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Developing Digital Health and Welfare Services in an International Multidisciplinary Student Team

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Abstract

The rapid growth of digital health and welfare services demands new competences for health and social care, information technology, and business professionals. This study aims to describe the competences that students have before their studies and those they expect to gain from the study module "Developing Digital Health and Welfare Services" in multiprofessional groups during their bachelor studies. This study reports open-ended questions about students' knowledge concerning digital health prior to the study units. The results, analyzed by QSR NVivo 10 for Windows, show that students are keen to learn about developing digital health and welfare services, and they see that multiprofessional work requires a communicative environment and respect for every profession. Students also believe that they have competences to bring to the multiprofessional group. A successful multidisciplinary development of digital health and welfare services requires changes and cooperation in education between various professions.

Keywords:

Informatics; Education; Professional Competence

Introduction

Wellbeing, health promotion, disease prevention, and citizen's empowerment to his/her own life are the core areas of social and health politics. Health informatics plays a crucial role in accomplishing these elements [1]. New digital health services are essential in order to improve care all over the world, to increase the level of patients' engagement in their own care, to arrange quality health services with universal access, and to create a sustainable financial ground for health care systems [2]. To achieve effective implementation, the customer-centric service culture in health care requires a human-centered design approach to co-creation innovation and also skills, such as sensitivity and attitudes [3]. Well-functioning eHealth services need new competences from professionals and citizens [4]. Nearly half of the European Union (EU) population (47%) does not have proper digital skills, yet in the near future, 90% of jobs will require it. The EU Commission supports efforts to enhance the digital skills and qualifications of the population and to increase the level of ICT professionalism [5.] An effort to achieve this has been made through the European Computer Driving License (EDCL), which since 1995, has given a worldwide format to provide general knowledge and skills about ICT to all professionals on different educational levels [6]. The biomedical and health informatics standardized curriculum developed by the International Medical Informatics Association (IMIA) is widely known [7]. Also, nursing informatics has been part of nursing education for many years [8–11]. Moreover, social workers are required to be competent in the use of informatics [12]. However, the research still shows that students need to increase their knowledge, skills, and competences in informatics [10]. The European Qualifications Framework (EQF) defined by the EU is the general framework of vocational qualifications for competence in eight different levels. A bachelor's level is defined as college completion level 5, and it is the first level of higher professional education. The University of Applied Sciences (UAS) is level 6. The EQF defines competences, skills and knowledge related to all degrees [13], and the directive describes professional minimum competences [14].

This study aims to describe the competences that students have before studies and those they expect to gain from the study module "Developing Digital Health and Welfare Services" in multiprofessional groups. This study is part of an EU-funded project. The final aim of the whole project, called the "Developer of Digital Health and Welfare Service (DeDiWe)", is to create a 30-credit module curriculum based on IMIA's recommendations about Developing eHealth and Welfare Services, and to define and describe the eHealth developers' previous knowledge, skills, and competences in bachelor's degree programs for EQF levels five and six.

The research questions are as follows: 1) What kind of competences do bachelor's students expect to get from participating in the study module for developing digital health and welfare services? 2) What do the bachelor's students experience as most important in multiprofessional work in developing digital health and welfare services? 3) What kind of competences do the students from the different professions bring with them to the multiprofessional group?

Methods

The questionnaire

Data for this study were collected with the help of an e-questionnaire, which was based on the IMIA´s curriculum content [7] for EQF levels 5 and 6 [13] and described the user's information technology (IT) levels in relation to the IMIA's curriculum content. The questionnaire is cross mapped with the EDCL's [6] and IMIA's [7] contents. The service design, which is part of the DeDiWe module's curriculum, is included as an addition. Competences for design thinking have been used as a framework [15] to describe the part of the questionnaire relating to the service-design process. The DeDiWe curriculum also is cross mapped with the IMIA's content-based competence evaluation measurement tool. This study reports on three open-ended questions about the students' knowledge of digital health

prior to the study units. This study is part of the students' competence evaluation before the DeDiWe studies.

Data collection and analysis

Data were collected using an e-questionnaire answered by students who enrolled in the course in Fall 2016. The course outline, aims, learning outcomes, and the timetable were introduced to students before the data collection. Answering the questionnaire was voluntary-based. Students were informed to answer based on their own preconceptions and expectations. The e-questionnaire was distributed to all participating students through the eLearning platform used for the study unit. Research data was anonymized.

The questionnaire was sent to all students (n = 82) from the European partner schools in Finland, Latvia, and Estonia that participate in the study units and thesis work. Students' answers from the e-questionnaire came in an Excel spreadsheet, which was transformed into a Word format, and read several times by OA and G-BL, before being loaded into NVivo. QSR International's NVivo 10 for Windows software for qualitative data analysis was used for arranging and analysis of the open-ended questions, finding themes, coding data, and calculating word frequency. All the obtained data was screened and structured to seek the most relevant information. NVivo 10 created a data file for each question, resulting in three data files. The data was checked by seeking synonymies to the words through a text search query in every questionnaire's data separately, which showed the trends for the inductive classification. It also used theoretical knowledge for the classification. After that, the project researchers chose the items for every node by reading the text and designating the node to the item. Some of the items could be in two nodes. NVivo10 helped by coding stripes to see how the items fitted into the nodes and data. After the nodes' references were chosen, researchers read the text again and designated categories under the nodes by qualitative content analyses [16]. Regarding any overlaps, the researchers OA and G-BL performed the final classification.

Results

The results are preliminary and part of the bachelor's students' competence evaluation results. There were students (n = 64) from three countries: Finland (n = 39), Latvia (n = 13), and Estonia (n = 12). The number of students in the different study programs were nursing (n = 32), physiotherapy (n = 3), biomedical laboratory science (n = 3), midwifery (n = 3), business administration (BBA) (n = 4), BBA–IT (n = 3), engineering–IT (n = 0), doctoral assistant (n = 7), social and welfare (n = 8), environmental health (n = 0), radiography (n = 1), and other (n = 0). Of all the students, 76.6% were women and 23.4% were men, 46.9% were ages 19–29, 21.9% were 30–39, 23.4% were 40–49, and 7.8% were over 50. Most of the students (85.9%) were full-time students at the bachelor's level, but some of the students (14.6%) were in the open university. The results are presented in the form of word frequency, text search, and metrics coding queries by using NVivo 10.

There were 376 answers (Table 1). The results are presented by each research question, with the whole data and numerical knowledge about categories and subcategories. Every node has been described with categories, subcategories, and original sentences. In each question, the students were asked to name the three most important aspects from every content category: student expectations, multiprofessional work, and student competences. Not all students gave three alternatives, but only one or two.

Table 1 – Frequencies from all answers in data

Content	First answer	Second answer	Third answer	Together
Students' expectations	49	47	39	135
Multi-professional	46	42	38	126
Students' competences	43	39	33	115
All answers	138	128	110	376

Knowledge and skills students expect to gain

The data showed that "Health" (n = 32, 5.4%) and "services" (n = 23, 3.9%) were the two most common words in the data. There were many synonyms, such as digital and eHealth. The data were divided into two nodes: Biomedical and health informatics (96 references coded with 69.9% coverage) and Developing services (73 references coded with 54.7% coverage). Figure 1 describes the relationships of the nodes and categories, considering the content that students see as important. All nodes and categories are explained in the following sections.

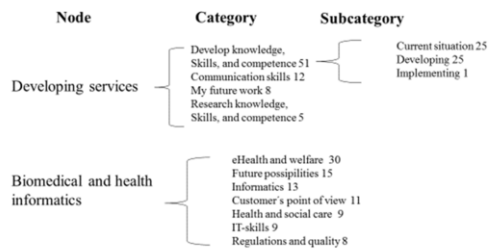

Figure 1– Knowledge and skills students expect to gain from studies

Developing services

The first node in which students expect to gain more information is "Developing services", and it is classified into four categories. 1) "Develop knowledge, skills, and competence" is the only category that has additional subcategories. The "Develop" category is spread into three subcategories: a) "Current situation" has 25 items expressing needs to understand the current situation in eHealth and eSocial services, including "*advanced technologies in social services*", "*artificial intelligence machine learning*", and *"a greater understanding of the current innovation projects in e-Health in Europe/world*". Students also expressed needs to understand the multidisciplinary perspective: "*understanding of business, technology and healthcare together*"; b) The "Develop" subcategory has 25 items about the need to understand the developing perspective, such as *"I would understand the concept 'citizen as customer' in digital health and welfare services";* and c) "Implementing" has one item: "*Implementing".* 2) The "Communication" skills category has 12 items, including "*improving communications methods to remove cultural barriers*". 3) The "Gain knowledge for future work" category has eight items, such as "*be ahead of current trends to be able to predict coming changes in my profession*". And 4) The "Research knowledge, skills, and competence" category has five items, including *"analytical skills".*

Biomedical and health informatics

The second node in which students want to gain knowledge and skills is "Biomedical and health informatics", which is classified into seven categories. There are variations between contents in these categories. 1) The "Health and social care" category has nine items, and mostly students want to know about health care and human functioning in general, but there are also some specific comments, such as "*specifically learning about the brain*". 2) The "eHealth and welfare" category has 30 items and is the largest category in this node. Students mostly hope to understand the content, for example, "*understanding of business, technology, and health care together*", but they also have advanced plans, such as "*I wish to learn more about how to use data analysis to diagnose diseases*". 3) The "Customer's point of view" category has 11 items explaining the desire to understand the customer's orientation, such as "*understanding customer behavior in digital the health and welfare environment*" and "*to know more about patient requirements in the e-platform*". 4) The "Regulations and quality" category has eight items explaining students' hopes to gain more knowledge about a safe environment, including "*patient data safety and confidentiality in eHealth*", but also trust, such as "*gaining customers'/patients' interest and trust regarding using e-health services*". 5) The "IT skills" category has nine items, including "*Improve my IT-skills*" and *"to have skills to make tools for digital websites*". 6) The "Informatics category" has 13 items describing students' wishes to understand how to work with data, such as "*I know where to find the evidence*" and "*health information management skills*". 7) The final category, "Future possibilities", has 15 items, which vary from the personal level to international development. Those include "*ability to use digital appliances and skills in the future working as a nurse*" and "*developing health programs in Finland and abroad*".

Contents students see as important in multiprofessional work in developing digital services

When the words were counted, "different" (n = 16, 3%) and "work" (n = 13, 3.5%) were the most common. There were also many synonyms like "patient" and "patients". The data was analyzed and divided into three categories: Biomedical and health informatics (29 references coded with 25.6% coverage), Communicative culture (78 references coded with 55.86% coverage), and High-quality services (35 references coded with 35.8% coverage). Figure 2 describes the relationships of nodes and categories, considering the content that students see as important in multiprofessional work for developing digital services. All nodes and categories are explained in the following sections.

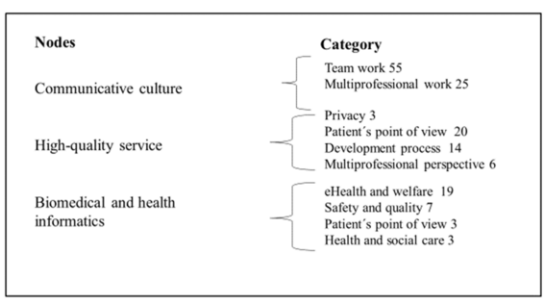

Figure 2 – Content that students see as important in multiprofessional work in developing digital services

Communicative culture

The first node is the "Communicative culture" category, and it was classified into two categories. 1) The "Team work" category has 55 items. Examples are as follows: "*willing to work in a team*", "*compliance*", "*dedication*", and "*coverage*". *2*) The "Multiprofessional work" category has 25 items, such as "*teamwork and collaborating with relevant stakeholder*" and "*understanding other professionals' roles and competencies*".

High-quality services

The second node, "High-quality services", was classified into four categories: 1) "Patient's point of view" has 20 items, such as "*improve my understanding about the customer in the health and welfare system*"; 2) The "Development process" category has 14 items, including "*development of digital healthcare and welfare services*" *and* "*leadership and management skills*"; 3) The "Multiprofessional perspective" category has six items, for example, "*every profession has different ideas from different perspectives*"; and 4) The "Privacy" category has three items, including "*privacy issues in health services*".

Biomedical and health informatics

The third node about the content that students see as important in multiprofessional work in developing digital services is "Biomedical and health informatics". The node was classified into four categories, and there was a variation between content in the categories: 1) The "eHealth and welfare" category has 19 items, for example, *"Innovation: What works well and what needs to be changed*" and "*research and surveys, monitoring and evaluating digital health and welfare services*"; 2) The "Safety and quality" category has seven items, such as "*data collection while at the same time maintaining confidentiality and privacy*"; 3) The *"*Health and social care" category has three items, including "*control of people health*"; and 4) The "Patient´s point of view" category has three items, such as "*respecting the right of the patient*".

Professional competences that students from different branches bring to the multiprofessional group

The most common words in the data were "skills" (n = 23, 4.7%) and three words with the same value "understanding", "work", and "working" (n = 9, 1.8%). There were also many synonyms. The data was analyzed and divided into four nodes. Biomedical and health informatics (17 references coded with 13.1% coverage), Communication (49 references coded with 24% coverage), Health and welfare (41 references coded with 47.5% coverage), and Management and developing (37 references coded with 24% covered). Figure 3 describes the nodes' and categories' relationships regarding what professional competences students from different branches bring to the multiprofessional group. All nodes and categories are explained in the following sections.

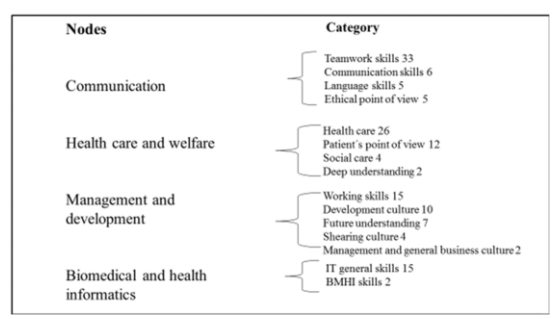

Figure 3 – Professional competences that the students from different branches bring to the multiprofessional group

Communication

The "Communication" node is the first node about the professional competence students from different branches bring to the multiprofessional group, and it was classified into three categories: 1) The "Teamwork skills" category has 33 items, including "*spreading ideas*" and "*the capability to work in a multiprofessional team*"; 2) The "Communication skills" category has six items, such as "*communication (written, spoken, tools, social media)*"; 3) The "Language skills" category has five items such as, such as "*good language skills*" and "*writing competence*"; and 4) The "Ethical point of view" category has five items, such as "*compliance*" and "*loyalty*".

Health care and welfare

The second node is "Health care and welfare", which was classified in four categories: 1) The "Health care category" has 26 items, including "*up-to-date information about public health care*" and "*working with chronic diseases and use of e-compliance*"; 2) The "Patient's point of view" category has 12 items, such as "*a practical skillset and an understanding of how to prioritize the needs of a patient*" and "*inform, instruct and guide people in making the change to better in behavior and movement*"; 3) The "Social care" category has four items, for example, *"knowledge of social branch, law, practicals, and ethics*"; and 4) The "Deep understanding" category has two items, including "*a diverse work and internship experience, with an understanding of the complexity of the health care system*".

Management and development

The third node is "Management and development", which was classified into five categories. 1) "Management and general working skills" has 15 items, such as "*leadership skills*" and "*the capability to work in a multiprofessional team*". 2) The "Development culture" category has 10 items, including "*professionality in my own branch/sector*" and "*service development*". 3) "Future understanding" has seven items, for example, "*dedication in seeking further knowledge to improve the system*" and "*multidimensional insights*". 4) The "Shearing culture" category has four items, such as "*give and share my knowledge*". Finally, 5) "Business culture" has two items, for example, "*knowledge in business, finance*".

Biomedical and health informatics

The fourth node is "Biomedical and health informatics", (BMHI) which was classified into two categories: 1) The "IT general skills" category has 15 items, such as "*IT background from end user support and IT management, customer service and support*"; and 2) "BMHI skills" has two items: "*knowledge concerning possibilities using digital services in public health care*" and "*specification and documentation skills*".

Discussion

In the last decade, health and welfare services have become a customer-centric culture with many digital services [2]. Designing and innovating these new digital-service processes effectively require human-centered co-creation with sensitivity and motivation [3]. This study aimed to describe the competences that students had before studies and those they expect to gain from the study module "Developing Digital Health and Welfare Services" in multiprofessional groups as part of their bachelor studies.

The study results showed that the students expect to gain an understanding of the current situation in eHealth and social care services. They also want to acquire skills to communicate with customers through digital services and learn how to develop and design services. Lifelong learning has become an even more important aspect because professionals and citizens need new competences to use eHealth services in flexible ways [4].

IMIA's biomedical and health informatics curriculum [7], EDCL [6], and design-thinking competences [14] are the framework for the DeDiWe studies. Results showed that students are interested in understanding regulations and how quality customer-oriented services are built. They want to know the future trends in eHealth and welfare services, and also connect to different service providers and meaningful networks. Students prioritized the knowledge and skills needed to develop services in multiprofessional teams. They want concrete skills that will help them work with apps, but at the same time, do want to gain an understanding of development projects on an international level.

In developing digital health and welfare services in multiprofessional teams, the bachelor's students see as equally important biomedical and health informatics knowledge and skills, a communicative culture, and high-quality services. The results of this study are in line with the EQF [13], which provides the framework for general professional competences to all professionals to reach the requirements to be active partners in research, development, and innovation processes. IMIA's curriculum [7] is multiprofessional, between IT and health care, but business and social professionals are not included. Also for designers [15], BMHI studies could be useful. Today's health care services need a paradigm change to have more open and customer-oriented services, in which all can take part in designing new services and implementing them actively in society [3]. In DeDiWe studies, we have had the opportunity to allow health and social care, IT engineer, IT business, and business bachelor's students to take part in a common study module about developing digital health care services. This project is one intervention by the EU that supports enhancing the population's digital skills and increasing the level of ICT professionalism [5].

The results of this study showed that students believe that they can bring their own competences to the multiprofessional team and they believe in their ability to co-create safe, customer-friendly digital health and welfare services for customers. These results differ from those of the EU's [5] Single Market Strategy, which determined that nearly half of the EU population does not have the proper digital skills for jobs that require ICT competence, but these results are in line with World Health Organization's [2] strategy's objectives to have eHealth services implemented globally.

The questionnaire was developed for this study and contained only open-ended questions. The next step is to analyze the quantitative data from the questionnaire. The wording and format of the questions may have influenced the results. The data were analyzed using NVivo 10; however, because of a qualitative analysis, there is always a possibility of diverse interpretation among two researchers. The results are not generalizable because of the small sample size. The sample mainly reflects the opinions of the health care sector because most of the students represent that sector. However, these results imply that students are capable of working multiprofessionally in developing digital health and welfare services. Students were informed that completing the e-questionnaire was voluntary, but that we recommended it because of the importance of the project. This and the need for adequate English skills might have affected the response rate and the results of the study.

Conclusion

Successful development of multidisciplinary digital social and health care services requires changes and cooperation in education between various professions including health care, social care, IT, and business. Digital health and welfare services development need a multiprofessional curriculum and a combination of all teachers' competences for high-quality service development.

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