EU*US eHealth Work Project H2020-SC1-HCO13-2016

Mapping Skills and Competencies; Providing Access to Knowledge, Tools and Platforms; and Strengthening, Disseminating and Exploiting Success Outcomes for a Skilled Transatlantic eHealth Workforce

Case Study: The Development of Digital Health and Welfare Services in Estonia, Finland and Latvia

Laurea University of Applied Sciences and Arcada University of Applied Sciences, Finland; Tartu Health Care College, Estonia; Red Cross Medical College of of Rīga Stradiņš University, Latvia

TITLE The Development of Digital Health and Welfare Services in Finland

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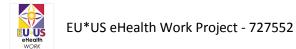
ORGANIZATION

Arcada is a multi-professional University of Applied Sciences (UAS) with a campus located in Helsinki, Finland. Arcada offers practice-oriented higher education in seventeen bachelors and seven master's degree levels, as well as advanced educational offerings in both Swedish and English. Arcada has over 2,400 students and 190 employees in four educational departments. The Department of Health and Welfare is the largest department at Arcada with over 1,100 students and approximately 50 teachers and researchers in emergency care, occupational therapy, physiotherapy, nursing, sports and social services.

Laurea is a multi-professional UAS with seven campuses located throughout the greater Helsinki region. Laurea offers higher education based on the Learning by Developing (LbD) pedagogical model in 10 bachelor level programmes in Finnish and six in English, and 10 master's level programmes in Finnish and two in English. Laurea has 7,800 students and nearly 300 employees. Laurea has three research, development and innovation areas: health and social integrity, coherent security and service business. The Health and Welfare sector encompasses nursing, physiotherapy and social science programs. Laurea is one of the largest nursing educators in Finland with 1,700 nursing students.

Tartu Health Care College (THCC) is a higher education institution with a modern learning environment offering education and training in the fields of service, health and social care. THCC offers seven programs: nursing, midwifery, specialized nursing, physiotherapy, radiography, biomedical science, environmental health and vocational education in five programs in Estonian language. The college is also going to open an English language master's program in radiography. In THCC, the principle followed is that practical training forms an integral part of the study process, supporting the acquisition of specialist, occupational and professional competencies and experience, supporting the consolidation of theoretical knowledge in practical work conditions. THCC has recognition in Estonia and internationally with over 1, 2000 students and nearly 80 employs.

Red Cross Medical College (RCMC) of Rīga Stradiņš University is a higher education institution offering programs in nursing and medicine as well as a vocational education program in nursing. RCMC has 780 students and approximately 60 employees serving for five 1st level higher professional education study programs and three vocational education programs. RCMC has extensive network of health care industry

partners, including hospitals, primary doctor's practices and emergency services, to provide insights into the health sector and ensure program compliance in relation to industry needs. RCMC is a modern, stable and demanded educational institution with more than 97 years of rich history and experience in health care education. RCMC provides strong expertise in the development and implementation of innovations in health care and public health sectors, research and student's enterprise for implementation projects. RCMC works in collaboration with health sectors, institutions, labor market and line authorities.

There was no formal connection between the four universities before the Digital Health and Welfare Services (DeDiWe) project began, other than the fact that all universities are located in the Central Baltic Region.

BACKGROUND

Electronic health, referred to as eHealth, is an emerging field that intersects medical informatics, public health and business sciences. eHealth also refers to health and welfare services delivered or enhanced with digital technologies [1] and has been several decades in the making. eHealth has been a priority for the World Health Organization (WHO) since 2005, with an aim at cost-effective and secure use of information and communication technologies (ICT) in support of health and health-related fields [2]. Finland is taking on a leadership role in Europe with the development of client-centred health and welfare services that are effective and equally accessible to everyone. A precondition for these services is the multi-professional cooperation between different actors when developing and using health and welfare [3]. The European Union (EU) Commission is strategically enhancing the digital single market throughout Europe; however, it is even more necessary to have functional cross-border digital health and welfare systems in the Baltic region [4]. There are functional cross-border co-operations on many levels of society, from citizens relocating to macro region strategies, where the Baltic Sea region has been an EU testing ground for international cooperation [5].

Healthcare systems across Europe are facing new challenges with increased budgetary pressure in combination with the ageing population (both cited as key challenges). This raises the need for new and cost-efficient solutions. The impact of new technology on improving the health and well-being of individuals and populations is unprecedented, which speaks for a digital revolution in healthcare [6]. This digital revolution offers an opportunity to transform healthcare and empower citizens in taking charge of their own health [7]. Digitalisation of health and welfare services is also essential in order to improve care and to increase the level of patients' engagement in their own care. Digitalisation is also essential in order to arrange quality health services with universal access and to create a sustainable financial ground for health care systems [3, 8, 9]. The use of ICT in healthcare has the potential to increase the efficiency of services as well as to improve quality of life and unlock innovation in health markets [10]. This is also emphasized in the strategies of the EU, as noted within the European eHealth action plan, that aim to improve healthcare with a patient-centred approach and reduce costs by developing the use of digital tools and services for health related matters.

This rise of digital health and welfare brings about a demand for specialized skills and competencies. The changes that technology brings will call for a different type of employee. To be able to fully utilize the potential of eHealth, professionals in the health and welfare sector need to have proficient digital competencies to serve citizens and to take part in the development of new eHealth services. These shifts also require a new or an enhanced set of knowledge, skills and attitudes with renewed focus on the individual [11]. These revolution-like changes bring about a need for a new kind of educational setting, for

both professionals in working-life and in the education of future professionals in health and welfare. The development of the DeDiWe project aimed at responding to these challenges and needs.

STATUS/CURRENT DEVELOPMENTS

Nearly half of the EU population does not have proper digital skills, yet in the near future a majority 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 competencies in professionals [4]. An effort to achieve this has been made through the European Computer Driving License (ECDL), which has been a worldwide resource to provide general knowledge and skills about ICT to all professionals on different educational levels since 1995 [12]. As the Digital Agenda for Europe states, insufficient skills and motivation of the health care personnel can pose challenges to take part in digital development [13]. This is problematic as professionals are needed in the services development process.

According to Dr. Elina Rajalahti, Principal Lecturer, Health Informatics, Laurea UAS [14], the minimum digital competency requirements for healthcare professionals and teachers in the future are the following: Informatics knowledge base, informatics tool adoption and nursing and health information integration management. In the DeDiWe project, partners from working life and higher education organizations are included, and our aim is to develop multi-professional (defined as teachers from different disciplines) competencies for all partner professionals and students.

The standardized curriculum for biomedical and HI developed by the International Medical Informatics Association (IMIA) is widely known and utilized [15]. Nursing informatics (NI) has been a part of nursing education for many years however, competence in informatics is not limited to the field of nursing but more generally, to the whole field of health [15-19] and welfare [20]. Research shows that students in the field of health and welfare need to increase their informatics knowledge, skills and competencies [18]. Therefore, there is a need for students to develop their current competencies to match the needs of digital health and welfare.

The Central Baltic region (Estonia, Finland, Latvia and Sweden) needs professionals who have excellent skills in ICT as well as competencies in developing new digital health services.

ACTIVITIES/MEASURES

The EU Central Baltic Program 2014-2020 is a cross-border cooperation initiative that finances high quality projects in Finland, Estonia, Latvia and Sweden, with the aim of solving common challenges together and across borders. The program funded the DeDiWe project, which aimed to enhance future health care professionals' abilities to develop digital health care and welfare services. The project was a multi-cultural and multi-professional project, combining students from health and welfare with students from the ICT sector. The main objective of the project was to create a new curriculum, taking into account professional qualifications defined at European Qualifications Framework (EQF) level 5 - 6. The EQF is the general framework of vocational qualifications for competence in eight different levels, defined by the EU. The EQF defines competencies, skills and knowledge related to all degrees [20] and the directive describes professional minimum competencies [21]. Based on the Digital Agenda for Europe [13], the overall objective of the DeDiWe curriculum was to support the professionals' competence to work in a digital society and to help offer citizens accessible eHealth services. The project aimed to integrate the best professional strengths in the Baltic region, from Finland and Sweden to Estonia and Latvia.

DeDiWe curriculum content is based on measured competence and the latest multi-professional knowledge about the needs of the digital society [3, 10, 12, 15, 23]. The curriculum is multi-professional and combines health and welfare with IT and service design [15, 24]. In the study unit, future professionals from different fields of study (IT, social care, economics and health care) are developing their own unique competencies to match the needs of future digital healthcare.

The DeDiWe curriculum utilizes the LbD pedagogic model, which combines research, development & innovation work, regional development as well as an educational perspective. The goal is to bring about real changes in the world and new habits of action [25]. LbD provides students and lecturers the opportunity to have genuine encounters with the changing requirements of working life and a collaboration model for functioning as innovative partners. Learning is seen as a tool for enabling the achievements of new competencies needed in working life [26]. The DeDiWe digital learning environment was built on an open web based chat platform, which brings digital content, software applications and services together to provide the participants with a single solution. The studies are entirely online, combined with cross-border, co-creation and cooperation in the form of group activities between all participating countries.

The DeDiWe studies consist of three study units (15 credits) with the possibility of adding a thesis (15 credits). The three study units of five credits each are built around three main themes:

1. Citizens as customers of digital health and welfare services
2. The digital environment in health and welfare services and its ethics and regulations
3. Digital service development and information management in health and welfare services

In the first study unit, the aims and objectives are to recognize current and future trends of digital health and welfare services and to discuss and describe what the citizen, as a customer of health and welfare services, means. The focus is also on empowering and guiding customers to participate in their own digital health and welfare service area and to identify the need for professional-level communication in digital environments.

The aims and objectives of the second study unit focus on understanding the basics of health and welfare informatics and its methods and technical aspects, especially from the legal, confidential, privacy and security perspectives.

In the third study unit, the aims and objectives are to understand the user-centred and multi-professional service design and development process for digital health services, and to be able to apply future orientation and solutions-centric working habits to these. Knowledge about the different kinds of data sources, structures and future possibilities for using data analytics for health promotion of citizens is a secondary focus.

The contents of all three study units revolve around the aims and main objectives. The learning outcomes on levels EQF 5 and 6, as well as the competence areas for the different study units are described in *Table 1*, *Table 2* and *Table 3*.

Competence area	Fundamental of human and health	Communication	Guidance

Learning outcomes EQF5 The student is able to	Know the fundamentals of health related to citizens as customers in digital health and welfare services.	Know the aspects of effective virtual communication.	Know methods and guidance techniques for digital health and welfare services.
Learning outcomes EQF6 The student is able to	Understand and explain fundamentals of human and health related to citizens as customers in digital health and welfare services.	Understand and explain the aspects of effective virtual communication.	Know and implement methods and guidance for all digital health and welfare services.

Table 1. Learning outcomes and competency areas for the DeDiWe Study Unit 1

Competence area	General Health and Welfare services	Treating the digital environment as a technical environment/ The digitalization process.	Safety culture in the digital world	Informatics environment / Intelligent services
Learning outcomes EQF 5 The student is able to	Know the partnership countries' health and welfare environment (especially from the digitalization perspective) and know the principles of evidence-based practice and evidence-based clinical pathways in digital health and welfare.	Enable digitalization through the understanding of the underlying technical foundation. Know the digital environment and ways to navigate it. Find ways to conceptualize and focus on digital health and welfare services in relation to customer needs.	Know ethical theories, safe procedures as well as the principle laws effecting digital health and welfare (customer privacy). Employ skills to practice ethical and high quality customer service (take responsibility for client safety and integrity).	Know basic elements of structural data, intelligent services and decision support systems. Know the system and apply outputs in decision making and in facing the challenges digitalization might bring.
Learning outcomes EQF 6 The student is able to	Understand and explain the partnership countries' health and welfare environments (especially from the digitalization perspective) and know principles of evidence-based practice and evidence-based clinical pathways in digital health and welfare services.	Enable digitalization through the understanding of the underlying technical foundation. Understand the digital environment and ways to navigate it. Find ways to conceptualize and focus on digital health and welfare services in relationship to specific customer needs.	Understand ethical theories, safety procedures, principles and laws affecting digital health and welfare as well as customer privacy. Have the skills to practice ethical and high quality customer service taking responsibility for the safety and integrity of the client.	Know basic elements of structural data, intelligent services and decision support systems. Know the system and apply outputs in decision making whenever possible and continue to face the challenges digitalization might bring.

Table 2. Learning outcomes and competence areas for DeDiWe Study Unit 2

Competence area	Digital service in health & wellbeing context	Service design methodology	Technology design and build -process	Implementation and evaluation
Learning outcomes EQF 5 The student is able to	Know the meaning of the theoretical knowledge and principles of digital service in a health and wellbeing context.	Know and demonstrate skills to innovate service design methodology.	Know the principles and methods of digital service development in the technology design process.	Know the elements of successful implementation of new digital services for users and organizations.
Learning outcomes EQF 6 The student is able to	Understand and explain the meaning of the theoretical knowledge and principles of digital service in a health and wellbeing context.	Identify and create simple solutions/skills to innovate service design methodology.	Apply practice principles and methods of digital service development in the technology design process.	Plan and execute simple implementation projects.

Table 3. Learning outcomes and competence areas for DeDiWe study unit 3

CHANGES

The current situation in DeDiWe's participating schools has varied since the project began. In Finland, HI studies have been incorporated in health and welfare study programs, but not in a multi-professional context on a bachelor level (EQF 5-6). On the master's level, informatics studies have some degree programs focused on the multi-professional in the field of health and welfare. In Estonia and Latvia, the subject is less known to students. The experience and use of online learning environments and platforms in the Baltic states also vary. For all partner schools, the chat-based online environment was a completely new way of organizing studies [27].

In the DeDiWe studies, the combination of multi-professional teachers led to positive attitudes towards multi-professionalism in students. There is research to support the notion that active multi-professional co-operation between teachers is needed when aiming at developing multi-professional competencies for students [28]. There is also evidence that community learning and development work needs a common language to be successful [29]. In the DeDiWe project, multi-professional (and multicultural) teams were formed at the beginning of each study unit while finding a common language took time.

As previously shared, the studies defined within the DeDiWe project were organized in the LbD pedagogic model. The model is well-known in Finland although not as familiar in the Baltic states.

RESULTS

The pilot for the DeDiWe course started in autumn 2016. The evaluation of the curriculum for the course pilot was completed from both the view of the participating students and the teachers, with the aid of questionnaires and focus-group interviews for each study unit, before and after the studies. The evaluative discussions among teachers were executed through online discussion as well. The discussion results will be published as articles in the future.

Overall, the feedback for all study units were quite similar. The content of the course was found to be good, interesting and supported learning. The evaluation also showed that the framework and the study unit content created useful challenges to achieve new competencies and skills to predict the use of the principles and methods of digital service development in the technology design process. The assignments especially enabled the students to show their skills and to demonstrate learning and the use of methodology, specifically in the service design process.

The LbD process was visible during all three study units. Professionals served as active partners during the process, enabling a connection to digital health service development in working life. In study units one and two, professionals made presentations via webinars and gave voice to the current situation in digital health and welfare services. In study unit three, students got involved with working life development targets and worked with them during the service design process. Over 20 students also took the opportunity to write their bachelors thesis about the project, commissioned by various external project partners. The theses were mainly completed in Finland at the City of Helsinki Department of Social Services and Health Care— Hospital, Rehabilitation and Care Services and Hospital District of Helsinki and Uusimaa (HUS) Lohja Hospital Area. In Finland, it is common that a thesis is a part of the working life development effort. In Estonia, the East-Tallinn Central Hospital and Tarto Health Care College and in Latvia, at the Red Cross Medical College and State Emergency Medical Service (SEMS), made great development work with local associate partners to build stronger relationships to implement the LbD method for future collaboration. In Latvia, RCMC and SEMS also created a new, joint curriculum for the development and improvement of quality and relevance of practical training (internships), as well as joint research exchanging know-how and innovation. For example, representatives of SEMS had the opportunity to be the scientific supervisor of the qualification work.

OUTLOOK/LESSONS LEARNT

Even if the official funding for the project has concluded, the project will continue to be relative and leveraged through the curriculum and open online platform until the year 2022. The main challenges that the project faced are related to multi-professional cooperation. Some of the challenges are related to finding a joint or shared language within the different professions, both on faculty and student levels as well as within working life. Solving the problem and finding a common language might help recruit students, adult learners and teachers to take part in the curriculum. There will be new partner schools utilizing the curriculum, which will aid the development process for recruiting teachers and students within the IT field and working life.

As for the curriculum, re-evaluation of the learning outcomes, objectives and content needs to be done at regular intervals, as the eHealth field is developing at a rapid pace.

References

[1] Eysenbach G. 2001. What is e-health? J Med Internet Res. 2001 Apr-Jun; 3(2): e20.Published online 2001 Jun 18. doi: 10.2196/ jmir.3.2.e20 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1761894//

[2] World Health Organization. 2016. Global diffusion of eHealth: Making universal health coverage achievable - Report of the third global survey on eHealth. Available at: http://www.who.int/goe/publications/global_diffusion/en/. Retreived 13.12.2017

[3] STM (Ministry of Social Affairs and Health) 2015. Information Strategy for Social and Health Care 2020. Available at: http://www.julkari.fi/bitstream/ handle/10024/125500/URN_ISBN_978-952-00-3548-8.pdf?sequence=1

[4] Communication from commission to the European Parliament, the Council, the European economic and social committee and the committee of the regions. A Digital Single Market Strategy for Europe (2015). Brussels, May 6. 2015. COM (2015) 192 final.

[5] Studzieneckia, T. 2015. The development of cross-border cooperation in an EU macroregion – a case study of the Baltic Sea Region. 3rd GLOBAL CONFERENCE on BUSINESS, ECONOMICS, MANAGEMENT and TOURISM, 26-28 November 2015, Rome, Italy Procedia Economics and Finance 39 (2016) 235 – 241. Available: https://ac.els-cdn.com/S2212567116303185/1-s2.0-S2212567116303185-main.pdf?_tid=60d8cc28-dff4-11e7-912b-00000aacb35d&acdnat=1513162815_4b4e5795ec64b1dc1a6bda261a436155

[6] Birkler, J. and Dahl, M.R., 2014. *Den digitala patienten.* Liber. 1st edition. Stockholm.

[7] Kostkova, P., 2015. Grand challenges in digital health. *Frontiers in public health*, 3.

[8] European Commission. 2014. GREEN PAPER on mobile Health ("mHealth"). SWD(2014) 135 Final. Brussels. Retrieved January 11 2016, from https://ec.europa.eu/digital-agenda/en/news/green-paper-mobile-health-mhealth

[9] European Commission. 2015a. eHealth. Retrieved 11.122017, from http://ec.europa.eu/health/ehealth/policy/index_en.htm

[10] eHealth Action Plan 2012-2020. 2012. Innovative healthcare for the 21st century6.12.2012. COM(2012) 736 final, Brussels. Retrieved January 11 2016 , from https://ec.europa.eu/digital-agenda/en/news/ehealth-action-plan-2012-2020-innovative-healthcare-21st-century

[11] Salmond, S. W., & Echevarria, M. (2017). Healthcare Transformation and Changing Roles for Nursing. Orthopedic Nursing, 36(1), 12–25. http://doi.org/10.1097/NOR.0000000000000308

[12] European Computer Driving Licence Association, ECDL and Qualifications Frameworks Worldwide 2015. Available at http://ecdl.org/policy-publications/ecdl-and-qualifications-frameworks-worldwide

[13] European Commission. 2015b. Digital Agenda for Europe A Europe 2020 Initiative. Retrieved December 8, 2017 from https://ec.europa.eu/digital-agenda/en/digital-europe

[14] Rajalahti, E. 2014. The development of health educators' nursing informatics competence. Faculty of Social Sciences and Business Studies. Dissertations in Social Sciences and Business Studies, no 89. 2014. Publications of the University of Eastern Finland. University of Eastern Finland, Kuopio. Available from, http://epublications.uef.fi/pub/urn_isbn_978-952-61-1611-2/urn_isbn_978-952-61-1611-2.pdf

[15] Mantas, J., Ammenwerth, E., Dermis, G., Hasman, A., Haux, R.,Hersh, W., Hovenga, E., Lun, KC. Marin, H. Martin-Sanchez, F. ja Wrighr G. 2011. Recommendations of the International Medical Informatics Association (IMIA) on Education in Biomedical and Health Informatics -First Revision. European Journal for Biomedical. Informatics, 7(1), 3-18.

[16] N Staggers, CA Gassert, A Carole and C Curran, Informatics competencies for nurses at four levels of practice. J Nurs Educ 40.7 (2001), 303 316.

[17] N Staggers, CA Gassert and C Curran, A Delphi study to determine informatics competencies for nurses at four levels of practice. Nurs Res 51.6 (2002), 383-90

[18] BW Thompson and DJ Skiba, Informatics in the nursing curriculum: a national survey of nursing informatics requirements in nursing curricula. Nurs Educ Perspect 29.5 (2008), 312-317.

[19] TIGER Initiative, Technology Informatics Guiding Education Reform 2009: Informatics Competencies for Every Practicing Nurse: Recommendations from the TIGER Collaborative. Available at http://tigercompetencies.pbworks.com/f/TICC_Final.pdf

[20] T Naccarato, Child welfare informatics: A proposed subspeciality for social work. Children and Youth Services Review. 32, (2010), 1729-1734. doi:10.1016/j.childyouth.2010.07.016

[21] The European qualifications framework for lifelong learning (EQF) European Commission. Education and Culture Lifelong Learning: Education and Training policies. Coordination of Lifelong Learning Policies. European Communities, 2008. Luxembourg. DOI 10.2766/14352 Available at: http://www.ecompetencies.eu/site/objects/download/4550_EQFbroch2008en.pdf

[22] Directive 2013/55/EU of the European parliament and of the council of 20 November 2013 amending directive 2005/36/EU on the recognition of professional qualifications and regulation (EU) no 1024/2012 on administrative cooperation through the internal market information system ('the imi regulation') Official Journal of the European Union. Brussels, 28 December 2013.134-173. Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2013:354:FULL&from=EN

[23] Finnish Nursing Association. 2016. Strategy for eHealth. Retrieved January 13 2016, from https://sairaanhoitajat.fi/wpcontent/uploads/2016/01/S%C3%84HK%C3%96ISET_TERVPALV_STRAT EGIA.pdf

[24] Razzouk R, Shute V. What is design thinking and why is it important? Rev Educ Res. 2012;82:330-348. doi: 10.3102/0034654312457429.

[25] Taatila V, Raij K. 2012. Philosophical review of pragmatism as a basis for learning by developing pedagogy. Educ Phil Theory 44(8), 831–44.

[26] Raij, K. & and Niinistö–Sivuranta, S. (Eds.) 2011. Learning by developing LbD guide. Laurea University of Applied Sciences.

[27] Karlsson, K., Tana, J., Ahonen, O. Chat – the Future Platform of Finnish Education Exports? Journal of Finnish Universities of Applied Sciences, 4/2017. https://uasjournal.fi/in-english/chat-the-future-platform-of/

[28] Aungst TD, Lahoz MR, Evans PJ. Digital health evaluation workshop for interprofessional healthcare students. Digital Health. 2017; 3:1-6. Available from: http://journals.sagepub.com/doi/pdf/10.1177/2055207617740089.

[29] Wenger E. Communities of practice. Learning, meaning and identity. Learning in doing: social, cognitive and computational perspectives. USA: Cambridge University Press.
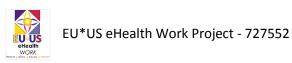
Case Study Checklists

Checklist of eHealth topics (competencies)
Role of "Peopleware": human factors, awareness, satisfaction and acceptance of health IT, usability measurements, evaluation of health IT, communication, leadership, change management, ethics and IT and similar topics Yes. These topics are covered in the DeDiWe curriculum in all three units.
Role of inter-professional approaches: inter-professional versus mono-professional training and learning activities. What subjects lend themselves to inter-professional vs. mono-professional classes, learning environments and similar topics Yes. These topics are covered in DeDiWe curriculum and students are studying in multi-professional groups.

Role of healthcare data sciences: data and information acquisition including documentation, data quality, data, information and knowledge management, data analysis and statistics, clinical decision making instruments, reporting and similar topics

Yes. The topic is slightly covered in DeDiWe curriculum, but not through deeper understanding about topics within this DeDiWe curriculum. In the health and social care curricula, it is covered.

Fusion of medical technology & informatics: software as a device, smart devices, automatic data acquisition via devices, risk and safety management

Yes. The topic is covered in the DeDiWe curriculum. In engineering curricula, it is covered on a deeper level.

Role of process and workflow management: clinical and administrative processes, information continuity and information logistics, management of processes, workflow management systems and similar topics

Yes. The topic is covered in DeDiWe curriculum. In health and social care curricula, it´s covered. In the engineering and business administration bachelor (BBA) curricula, this is covered as a general level, not in a health and social care context.

Role of ethics, legal and data protection issues: ethics and IT, legal requirements, data protection and information self-determination, data safety and similar topics.

Yes. The topic is covered in DeDiWe curriculum from a health and welfare perspective. In engineering and IT-BBA curricula it is covered on a deeper level.
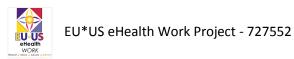
Role of learning and teaching: learning techniques ("learn how to learn"), learning and teaching styles (online, blended, face-to-face), learning management, information management for learning and teaching and similar topics

Yes. This is subject is covered throughout the curricula. The LbD process is described in the case study above.

Role of management related topics in health informatics and IT: principles of management, strategic management, stakeholder and change management, leadership, financial management, risk management, quality and safety management, resource planning and management and similar topics

Yes. The topic is covered in the DeDiWe curriculum from a data management perspective in health and welfare. In the overall curricula for the different study programmes at different universities, there are variations in how deeply it is covered.

Role of technology: information and communication systems, telemedicine, telematics, assistive technologies, mHealth, life-cycle-management including systems development/engineering

Yes. The topic is covered in DeDiWe curriculum. In the overall curricula for the different study programmes at different universities, there are variations in how deeply it is covered.

Role of consumers and populations: consumer health informatics, public health informatics

Yes. The topic is covered with high importance in the DeDiWe curriculum.

Role of Research: information management in research, data analytics

Yes. The topic is covered on a theoretical level in the DeDiWe curriculum. In the overall curricula, this subject is covered within the research methods and thesis work.

Role of interoperability: systems integration, IT standards, terminologies and classifications

Yes. The topic is covered in DeDiWe curriculum with a focus on interoperability within the field of health, as well as welfare where they exist.

Checklist of eHealth topics (gaps and deficiencies)

Teaching the teachers: Are there any activities in your organisation to teach health IT/eHealth to teachers in healthcare?

There are variations between the different universities within the project. The DeDiWe project has partly been an effort to achieve a more systematic adoption of health IT/eHealth and multi-professionalism.
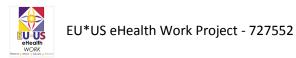
Supporting participatory design and acceptance testing/research: Are there any educational activities to teach or practice participatory design? Are there any activities including research in user acceptance testing and satisfaction measurement?

There are variations between schools, but schools in Finland have many educational activities focused on to service design. Within the DeDiWe project, participatory design teaching and testing, as well as user acceptance testing are focused on in the third study module.

Integrating eHealth/health informatics into traditional curricula: Are there any activities to include eHealth/health informatics into traditional curricula of physicians, nurses and other health professionals with direct patient care?

The DeDiWe curricula is optional for all health and social care students, but there are variations between countries and universities regarding which portions of the curricula is mandatory. This is highly dependent on the individual teacher interests, even if the learning outcomes at some universities have implemented IT skills within their courses.

Motivating clinicians and managers: Are there any incentives and opportunities for clinicians and healthcare managers to acquire and update digital eHealth/health informatics skills and knowledge?

The DeDiWe course is offered as open university study option for clinicians and health care managers. The course is also advertised and promoted to many actors within health and welfare.

Engaging women: Are there any activities to attract female students in eHealth/health informatics or employ female health IT staff?

No particular activities to attract female students have been done. All students get same treatment and engagement in the DeDiWe courses.

Adjusting job descriptions and enable continuing education: Are there any activities to adjust job descriptions, e.g., for clinicians, that include health informatics competencies (also proper use of health IT/eHealth systems) and are there activities to support staff updating and upgrading their health IT related skills and knowledge? This topic is mainly related to provider organisation and also to IT vendors.

Every country has these elements, but there are variations in how much they have. There are also strong EU and national strategies to support digital development. More and more job applications have some IT skills in competence areas, which is a common phenomenon within all jobs in the EU region.

Updating teaching and learning material: Are there any activities to ensure that the material is up-to-date and of high quality?

There are variations between universities from year to year. The students usually get their practical knowledge about different systems and medical devices in their practical training courses. Based on the DeDiWe project, there are common materials that all universities could utilize or benefit from if suitable for their education.

Availability of courses including electronic courses: Are there any additional activities to improve the availability of courses such as implementation of new courses, new course formats that recognise previous experiences/training in particular for continuing education?

The DeDiWe course itself is an activity to improve eHealth skills and competencies, utilizing a new type of course format that is open and accessible for all. There are some variations between countries, but in all countries there are possibilities to continue education as a lifelong participant.

Informal caregivers: Are there any educational activities to teach health IT usage to informal caregivers, e.g. for assistive technologies?

The courses are mainly for professionals, but are open to all, if course prerequisites are fulfilled.

Shortage of health informatics specialists: Are there any programmes to attract health informatics specialists?

There are variations between the different universities and countries, but no common programs exist in the area at the moment. There was a program at Laurea called "Knowledge Management in Future is Social and Health Care Sector" for HI specialists. Today, the program is called Digital and Innovative Services of the Future and is more generally oriented.

eHealth Budget: Does your organization, area or region have a dedicated budget set aside for eHealth/health informatics training, education or workforce development initiatives?

Health and social care organizations have money for eHealth and IT related programs, but schools don´t have special budgets for special content outside of specifically funded projects.

eHealth Specialty Areas: Does your organization address any of these speciality settings/areas of training or outreach for eHealth education or workforce development: ambulatory care, social medicine, geriatric/ageing medicine, rehabilitation?

Every university has some of these eHealth content areas, but there are variations between them, including specific content and how deeply they are taught.