Digital Professionalism in Health and Care: Developing the Workforce, Building the Future
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Developing the Digital Healthcare Workforce in Italy: The SIBIM Experience

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Abstract. The digital healthcare workforce is usually composed of two major types of professionals: the healthcare workers, who are the users of eHealth, and the health informatics developers, who are usually computer scientists, biomedical engineers, or other technical experts. Health informatics educators have the responsibility to develop the appropriate skills for both, acting within their specific curricula. Here we present the experience of the Italian Society of Biomedical Informatics (SIBIM) and show that, whereas the technical curricula are widely covered with a large range of topics, the eHealth education in medical curricula is often limited to simple bioengineering and informatics skills, thus suggesting that eHealth associations and organizations at the national level should focus their efforts towards increasing the level of eHealth contents in medical schools.

Keywords: Health Informatics, Biomedical Education, SIBIM

1. Introduction

The Italian Society of Biomedical Informatics (Società Italiana di Informatica Biomedica, SIBIM) [1] is a scientific and cultural association founded in 2016. SIBIM is a member of European Federation of Medical Informatics (EFMI)[2]. SIBIM aims to link the heterogeneous and complementary expertise in Italian Academic and clinical institutions regarding eHealth and digital health. SIBIM members have expertise in a wide range of research topics, including clinical informatics, clinical and healthcare data management, process mining in healthcare, electronic health record (EHR) modeling and data integration, decision support systems, telemedicine, bioinformatics, and software as medical devices. Besides the scientific mission to link academic and clinical institutions with industrial partners to develop advanced research projects, SIBIM was also born to support eHealth and digital healthhigh-level education on medical informatics (academic courses, PhD, masters, etc.). Figure 1 reports SIBIM aims and scopes.

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eHealth education poses several challenges that are mostly related to the fast evolution of the technology landscape in a field in which complexity is interlinked with uncertainty and personalization, and in which availability has a long-standing trade-off with safety, privacy, and confidentiality. In addition, two main figures are acting in eHealth: (i) the users, mainly healthcare professionals, and (ii) the developers/implementers, mainly computer scientists and biomedical engineers. Even though these are not the only eHealth actors, considering the emerging definition of 5P eHealth ecosystems [3], educational efforts are mainly focused on them [9,10,11,12,13].

This paper aims to provide a picture of the present structure of eHealth education for the digital healthcare workforce in Italy based on SIBIM members experience, including both medical and technical curricula.

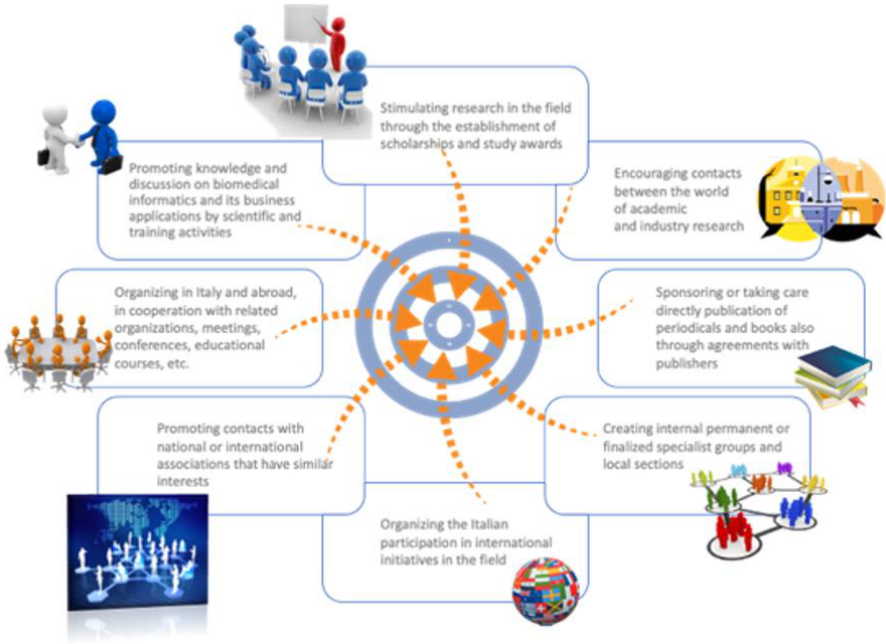

Figure 1. SIBIM aims and scopes in a nutshell

2. Methods

The geographic coverage of SIBIM members (see Figure 2) spans all over Italy with representatives from the major Universities of the Country. SIBIM members largely contribute to education in both Medical and Technical Schools. We, therefore, surveyed SIBIM members regarding their involvement in eHealth education, with a request to describe the courses and curricula regarding themes of digital health and eHealth in their university. Interdisciplinary experiences in terms of clinicians, biologists, and (bio)engineers are also reported showing contribution both in undergraduate as well as graduated students (e.g., interdisciplinary Ph.D. experiences).

3. Results

Ten out of sixteen sites responded to the survey (i.e., Milan, Pavia, Brescia, Turin, Alessandria, Genoa, Catanzaro, Padova, Trieste, and Udine) covering a wide range of the Italian eHealth educational offer.

All sites except Alessandria have an active Biomedical/Clinical Engineering or Biomedical Computer Sciences degree with a track on eHealth. In Alessandria, University of Eastern Piedmont, a degree in Artificial Intelligence focused on biomedical applications is starting, while in Trieste the Master Degree in Data Science and Scientific Computing has an active Biomedical curriculum that also includes a course in health data management.

Courses cover the basics of Medical Informatics (standards, semantic interoperability, EHR, hospital information systems, telemedicine) as well as more advanced skills (Internet of Health Things, Clinical Guidelines, Ontologies, Medical images analysis and interpretations, Clinical data mining and machine learning, Bioinformatics, Decision Support Systems).

All SIBIM members participating in the survey are involved in Medical School courses, including both Medicine and Medical professions (such as Nursery master degree). In Medical Schools, most courses are basic informatics without eHealth related topics. When present, such topics are limited to general EHR principles and hospital information systems, with some advanced contents (e.g. standards, with focus on HL7 [4] and DICOM [5]) in Medical Profession degrees.).

Finally, Ph.D. programs experiences are proposals in several SIBIM member universities, aiming to offer opportunities to clinicians of studying techniques, such as biomedical data management and analysis as well as to graduated students in scientific classes (e.g., bioengineers, computer science, computer engineering) to apply techniques in digital medicine. This is the case for instance the University of Catanzaro where the Digital Medicine Ph.D. program allows medical doctors, biologists as well as biomedical engineers to apply to multidisciplinary Ph.D. programs. Moreover, in 2021, the national PhD in Artificial Intelligence is started and "Health and life sciences" has been identified as one of the five strategic areas of specialisation. The Ph.D. course AI & Health and Life Sciences [6] has Università Campus Bio-Medico di Roma as lead university and it involves twenty organizations between universities and research institutions. It is focused on the application of AI in the field of health and life sciences with particular attention to the integration of AI, IoT & biorobotics foreshadows scenarios of rapid evolution towards precision medicine, an increasingly predictive, preventive, personalised and participatory medicine.

This allows to enrich the possibilities of forming new profiles able to work not only in medical school or in research area, but also in industries, where the capacity of managing multidisciplinary topics in a more world large competitive market.

Figure 2. SIBIM geographical distribution in Italy. For each site, the number of members is indicated

4. Conclusions

The eHealth curricula in technical schools are arousing an increasing interest from companies and several students that graduated in the field found a job related to the medical informatics area.

The eHealth education in medical curricula is often limited only to basic informatics skills, thus suggesting that national eHealth organizations should focus their efforts towards increasing the level of eHealth contents in medical schools (both Medicine and Medical professions). This consideration is coherent with the result of [7], where 451 responses from medical students of 39 European countries show a lack of eHealth contents in medical education.

The need for a more in-depth eHealth literacy of medical and clinical staff has become fundamental in the light of the National Recovery and Resilience Plan (PNRR) which allocates huge resources (i.e. € 15.6 billion) for the digitalization of medical management in Italy [8]: large numbers of adequately trained technicians will be needed to develop innovative systems, but without a group of adequately trained health professionals these systems will at least remain underused.

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