Investigating Students' Perceptions of Health Informatics Education:
What Action Needs to Be Taken?

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Abstract

Curriculum evaluation is critical to identify the weaknesses and strengths. Measuring students' satisfaction and analyzing their experiences is an effective tool for curriculum development. **Purpose:** Evaluate Health Informatics (HI) curriculum from learners' experience in multiple universities in Saudi Arabia. **Methods:** a cross-sectional study using a survey distributed via Twitter, WhatsApp, and Telegram. **Result:** a total of (N = 252) participants, Male and Female, with different universities and study levels (Diploma, Bachelor, and Master's) were involved in the study. Among the total number of participants (252), female participants (153) are higher than male participants (99). Furthermore, 79% (200 out of 253) of the students experienced psychological pressure and a lack of understanding of the field. 43.7% (110 out of 252) indicated that the time was compatible to finish chapters in the courses. **Conclusion:** On a national and international scale, health informatics education faces several challenges; required actions to improve the curriculum must be evaluated continuously to achieve the goals and objectives.

Keywords: curriculum evaluation, program evaluation, course assessment, health program, health informatics evaluation, and student's perspectives

1. Introduction

In the modern era, knowledge and technological advancements are accelerating, and each individual needs a quality education in order to meet the demands of the future. A curriculum that promotes social and individual development can be designed to achieve this objective. To improve educational programs, it is necessary to evaluate them throughout the educational process. In many countries, including Saudi Arabia, improvements to higher education are among the most pressing issues. Several attempts have been made to improve education and empower communities with knowledge. The first university in Saudi Arabia was established in 1957. Since then, many schools and universities have offered degrees in various fields. Some of these fields are relatively new throughout the world, such as health informatics. Health Informatics (HI) is defined as "the science that deals with biomedical information, data, and knowledge, and its storage, retrieval, and optimal use for problem-solving and decision-making (Shortliffe et al., 2014).

The interdisciplinary nature of health informatics programs requires extensive evaluation and investigation. There are a number of differences between courses offered nationally and internationally at both the graduate and undergraduate levels. A curriculum evaluation involves collecting information about a particular educational program and assessing its value and effectiveness (Akpur et al., 2016a). A significant aspect of evaluation is measuring and assessing the extent to which the intended goals and objectives are achieved. Evaluation of curriculum has become increasingly important in recent years.

2. Literature Review

Globally, health informatics education faces a variety of challenges. There are many similarities between health informatics and health information technology fields, even though they differ in some respects. The academic materials, lecturers' knowledge, and instruction styles vary between local and global schools. Curriculums in the health information technology field are designed to meet the diverse educational needs of students (Zhang et al., 2014). It is also possible that some students are more interested in the technical aspect of health informatics than healthcare, but others might claim otherwise (Longenecker et al., 2012). A number of curriculum issues have been observed across several disciplines and at an international level. Health information management and health information systems have been lacking among university faculty, and this continues to exist today in some countries. Moreover, health informatics is a relatively new discipline or subject in its own right, according to professional associations, academic papers, and conferences (Brittain & Norris, 2000).

For imparting the necessary theoretical knowledge, practical skills, and mature attitudes, numerous educational approaches must be used. There are numerous options for flexible learning, distance learning, and supported open learning in addition to conventional classroom-based models. Additionally, the explosive expansion of information and communication technology (ICT) platforms and applications such as video conferencing, document sharing, and social media is having a significant impact on all educational methodologies, promoting flexible and distance learning, which includes both synchronous and asynchronous communication between instructors and students (Mantas et al., 2010).

The conservative approach to curriculum revisions in medical schools has been a significant factor in delaying the inclusion of medical informatics courses in core medical curriculums. Integrating computer science into medical curricula was challenging (Mantas, 2016). Graduates of health informatics programs should have strong analytical and critical thinking abilities, particularly concerning selecting, implementing and applying research methods designed to improve the usefulness, usability, and adequate adoption of health informatics advancements (Kushniruk et al., 2006). Competency descriptions varied significantly among the same MSc degrees with the same target audience. For example, some degrees focused on technical knowledge and computer science, whereas others provided more comprehensive coverage of topics such as ethics and communication (Jidkov et al., 2019).

Multiple researchers concluded that health informatics employment opportunities are generally limited, possibly due to a lack of standardized job titles compared to data analysis and health care leadership(Marc et al., 2019). The field of health informatics will continue to evolve, and the Saudi Commission for Health Specialties needs to evaluate the recommended competency model regularly to design a context-based HI competency framework in the future that will make HI specialists more competitive, educated, and efficient in their endeavors to improve healthcare quality in Saudi Arabia (Almalki et al., 2019).

Through searching the databases, we found different issues and perspectives related to the curriculum; for example, an investigation published in 2017 stated that 24% of students believe that mental health courses are ineffective and that 48% are unsure of the effectiveness of these courses Students' involvement in curriculum development has had a positive impact, with 87 percent of respondents acknowledging students' contribution to curriculum improvement (Claessens, 2020a). A study of 225 college instructors evaluated their knowledge

of statistics, and the results indicated that the level of proficiency in statistics courses varied. For example, the number of English instructors who studied statistics at the graduate level is 15%, and the number of psychology instructors who studied statistics at the graduate level is 100%. Furthermore, University instructors who devote their time to research have a lower interest in teaching. Students' performance affects the instructor's interest in teaching (Boysen, 2017).

The current educational curriculum in Ghana is cited as a source of primary concern by teachers due to a high workload, a lack of teaching materials, and lengthy class periods (Aboagye & Yawson, 2020). Students' fears regarding the difficulty of the English curriculums have been examined as they progress through the educational system in a study of English as a foreign language in South Korea (Hwang & Kim, 2019). Other results showed that students were dissatisfied with the instructional program content because it did not meet their stated objectives (Akpur et al., 2016b). In Meyer et al. 's study of dental curriculum content, 59% of students expressed satisfaction with that content (Meyer et al., 2021).

In a recent study conducted in Saudi Arabia, the curriculum considerations of high school science and math teachers were examined. Evidence suggests that teachers with more experience are more competent than those without enough training (Madani & Forawi, 2019). A professional professor, passionate about the course, and has experience related to the content and logical reasons for evaluating students can influence the evolution of importance and awareness (An et al., 2020). Instructors helped students learn more, improve their critical thinking skills, and increase their confidence by integrating attributes and techniques such as trusting relationships, knowledge, experience, coaches, and role models (Niederriter et al., 2017).

2.1 The purpose of the study

is to investigate students' experience of the Health Informatics program in Saudi Arabia and suggest improvements for future curriculum development.

2.2 Research questions

1. To what extent do students satisfy with the health informatics curriculum education in Saudi Arabia universities?

2. What are the issues related to the health informatics curriculum from students' experience?

3. Research Method

3.1 Data collection and study group

A cross-sectional survey was used for this study which contained twenty questions, five demographic questions, and fourteen questions related to the curriculum. In collaboration with an expert in curriculum and instruction, adequate questionnaires were selected. On the 4th of July 2021, the survey was circulated to the relevant population. People with various characteristics, such as educational institutions, ages, and locations, sought to observe this valuable knowledge. The respondents voluntarily filed the survey and were informed that their participation would be anonymous and informed about its purpose.

This paper investigates the strengths and weaknesses of the HI curriculum in Saudi Arabia from students based on their experiences and perceptions for future development in order to reach a high level of standardization. Assessing and evaluating the HI programs in multiple universities in Saudi Arabia enables those concerned with quality assurance in higher

education to develop and improve these programs and different aspects of the curriculum. All the selected studies were written in the English language. The researcher used the following keywords: curriculum evaluation, program evaluation, course assessment, health informatics evaluation, course evaluation and students' perspectives.

Data was collected by several databases such as Google Scholar, the Saudi digital library, and others. All this research was published in scientific journals.

3.2 Research data analysis

The study aims to assess and evaluate the health informatics programs in multiple Saudi Arabia universities to enable those concerned about developing and improving these programs and different parts of the curriculum. Questioner's questions were selected with an expert specialized curriculum and instruction. The collected data were analyzed by the statistical package for the social sciences SPSS version 23.

3.3 Missing data

As the survey questionnaire was distributed to the respondents across several platforms, responses were collected from more than 310 respondents, but not all survey questionnaires were completed, so there were only 252 valid responses from 310 respondents. The following table represents the main variables (gender, age, study level, university, curriculum, satisfaction, and academic program), indicating no missing value in our analysis.

4. Findings and Discussions

The table below represents the participants' demographic data, study levels, and universities. . Among the total number of participants (252), female participants (72) are higher than male participants (99). Besides, most of the participants' age (38.5%) are 23 to 28 years old.

Table 1. The Frequency of the demographic data

Variable	Categories	Frequency	Per cent
Gender	Male	99	39.3
	female	153	60.7
	Total	252	100.0
Age	from 18 to 23	69	27.4
	from 23 to 28	97	38.5
	from 28 to 33	45	17.9
	from 33 to 38	41	16.3
	Total	252	100.0
Study level	Diploma	11	4.4
	Bachelor's	197	78.2
	Masters	44	17.5
	Total	252	100.0
University	Hail	88	34.9
	King Saud bin Abdelaziz for Health Sciences	49	19.4
	The Saudi electronic university	83	32.9

Umm al-Qura	26	10.3
Other universities	6	2.4
Total	252	100.0

The pie chart shows the proportion or percent that each class represents of the total number of frequencies. The following pie chart provides a graphical presentation of the gender variable. It visibly indicates that female participants are higher than male participants.
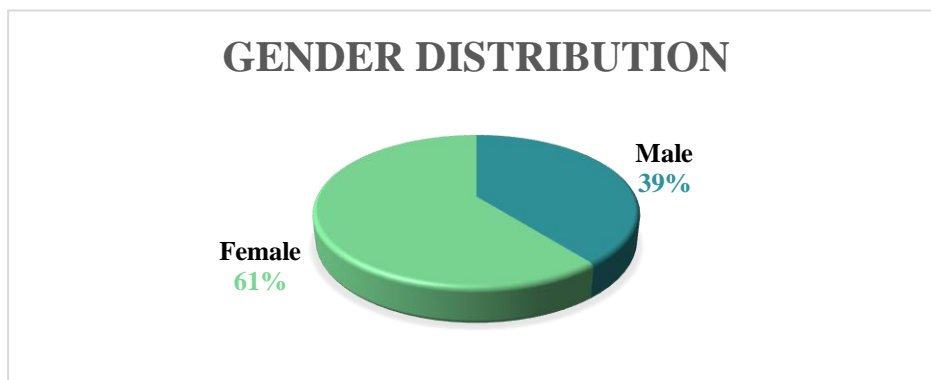

Figure 1 Gender of the respondents

Table 2: Survey questionnaires

Attitude	N %	Strongly Disagree	Dis agree	Neu tral	Agree	Strong ly Agree	Mean	Std	Mean
1.The objectives and contents of the syllabus were explained to me at the beginning of each course.	N %	53 21.0	103 40.9	39 15.5	47 18.7	10 4.0	2.43	1.13	10
2. As the school stage began, there was psychological pressure as a result of the abundance of information and insufficient understanding of the discipline	N %	123 48.8	77 30.6	28 11.1	22 8.7	2 .8	1.82	.995	13
3.A realistic time to complete the unit in the offered curriculum	N %	44 17.5	66 26.2	**77 30.6**	**45** 18.9	**20 7.9**	2.72	1.17	8
4.The questions were compatible with the educational objectives	N %	33 13.1	**71 28.2**	**77 30.6**	57 22.6	14 5.6	2.79	1.10	6
5.The main learning objectives achieved in the curriculum studied?	N %	30 11.9	100 39.7	69 27.4	26 10.3	27 10.7	2.68	1.14	9
6. Assessments and educational activities are compatible with learning objectives.	N %	21 8.3	48 19.0	102 40.5	55 21.8	26 10.3	3.06	1.07	4
7. the assessments were accurately measuring student learning.	N %	14 5.6	54 21.4	77 30.6	75 29.8	32 12.7	3.22	1.09	2
8.The assignments and activities were designed to encourage students to use higher-order thinking skills.	N %	26 10.3	**60 23.8**	**68 27**	61 24.2	37 14.7	3.09	1.21	3
9. I clearly benefited from the study materials during the internship.	N %	15 6.0	89 35.3	**67 26.6**	46 18.3	35 13.9	2.98	1.15	5
10. The curriculum sequence was logical and proportional during the study period.	N %	10 4.0	63 25.0	78 31.0	49 19.4	52 20.6	3.27	1.16	1
11. The academic content was distributed in the exams in a balanced way.	N %	15 6.0	123 48.8	45 17.9	51 20.2	18 7.1	2.73	1.07	7

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13. There is a need to increase technical subjects in the academic program.	N	20	80	70	48	34	2.98	1.17	5
	%	7.9	31.7	27.8	19.0	13.5			
Weighted Mean							2.744898		
Standard deviation							0.677897		

To the best of our knowledge, this is the most comprehensive study of the health informatics curriculum in the country that focuses on the attitude of students toward the program, and it contributes to a comprehensive understanding of students' perceptions of the program. This study is among the few studies in Saudi Arabia to assess students' perceptions regarding multiple aspects of the health informatics curriculum. It is reasonable to assume, since the research was conducted and analyzed in Saudi Arabia, that similar factors exist in schools with similar settings in other parts of the world. On the basis of our data, we found that half of the respondents agreed and 15.5% disagreed with being informed about the course objectives and goals. These results are generally consistent with previous studies exploring MPA faculty perceptions of course objectives and outcomes (Narayana & Rao, 2020). The result of a recent study suggests that one of the main reasons for the complicity of the health informatics field is the combination of different disciplines, for which 210 respondents reported psychological pressure and difficulty understanding (ASIRI, 2014).

Approximately 23 % of survey respondents reported not receiving information regarding the course's content or objectives, while 62% indicated they had received such information. In the first year, 79% of the students reported feeling psychological pressure and not knowing what to expect from the specialty. Students surveyed felt that the curriculum provided adequate time for each subject, as indicated by 44%. Only 28% of respondents stated that the questions did not align with the educational objective, and 41% disagreed. In response to a question about whether or not they met learning objectives, 41.5% said assessments and activities were compatible with objectives, and 33.2% disagreed. 42 % of respondents feel that tests do not properly measure student learning.

The assignments and activities allowed 34% of respondents to use higher-order thinking skills, while 62% disagreed. 41.3 % of respondents indicated that the curriculum includes problem-solving and reasoning skills. While 29 percent of respondents said coursework benefits them, 40 percent disagreed. Out of 252 respondents, 138 responded positively to the curriculum sequence. There were only 82 respondents who were dissatisfied with how the exam and content were administered. More technical courses should be included in the academic program, according to 66.7 % of respondents. Health / medical courses should be included in the academic program, according to more than half of the respondents, while 21% disagreed.

 Curriculum content and instructional methods must undergo significant revisions in order to give freshmen students varied opportunities to gain a complete understanding of their studied fields, such as attending seminars and organizing group meetings with volunteer sophomores, juniors, and seniors to share their experiences and knowledge about their respective fields. Student services, such as student counselors, workshops, and study training, also play a critical role in resolving many of these issues. Among the educational institutions and language centers in Saudi Arabia, we observed higher levels of achievement of learning objectives than those reported by Nadia. The researcher concludes that educational barriers consistently prevent institutions and language centers from achieving the intended learning outcomes (Yusuf, 2017). Only 27.3% of faculty members reported that the assessment and activities did not promote learning or enable them to achieve the intended goals and outcomes, which is not in agreement with the literature evaluated by 20 faculty members (Narayana & Rao, 2020)

As illustrated in Table 2, this result indicates a high degree of uncertainty among students in terms of higher thinking skills, indicating the need to undertake an immediate investigation in this area of the curriculum. The study in 2020 finds that students' evaluations are continuously conflicted (Claessens, 2020b).

138 respondents thought the time was allocated logically and that the curriculum sequence was satisfactory. Using our findings, we demonstrated that participants stressed the need for the expansion of technological courses in the current study plan; however, according to a recent publication aimed at identifying the major competencies for a graduate-level program in applied health informatics, technology and information science are essential for students to solve health informatics issues (Valenta et al., 2018).

The Master of Health Informatics program at KSAU-HS was evaluated by Altuwaijri a few years ago. The study found that most students felt that the courses and knowledge acquired were beneficial, regardless of their background (Majid, 2007). A 2018 study examined health and biomedical informatics competencies in higher education curricula and found that the International Medical Informatics Association (IMIA) curriculum contained a wide range of content related to medicine, health, and other. Evidence from more recent studies in 2018 emphasizes the importance of obtaining an adequate understanding of the basic research topics before taking a health IT evaluation course, as otherwise it would be necessary to cover them simultaneously with the health IT evaluation course (Ammenwerth et al., 2017b).

To provide learners with a clear understanding of some courses, it is necessary to illustrate the significance of the sequences. According to a recent study, health information technology can significantly improve efficiency and quality of health care at a minimal cost in developed countries (Ahonen et al., 2018).

5. Conclusion

The development of an effective health informatics curriculum is necessary for students to be provided with significant knowledge and skills that will allow them to provide quality care and regulate the sophisticated information systems utilized by modern healthcare facilities.

An evaluation of the health informatics (HI) curriculum among Saudi undergraduates and graduate students is presented in this paper. Health informatics education faces several challenges on an international and national scale. These findings indicate many obstacles to the implementation of the HI curriculum, such as the ambiguity of the field, inaccurate assessments of students' learning objectives, and a lack of technical courses. Technological advances can improve the quality and safety of health care in developed countries at a low cost. Health information systems (HIS) are one of the most popular technologies today, which offer a number of benefits to healthcare organizations. It is expected that the findings of this paper will assist policy-makers and decision-makers to generate new strategies for improving the health informatics curriculum and enabling health informatics programs to adequately assess the strengths and weaknesses for providing more reliable health informatics (HI) education.

Recommendations

The health informatics HI considers relatively new and combined with different disciplines. In order to give the freshmen a better understanding of the major, additional lectures and workshops by experts are needed. It is vital that future research addresses instructors' perceptions of the barriers linked to health informatics curriculum. The curriculum must be

developed to meet learners' expectations and to ensure that they are equipped with the necessary skills and knowledge.

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