e-Health – For Continuity of Care
C. Lovis et al. (Eds.)

doi:10.3233/978-1-61499-432-9-798

New Bachelors Degree Program in Health Informatics in Ethiopia: Curriculum Content and Development Approaches

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Abstract: With a widespread use of information technology in healthcare organizations, there is a pressing need for professionals who are both skilled in the use and management of information systems and knowledgeable in the field of healthcare. To fill this need, the department of health informatics at the University of Gondar started a new bachelor's degree in the health informatics program commencing in 2012. The curriculum was developed by a thorough needs assessment and considering the recommendations of the international medical informatics association. The program has duration of 4 years with a total of 249 ECTS. Currently there are 57 students enrolled in the program and 15 full time academic staffs are involved in the teaching and research activity of the department. To share our experience for other countries, in this paper we explain the curriculum development process and its content to the health informatics community.

Keywords. Health informatics education, Curriculum, Ethiopia, University of Gondar

Introduction

Healthcare organizations, not only in Ethiopia but also in most developing countries, are becoming increasingly reliant upon information and communication technology to support the daily clinical routine. Training knowledgeable, motivated and capable healthcare information technology (HIT) staff is essential for overcoming the bottlenecks to achieve national and global goals in quality of health care services and health data [1]. In the health information system strategic plan of Ethiopia, enhancing health management information systems through computer based information systems is kept as a priority task in the health sector policy until 2020 [2]. With this firm interest and ambitious plan, it is evident that the country needs HIT professionals who are aware of the complex health care processes and who can manage, plan, develop and provide expert consultations to the health care sector.

To fill this gap, the University of Gondar - one of the oldest research, teaching and community service oriented higher education institution in Ethiopia - through its health informatics department designed a health informatics bachelor's degree program. The

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department of health informatics was established as an independent health informatics teaching and research centre in 2004. The aim of this program is to train students who can handle the current pressing needs of health information technicians. This bachelor program is the first of its kind in Ethiopia and East Africa.

In Ethiopia, two masters programs in health informatics already exist, one in Gondar University and the other in Addis Ababa University. The programs were started in 2007 with the support of Norad's program for master studies (NOMA). Additionally, there is another HIT diploma program running in several health science colleges, which was started through the collaboration of the ministry of health of Ethiopia and the Tulane University technical assistant project for Ethiopia (TUTAPE). The assessment made by TUTAPE in 2008 specified that the country would need more than 7700 HIT technicians by 2015 to meet the HIT professionals requirement of the health sector [3]. To satisfy this need, the HIT training program was started in 2009 and currently runs in more than 15 colleges throughout the country and more than 1000 students already graduated. Until 2012, there were only masters and diploma (certificate study being one level below bachelors in the Ethiopian education system) program which gives those diploma graduates no option to upgrade their study which in turn leads to the migration of those professionals to other fields. Our bachelor program is therefore believed to give an opportunity to promising HIT diploma graduates to continue their education to the bachelor and masters level with a potential of climbing the professional ladder accordingly.

The purpose of this paper is therefore, to introduce the curriculum development, content and its current progress to the international health informatics community and make it available to other countries wanting to introduce health informatics bachelor programs.

1. Methods

The curriculum development process took two years (2010-2012). The approach used for the development was through assessment of Ethiopian health sector needs and review of the current health informatics education in the world. The needs assessment for the curriculum was conducted in 2010. In the assessment national and regional health offices and health science colleges were included. Data were collected through interviews and observations within those offices and the colleges that already run the diploma program. We assessed their way of work in health data management and the extent of health informatics professionals needs. In addition we reviewed the curriculum of different African and International bachelors level health informatics programs [4][5]. Moreover, the IMIA recommendation [6] was used as a basic reference for course allocation.

Internal and external evaluators analysed the draft curriculum in two different workshops conducted in 2012. Internal evaluators were medical, public health, and computer science staffs of the university. The evaluators worked on the integration of health care and computer science courses. External evaluators were experts from the ministry of health, regional health offices and delegates from other non-governmental organizations working in the health informatics sector. These groups analysed the needed graduate competencies in the work places of their respective organizations. After including the comments, the final version was approved by the University senate in July 2012.

2. Results

We developed a 4 years comprehensive health informatics bachelor's program curriculum by taking the local context and stakeholder needs as primary priority. We commenced the program in October 2012 by enrolling 26 students, and currently we have 26 students at the second year and 31 first-year students. The contents of the curriculum and the (planned) practical and lecture lessons are explained below year by year and listed with the specific course titles and corresponding credit hours in the respective tables 1-4.

2.1. First year of study

The first year of study aims to introduce the science of health informatics and provision of solid theoretical basis required for the next four years of study. Most of the courses are common courses in the area of both health and informatics so that the students acquire the necessary background knowledge. The first year courses result in 70 ECTS.

Table 1. Courses in the first year of study with the respective ECTS points

Year/Semester	Course Title	ECTS
1/I	Communicative English	5
	Civics and Ethical Education	5
	Fundamental of ICT to health informatics	5
	Fundamental of Health Informatics	5
	Anatomy	5
	Physiology	5
	Applied mathematics for health informatics	5
1/II	Pathology	5
	Communicable disease	5
	First aid	2
	Pharmacology	3
	Environmental and occupational health	5
	Epidemiology for health informatics	5
	Biostatistics for health informatics	5
	GIS & disease mapping	5

2.2. Second year of study

The second year of study is aimed to give more detailed knowledge about the organization of health institutions and of the overall health system, inter-organizational aspects, health administration, health economics, and health quality management. The second semester focuses on health care system development and computer programing languages. In those courses, the students are expected to understand the system development process and start to develop own systems in practice lessons using basic computer programing languages. The second year courses result in 64 ECTS.

Table 2. Courses in the second year of study with the respective ECTS points

Year/Semester	Course Title	ECTS
2/I	Health service management	5
	Health economics	3
	Monitoring and evaluation	5
	Disease coding and classification	6
	Health management information system	6

	General psychology	4
	Introduction to sociology	4
2/II	Health information project management	4
	Object oriented system analysis & design	7
	Discrete mathematics	5
	Fundamentals of programming (C++)	5
	Data structures and algorithms	5
	Object oriented programming (Java)	5

2.3. Third year of study

The third year of study is aimed at giving advanced knowledge and practice in health informatics. The students will continue to learn programming languages followed by modules such as health care database management, trouble shooting and maintenance as well as computer networking and communication services. For this 61 ECTS are planned.

Table 3. Courses in the third year of study with the respective ECTS points

Year/Semester	Course Title	ECTS
3/I	Internet programming	7
	Fundamentals of database systems	5
	Information storage and retrieval	5
	Medical knowledge based systems	6
	Biomedical instruments	5
	Computer maintenance & troubleshooting	6
3/II	Health informatics practical attachment I	6
	Computer networking and security	6
	Telemedicine	5
	Mobile health information systems	5
	Basic writing skill	5

2.4. Fourth Year of Study

The fourth year of study, with a total of 54 ECTS, is exclusively planned for practical work of the students. The students will learn advanced level courses and they will be assigned for internships in different health care organizations. There the students are expected to develop, maintain and manage different information systems in their organizational placement with close supervision of their advisers.

Table 4. Courses of the fourth year of study with the respective ECTS points

Year/Semester	Course Title	ECTS
4/I	Hospital operation systems	3
	Outpatient and inpatient systems	5
	Health record systems	6
	Practical attachment II	8
	Teaching skill for Health informatics	4
	Entrepreneurship	4
4/II	Health informatics project I	8
	Team training program	8
	Health informatics project II	8

3. Discussion and conclusion

The curriculum was designed by benchmarking different international programs [5][7] and the recommendations of IMIA in health informatics education [6]. The credit points for informatics and health courses are higher in our curriculum than those benchmarked programs given that our expectation is to graduate students with a solid understanding of the country's health system as well with advanced project management and technical skills. Those bachelor graduates are expected to play a key role in technical and management position at referral hospitals and regional health offices given the need of the complex data and infrastructure management in those offices.

The availability of other related disciplines such as- public health, computer science and informatics department in our university is an ample opportunity to effectively run the departments academic and research activity. However, lack of senior staffs (with PhD degree) in the area of health informatics is still the biggest challenge for the department. The emphasis given by the government by creating a career ladder in the health sector for future graduates of the department is an indicator of the emphasis given by the ministry to the program. But yet, the department need to interact and work more with the ministry and regional offices so that the various academic and research activities are in line with the E-health policy of the country.

The graduates of this multidisciplinary health informatics curriculum expected to be well prepared informaticians for management and technical positions, being able to meet the increasing demand of health informatics in the country. As the program is just starting, we will continuously evaluate it against the changing need of the country and the student's graduate profile. Additionally, we will work with the IMIA and HELINA health informatics education working group to share international experiences for our program.

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