Education in Biomedical and Health Informatics: A European Perspective

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Abstract

In higher education, programs in specialization in Health Informatics, Medical Informatics, Health Engineering are continuously growing. In this research, almost 1800 universities and colleges were checked in order to find related educational programs at all academic levels. Approximately 1000 academic leading degree programs in those domains have already been identified. The detailed records of the related educational programs will help to understand the current educational needs and priorities. Although, the growth of the related educational programs is not the same in each country.

Keywords:

Medical Informatics, Education, Europe

Introduction

Information technologies and telecommunications improve prevention, public health, quality of health care and biomedical research. The majority of new technological tools focus on access, processing and management of medical data and information, enhancing the decision-making process. Thus, it is important for the health scientists and professionals to be well trained by instructive programs in order to develop and operate these systems successfully [1; 2].

The past few years, in higher education, programs such as biomedical informatics, health informatics and biomedical engineering are continuously growing. Recent domestic and international articles emphasize curricula with specialization in Health Informatics, Biomedical Informatics, Medical Informatics, Medical Engineering and Biomedical Engineering of the European Universities which are offered at undergraduate and postgraduate level. However, there is a remarkable absence of detailed recordings of the European educational programs in these specializations. Thus, the scope of this research is to fill in this gap. The established EFMI Accreditation and Certification Committee (AC2) tries to fill in this gap among other tasks as well. This initiative was launched at that time by the EFMI President and endorsed by the EFMI Board in consultation with the EFMI WG EDU Chair. The main task of the AC2 Committee is to search for ways to develop and implement the Accreditation and Certification initiative in Europe. Since, the Committee in order to achieve its aim, has detailed records of the educational programs in specialization in Health

Informatics, Medical Informatics, Biomedical Informatics, Bioinformatics, Nursing and Dental Informatics, Health and Medical Technology, Health Engineering, Medical and Biomedical Engineering at all academic levels [1-3].

Methods

This project follows a series of steps in order to achieve the aim. First of all, online searching was conducted on Coursera, EdX, FutureLearn and Udemy databases. Secondly, a full list of the universities, colleges, institutions etc. of each European country was compiled via Google searching. Thirdly, the official website of every university was carefully checked so as to locate educational programs related to our subject. It is a fact that the duration of the search process has been conducted a couple of years before and the research is still in progress [2]!

It is worth mentioning that the research is limited only to European countries that are members of the European Federation for Medical Informatics – EFMI (Table 1) [4].

Table 1- The list of EFMI Countries-Members

Countries-Members of EFMI			
Armenia	Austria	Belgium	Bosnia-Herzegovina
Croatia	Cyprus	Czech Republic	Denmark
Finland	France	Germany	Greece
Hungary	Iceland	Ireland	Israel
Italy	Republic of Moldova	Netherland	Norway
Poland	Portugal	Romania	Russian Federation
Serbia	Slovenia	Spain	Sweden
Switzerland	Turkey	Ukraine	United Kingdom

Specifically, this study has covered almost 27 EFMI countries-members out of 32 [2]. In more detail, Figure 1 shows the countries have completed this process and the countries will have been completed in a few weeks.

Almost 1800 universities and colleges were checked in order to find related educational programs at all academic levels. About 180000 courses in total were checked.

Results

More than 1000 educational programs in these domains have been found in a wide variety of undergraduate and postgraduate degrees so far.

Figure 1-Twenty seven EFMI Countries-Members

Specific information was collected for each educational program. All these elements are included in Access Database (Figure 2). The information is being collected for each study program: university/ies, department/faculty, study program name, academic level (e.g. undergraduate / postgraduate / doctoral / postdoctoral Studies), type of education (full time – part time – combined), mode (on campus – e-learning / distance learning), specializations, director of the education program, details about contact person of the program, curriculum, time table, learning outcomes, competencies and program's language (English – local – bilingual). Additionally, Program's ECTS and academic staff's details are contained. Needless to say, the authors' interest focuses only on academic degree programs [1; 2].

Figure 2- Catalogue of Educational Programs

Furthermore, this database includes educational programs in specific areas such as Nanomedicine, Medical Electronics, Clinical Informatics, Clinical Technology, Clinical Engineering, Computational Biology, Life Science Informatics, Clinical Data Management, Big Data in Healthcare, Data Mining in Healthcare and Medicine, Digital Health Systems, E-Health, Telemedicine, Healthcare Analytics, Wireless Networks in Healthcare, Internet of Thing in Healthcare etc. Until now, the authors' have no view on specific countries such as the Russian Federation, Turkey and Ukraine due to local issues.

Finally, the data on this database is published in the appropriate established website (http://www.bmhi-edu.org). This website is under development and is available on the network. As verification of the included information is still in progress the information is not still available to the public. Only the registered users have access to the content.

Discussion

Earlier efforts in developing databases of educational programmes at an international level have been made. It is worth mentioning the effort by WG1 on health and medical informatics education of the International Medical Informatics Association (IMIA). The initiative of IMIA had aimed at the creation of an online database that would provide information about programs and courses in Health and Medical Informatics worldwide [5]. In our case, the data of the research comes from European Countries and provide information about programs in Health and Medical Informatics, Biomedical Informatics,

Bioinformatics, Medical and Biomedical Engineering etc. In addition, this study has included only the academic degrees of bachelor, master or doctoral and postdoctoral level in related educational programs. While the certificates, short courses, modules, summer schools, exchanges studies, lectures and seminars were excluded. Due to the limitations of this research, there is an unclear viewpoint for specific countries such as Belarus, Estonia, Georgia, and Latvia.

AC2 Committee strongly supports the promotion and provision awareness of the educational initiative to the wider biomedical and health informatics community in Europe. Consequently, this information to explore in order to understand the current educational needs and priorities of each European country. Presently, the educational priorities in Biomedical and Health Informatics for Europe are closely interlinked with the European Union's educational framework [3]. Thus, the Educational Policy should be focused on local, state, national and international activities and addresses short- and long-term needs [6]. The Committee will work diligently to seek collaborations and invite other international organizations to cooperate [3].

Conclusions

The present educational programs are offered at undergraduate and postgraduate level including a variety of specializations such as health informatics, bioinformatics etc. However, the growth of educational programs is not the same in each country. It would be useful to see if in each country a satisfying number of educational programs is provided with well-detailed curriculum at each level depending on their specialization [1; 2].

Acknowledgements

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