finally, professional organizations are continually challenged to assure competency of their practitioners. Competency includes critical-thinking, cooperative work, effective communication, and use of lifelong learning resources. Information literacy via computer technology is a key component of acquiring competency and needs to be included in dietetics-practitioners competency-screening (Litchfield, Oakland and Anderson, 2002). Consequently, dietetics software and e-learning, exempt for training, may be also an important tool to assess and verify practitioner competency in dietetics professionals.

### **E-LEARNING IN THE DEPT OF NUTRITION AND DIETETICS OF TECHNOLOGICAL EDUCATION INSTITUTE (TEI) CRETE, SITEIA**

In Greece, two major Dietetics programs are used by most of the relevant University-departments, public or private hospitals, and professional dietitians. The last two years, in the Department of Nutrition and Dietetics of TEI Crete, we carry out studies to provide complete evaluation of the “functional requirements or specifications or characteristics” of the two programs (Androulaki, Dimitropoulakis, Maraki, Markaki and Fragkiadakis, 2006). In parallel we evaluate the possible utilization of these programs in teaching dietetics and clinical dietetics to our students. As a result of this procedure we communicate regularly with the companies holding the copyrights of the Greek Dietetics-software programs and inform them on the options that future versions of these programs must provide to be more effective as educational tools.

As far as it concerns e-learning, our current everyday approach combines elements of self-paced learning with the person-to-person interactivity of a traditional classroom, including discussions, assignments and examinations. About 25% of the classes we offer are now including a web component, a number we are interested to increase to 50%, hopefully within the next 5 years. The reservoir of online resources we have available (more than 3,000 electronic journals through the Hellenic Academies Libraries Link or HEALink, as well as TEI-Crete Library or Departmental subscriptions to on-line journals) already offers a wealth of information, simulations and research material. This material is used not only to prepare homework but also during the classes of Dietetics, as occasionally and during the exams, since we have developed two labs of informatics where 40 students can work on-line simultaneously, and also interact with their teachers, as well as between themselves.

On the other hand, in cooperation with the Central Library of TEI in Heraklio (Mr. Panagiotakis Michael) we develop new e-learning programs on food recognition and utilise a site ([www.teiher.gr/meddiet/](http://www.teiher.gr/meddiet/)) for students to post their questions or responses related to nutrition topics. Our current observations on the effectiveness of e-learning/traditional learning combination indicate that e-learning involvement can result in students not only retaining more knowledge, but also receiving better grades (Markaki, Maraki and Fragkiadakis, unpublished data).

While face-to-face teaching will always remain at the heart of university life, online learning offers a number of unique advantages. In example much routine marking of tests can be automated to save valuable tutor time. Other e-learning attributes include ease in updating classes' content (easier than with printed matter), ease of distribution, standardization of content, and accountability. Last, but not least, e-learning can be integrated into medical education, resulting in a shift toward the model of adult learning in which faculty members are no longer just content distributors but rather facilitators of learning and assessors of competency (Ruiz, Mintzner and Leipzig, 2006).

Taking in mind all the above mentioned, and in a long term view, we are interested to expand e-teaching and learning activities across the Department of Nutrition and Dietetics and increase staff involvement, developing a lasting expertise. We are also interested to identify optional models of delivery of e-learning (incl. agreements with content providers, lecturers, moderators), examine the cost implications of these activities and look for partnerships and collaborations in e-learning development and delivery concerning Dietetics.

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