eHealth4all@EU

Interprofessional European eHealth Programme in Higher Education

IO3: Curricular Framework

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Abstract

The IO3 activities were developed around consensual work and grounded on common practices for syllabus development. Using the syllabus template framework an instance for each of the three knowledge areas was developed.

An overarching course development pipeline was proposed.

1 Introduction

The objective of Intellectual Output 3, derives from IO1 and IO2, focuses on preparing the grounds for content development and teaching initiatives, aiming for the efficient and effective delivery of the interprofessional European eHealth online courses and face-to-face summer schools. It focused on developing a generic curriculum framework for describing the general activities for each topic selected in the previous Intellectual Outputs. It was intended to represent a consensual syllabus structure addressing a set of learning outcomes around the identified topics to be covered and developed, considering the focus on a heterogeneous target group and the asynchronous and synchronous moments. Preliminary teaching material preparation activities for identifying and retrieving relevant material to pursue these learning goals were aimed at adapting existing ones and identifying others that needed to be created from scratch.

Feedback and assessment tools were also discussed and designed to address the main activities, materials, and topics covered.

2 Methods

A preliminary review of the commonly used syllabus structure amongst the partner and literature recommendations was performed.

Given the transversal nature and coherence aim for understanding the syllabus structure, a set of review rounds was done after an initial structure proposal. The confluence platform was used for asynchronous collaborative writing, and a set of videoconfer-

ences was done for more conceptual discussions and consensus agreement. Afterwards, each partner responsible for a topic created the corresponding syllabus, following the devised framework.

3 Results

The curriculum framework design activities resulted in the creation of a standard syllabus template for describing each module. The structure and general item description is included in the annexe. Also in same annex the instantiation for each of the topics addressed: Interoperability, Security and Data Protection and Data Analytics.

Additionally, and building upon the previous work in IO1 and IO2, a course development pipeline was devised and proposed. It is triggered by the TIGER International Framework for Recommendations of Core Competencies in Health Informatics 2.0, which specifies priorities of health informatics competency areas for various roles and professions. Because these competency areas are rather broad, further specification results from the different stages of the proposed pipeline: specification of competencies (scoping review), verification through focus group discussions (IO1), pedagogical approaches review (IO2), electronic learning environment (pragmatic decision-based on experience), syllabus with meta-information about the course and course content (IO3).

4 Conclusion

Within this IO, a syllabus construction framework was developed around a consensus of partners' practices and general recommendations.

For each topic covered, a syllabus was developed and used in the following teaching activities building creating the grounds for students information about the teaching activities and fostering reuse of contents.

Following the previous activities and adding the developed framework, a course development pipeline was added with the final piece and proposed to the community.

This pipeline will materialize its purpose with the implementation of the teaching activities in the next IOs.

Appendix

Syllabus Template

Syllabus Course Interoperability

Syllabus Course Data Protection and Security

Syllabus Course Data Analytics

Publication:

Hübner U, Saranto K, Vieira-Marques P, Kinnunen UM, Egbert N, Babitsch B, Kalthoff D, Cardosa A, Sousa P, Hüsers J, Padilha M, Mannevaara P, Jokinen T, Mansholt H, Correia R, Morawski TS, Wilson GM, Ball MJ. The eHealth4all@eu Pipeline of Course Development: TIGER Recommendations in Action. Stud Health Technol Inform. 2022;290:1126-1127. doi: 10.3233/SHTI220300

Syllabus Template

Name of the course

Proposal	
Name	Name of course
Description / Summary	Abstract of the course
Abbreviation	The short version of the name
Credits ECTS/Cp	Indentify the number of ECTS
Scientific Area	Describe the general scientific area
Students Profile	Describe the students profile that can attend this course and to who is aimed (minimum skills required should be stated)
Nº of Modules	Nº of modules (lectures)
Teachers	Who will be teaching
Course Structure	Type of lectures, platforms to use, etc
Digital Competencies Addressed	Describe what digital competencies are addressed by this module refer to outputs from IO1
Learning Outcomes - Should be mapped to the LO from each module	Using Blooms Taxonomy Verbs : (https://www.teachthought.com/learning/what-is-blooms-taxonomy-a-definition-for-teachers/)
	Example: "Interpret the central principles and methods of modelling to describe the processes and information." "Apply the central principles and methods of modelling in the context of health and social care." "Analyze the properties of data models and produce a conceptual model of the working environment."
Content	Main topics addressed, for example: Requirements, models and procedures of modelling. Special features of conceptual modelling. Modelling in relation to action.
Teaching methods	Online course, active participation in teaching (syncrounous/assyncrounous), refer to IO2
Assessment	Describe assessment methods
	Describe assessment scale
Scheduling	Describe the start and finish date, including assessment periods
Bibliography	General references supporting the subject, could be redundant with the bibliography in each module
	Other material
Additional information	Teaching language: English
Work effort	Work effort of the course (working hours online, face-to-face)

Syllabus Course Interoperability

Learning Healthcare in Action: The need for interoperability

Proposal	
Name	Learning Healthcare in Action: The need for interoperability
Description / Summary	The module Interoperability in Healthcare in the course “Learning healthcare in action” will provide participants with a perspective of the wide spectrum of problems in the field of Health Information Systems interoperability, its implications in Healthcare and paths that promote coherent and safe information exchange. The goal of the course is to show participants how standards play an important role in fostering interoperability. It will provide a hands-on approach, creating the opportunity for students to experience scenarios where information exchange occurs and putting them in the driver's seat while reaching for a solution.
Abbreviation	Interoperability
Credits ECTS/Cp	3
Scientific Area	Interprofessional health informatics
Students Profile	The target group includes students of health professions (e.g., physiotherapists, nurses, midwives, and physicians) and also students of health sciences, computer science, engineering, economics, law, and management.
Nº of Modules	The Need for Standards Standards in use – HL7 v2 Standards in use – HL7 FHIR Standards in use – Terminologies/SNOMED Standards in use - openEHR
Teachers	Pedro Marques, PhD; Prof. Dr. Ricardo Correia; Prof. Dr. Alexandrina
Course Structure	Online lectures, group work, content videos, self-paced study Platform and tools: Moodle, Zoom
Digital Competencies Addressed	• Interoperability in health • Standards usage • Information modeling
Learning Outcomes	• Exemplify communication exchange needs among most healthcare institutions • Associate the complexity of healthcare systems with the type of communication needs • Define interoperability in healthcare • Discuss the distance between health professionals expectations and technology limitations • Identify the levels of interoperability • Summarize the challenges and type of specialists for each level • Identify the main standards used in health interoperability • Relate the different standards needed to solve one particular integration • Summarize the main differences among the different standards • Understand and apply HL7 concepts, main building blocks and their meaning • Understand and apply FHIR concepts, main building blocks and their meaning • Understand and apply openEHR concepts, main building blocks and their meaning • Understand the main Terminologies, their structure, and purpose • Illustrate the main challenges that interoperability face in the future

Content	The Need for Standards ▪ Information in Healthcare ▪ Complexity and Heterogeneity ▪ Health Services Organization and Structure ▪ Standards Development Process ▪ Building Use Cases Standards in use – HL7 v2 ▪ Structure ▪ Main Constructs ▪ Message Examples Standards in use – HL7 FHIR • Structure • Main Constructs • Examples Standards in use – Terminologies/SNOMED • Structure • Main Constructs • Examples Standards in use - openEHR • Structure • Main Constructs • Examples
Teaching methods	Online course (mainly asynchronous with synchronous moments), active teaching, case based learning.
Assessment	Pre-/Post-Evaluation
Scheduling	29 November 2021 / 23 January 2022
Bibliography (general references supporting the subject)	Lehne M, Sass J, Essenwanger A, Schepers J, Thun S. Why digital medicine depends on interoperability. NPJ Digit Med. 2019 Aug 20;2:79. doi: 10.1038/s41746-019-0158-1. PMID: 31453374; PMCID: PMC6702215. Pinto, E., Brito, A. C., & Cruz-Correia, R. J. (2016). Identification and Characterization of Inter-Organizational Information Flows in the Portuguese National Health Service. *Applied Clinical Informatics*, *7*(4), 1202–1220. https://doi.org/10.4338/ACI-2016-08-RA-0135 Rijo, R., Martinho, R., Oliveira, A. A., Alves, D., Reis, Z. S. N., Santos-Pereira, C., Correia, M. E., Antunes, L. F., & Cruz-Correia, R. J. (2020). Profiling IT Security and Interoperability in Brazilian Health Organisations From a Business Perspective. *International Journal of E-Health and Medical Communications*, *11*(2), 96–114. https://doi.org/10.4018/IJEHMC.2020040106
Additional information	Teaching language: English
Work effort	81hours (3 ECTS)

Syllabus Course Data Protection and Security

Learning Healthcare in Action: Data protection and security in healthcare

Proposal	
Name	Data protection and security in healthcare
Description / Summary	In "Data protection and security" -course participants are learning basic data protection and security in healthcare context. The goal of the course is to learn about confidentiality and secrecy and how to ensure information security in healthcare work. Participants are learning how to act when security of personal data has been compromised. Lessons also include the key concepts of data protection and security, the data subject's rights, privacy legislation, actors and risk management in data protection and security in healthcare context.
Abbreviation	Data Protection and Security
Credits ECTS /Cp	3
Scientific Area	Information management, data protection, data security, in context of healthcare
Students Profile	healthcare professionals, healthcare students (nurses, doctors, physiotherapist,)
Nº of Modules	6 Modules: 1. Kick Off Learning objectives 2. Introduction Key concepts 3. Data Protection legislation Data protection legislation in Europe and in the country student lives. 4. Data Protection actors 5. Confidentiality, secrecy and patient information patient rights and confidentiality in healthcare 6. Risk management in healthcare The process of how to act in the event of a cyber attack or security breach. Organizations guidance in security breach cases.
Teachers	Prof. Dr. Ulla-Mari Kinnunen, Prof. Dr. Saranto Kaija Project researcher Tiina Jokinen, University teacher Johanna Ikonen,
Course Structure	
Digital Competencies Addressed	basic digital competences

Learning Outcomes	1. Lectures "Data Protection" and "Information security", how to study on this course. 2. data protection and security basics and key concepts 3. knows basic legislation 4. knows data protection actors 5. understands healthcare ethics and confidentiality 6. can identify data breach and knows how to act in data breach situation
Content	**1. Kick Off** 14. -15.9.2021 • introduction and objectives for the course • Time schedule • Course evaluation • Learning objectives **2. Introduction** 14.9. - 5.10.2021 • define and apply key concepts of data protection and security • describe and apply the importance of privacy protection • describe and apply the rights of client and patient in healthcare **3. Data Protecton legislation** 27.9.- 10.10.2021 • data protection framework • data protection legislation and state-specific legislation societal issues such as decisions that affect the implementation of data protection in healthcare • How is data protection legislation different in different European countries? **4. Data Protection actors** 11.10.- 24.10.2021 • learn actors and their roles in data protection in healthcare context • meaning of data controller, personal data processor, data subject • knows Data protection ombudsman`s role • knows Data protection officer in healthcare organization **5. Confidentiality, secrecy and patient information** 25.10.- 2.11.2021 • CASE learning where professional can discuss about patient issues? • Discussion of patient rights and confidentiality in healthcare work. **6.Risk management in healthcare** 1.11. - 17.11.2021 • identifying a data breach • how to act in the event of a cyber attack or security breach. • Find out what is your organizations guidance in security breach cases.
Teaching methods	Online lectures, learning videos, independent study, questionares, texts, essays, Platform and tools: Moodle, Zoom, Padlet,
Assessment	essays
Scheduling	14.9.-31.11.2021
Bibliography (general references supporting the subject)	REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 April 2016, on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) Andreasson A., Riikonen J. & Ylipartanen A. Osaava tietosuojavastaava ja EU yleinen tietosuoja-asetus . Tietosanoma 2019. Riikonen, J., Kuusisto-Niemi, S., & Karjalainen-Jurvelin, R. (2014). Johdon tuki tietosuojavastaavalle terveydenhuollon organisaatiossa. *Finnish Journal of EHealth and EWelfare*, *6*(2-3), 119–126. Retrieved from https://journal.fi/finjehew/article/view/45258 https://tietosuoja.fi/en/home
Additional information	
Work effort	81hours (3 ECTS)

Syllabus Course Data Analytics

Learning Healthcare in Action: Clinical Data Analytics

Proposal	
Name	Learning Healthcare in Action: Clinical Data Analytics
Description / Summary	The course “Learning healthcare in action – clinical data analytics” teaches participants how to apply statistical analysis techniques to clinical data. The goal of the course is to show participants how statistical methods and models can be brought together with clinical data to generate new knowledge. In order to transfer this generated knowledge into the clinic in the form of evidence-based medicine, the use of the presented statistical models as decision support systems will be demonstrated. The course aims to convey the content in a practical manner. Therefore, in addition to teaching the statistical methods, clinical data used to build models will be addressed. Furthermore, a focus of the course is a research workshop in which participants independently develop and validate statistical models based on clinical data.
Abbreviation	Data Analytics
Credits ECTS /Cp	3
Scientific Area	Interprofessional health informatics
Students Profile	The target group includes students of health professions, including e.g. physiotherapists, nurses, midwives and physicians, as well as students of health sciences, computer science, engineering, economics, law and management. The learning opportunity is aimed at students from master's programs as well as doctoral students who already have prior knowledge in the field of empirical social research, especially quantitative statistics. Participation in the module requires prior knowledge of descriptive statistics as well as inferential statistics.
Nº of Modules	5 modules: • Learning Health System (LHS) • Clinical data and secondary use • Evidence based medicine • Statistical methods and models • Research workshop
Teachers	Jens Hüsers, M.A. Prof. Dr. Ursula Hübner Nicole Egbert, M.A.
Course Structure	Online lectures, group work, learning videos, independent study, quizzes, texts Platform and tools: Moodle, Zoom, Miro, Padlet, etc.
Digital Competencies Addressed	Data analytics Information and knowledge management in patient care Communication

Learning Outcomes	Students will be able to: • summarize the characteristics of a Learning Health System. • explain the role of the Learning Health System within clinical data analytics. • indicate the characteristics of routine data and different methods of data collection • list the characteristics and differences between experimental and observational data and categorize clinical data raised in care into this context • define the research design of observational studies, especially retrospective case-control studies • understand and interpret linear regression models and logistic regression models and explain differences and similarities of both • outline logistic regression models for clinical observational data • execute statistical calculations with the help of the statistics program SPSS • interpret and appraise the models with regard to their model coefficients and model quality • apply SPSS for logistic regression models • interpret the results of statistics analyses and models • exemplify static analyses for the appropriate target group • reflect critically and interpret the model created against the background of the clinical use case • appraise the context in which clinical data are generated and the research purposes for which they are used • identify appropriate study designs and quantitative analysis methods • execute meaningful descriptive statistical analyses and model building for clinical data • evaluate the usefulness and validity of the created model for practical work
Content	1. Learning Health System (LHS) a. LHS learning cycle b. Types of a LHS c. Examples of LHS 2. Clinical data and secondary use a. Digital clinical documentation systems b. Electronic patient record c. Data and communication standards in the healthcare sector i. Data models (UML class diagrams) ii. FHIR iii. SNOMED iv. OHDSI OMOP CDM v. Example: electronic wound report d. Decision support systems (example: PEDIS classification) 3. Evidence based medicine - Research designs a. Randomized trial b. Observational studies i. Case-control studies ii. Cohort studies c. Secondary use for case-control studies 4. Statistic methods and models a. Relative risk and odds ratios (SPSS calculations) b. Logarithm functions c. Linear regression models (linear regression in SPSS) d. Logistic regression i. Logit ii. Calculation of the logistic regression curve iii. Logistic regression coefficients iv. Logit and predicted probabilities v. Logistic regression in SPSS 5. Research Workshop / virtual European Summer School a. Descriptive statistics b. Model building c. Presentation of results
Teaching methods	Online course (synchronous and asynchronous), active participation in teaching, case based learning, group work
Assessment	Pre-/Post-Evaluation presentation, passed/failed
Scheduling	Kick-Off: 17.06. & 18.06.2021 (two half days) Self-learning phase vESS: 23.08.-25.08.2021 (three days)
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Additional information	Teaching language: English
Work effort	81hours (3 ECTS) = 19 hours attendance time (13 hours lecturer-related, 6 hours exercises and exam preparation in group work), 62 hours individual self-study

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The eHealth4all@eu Pipeline of Course Development: TIGER Recommendations in Action

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Abstract

This study describes the eHealth4all@eu course development pipeline that builds upon the TIGER educational recommendations and allows a systematic development grounded on scientific and field requirements of competencies, a case/problem-based pedagogical approach and finally results in the syllabus and the course content. The pipeline is exemplified by the course Learning Healthcare in Action: Clinical Data Analytics.

Keywords:

Health informatics, education, course development

Introduction

There is a wealth of educational recommendations in health informatics. Some of them have gained high visibility and impact [e.g. 1, 2]. Correspondingly, there is a wealth of health informatics courses tied to a university study programme, or available through subscription to a platform, e.g. the TIGER Virtual Learning Environment [3] and many more channels. While many of these courses originate in the internal expertise of a teacher or professor, there is a need to make the course production more transparent, standardised and thus enhance the quality.

The TIGER (Technology Informatics Guiding Education Reform) initiative embraces a "community of practice" with members from 29 countries around the globe. It comprises an international task force organising regular meetings, workshops, white papers and publications [3-5]. The European ERASMUS plus Strategic Partnership project eHealth4all@eu was inspired by the TIGER educational recommendations and is anchored within the TIGER initiative. It embraces partners from Finland (FI), Germany (DE) and Portugal (PT). eHealth4all@eu develops, implements and evaluates health informatics courses that have been designed according to a scientific procedure, the eHealth4all@eu pipeline of course development. These courses address Master and PhD students as well as health professionals who are seeking continuing education. The courses are designed for an interprofessional audience with a healthcare background and wish to upskill their health informatics competencies. The courses have synchronous and asynchronous online elements as well as face-to-face components. It is the aim of this study within eHealth4all@eu to present the pipeline showcasing its stages and to exemplify how to develop a course in clinical data analytics.

Methods

The course development pipeline (Fig. 1) is triggered by the TIGER International Framework for Recommendations of Core Competencies in Health Informatics 2.0 [5], which specifies priorities of health informatics competency areas for various roles and professions. Because these competency areas are rather broad, further specification is needed that should result from the different stages of the pipeline: specification of competencies (scoping review), verification (6 focus group discussions in FI, DE and PT), pedagogical approaches (scoping review), electronic learning environment (pragmatic decision based on experience), syllabus with meta information about the course and course content.

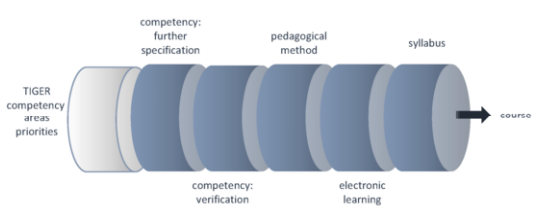

Figure 1– Educational pipeline with different stages

Results

Results of the educational pipeline are presented regarding one exemplar course.

Specification of the competencies: A total of 28 publications from 2016-2020 were included in the scoping review. They showed that interprofessional health informatics education should be provided for all healthcare professionals. The courses should include the spectrum of basics in health informatics to

information management, information processing, data modelling, as well as practical training, including the use of software. The studies showed that online education requires careful planning of interaction among students and teachers.

Verification: Two focus group discussions per country with a total of 22 experts reflected the necessity of education in digitalisation. The group discussion served as guidance for the development of the course contents. Competencies commonly agreed were data protection and security, including ethics and legislation, interoperability, terminologies and coding, management and leadership competencies. Experts hinted at the importance of data-driven health and the generation of evidence.

Pedagogical method: A total of 24 publications from Pubmed and CINAHL were included in the scoping review on problem-based learning in online health informatics education (ePBL). The review revealed a great variety of ePBL methods, with the majority of publications reporting advantages such as enhanced scores of students, better time management for participants or cost-effectiveness.

Learning environment: Based on prior experience Moodle was chosen for the courses and Confluence for managing the cooperation in the consortium.

Syllabus: Name: Learning Healthcare in Action: Clinical Data Analytics; ECTS: 3 (81 hours); Language: English; Learning method: synchronous online lectures, self-paced learning via webinars, teamwork following the case/problem-based learning approach; proof of achievement: presentation; duration: Jun to Aug 2021.

Course content: 1) Overview of Learning Health System Principles, 2) Clinical Data and Secondary Use focusing on electronic health records, data sharing and interoperability, 3) Evidence-Based Practice – Practice-Based Evidence with a focus on observational data and designs, 4) Statistical Modelling with a focus on different regression analyses, 5) Workshop focusing on building models from patient data (wound care, intensive care, cardiovascular conditions) in an ePBL learning paradigm.

Discussion

This pipeline has been tested for the "Clinical Data Analytics" course. The next online courses will address "Interoperability" and "Data Protection and Security". Furthermore, face-to-face courses in "Innovation and Entrepreneurship", "Leadership and Governance" and "Ethics and Legal Topics" will be developed in particular for a Summer School. Feasibility of these courses, learning outcomes regarding pre-post self-evaluation of the students, and proof of achievement per student will serve as material for an evaluation of the courses.

The courses will be offered as a virtual summer (2021) / winter school (2022) with participation from all three countries in a global classroom manner consisting of two half-day synchronous online sessions, a self-learning phase of 1.5 months, and a 3-day synchronous online session. Furthermore, there will be a 5-day face-to-face summer school in Porto in 2022. More courses will follow that are based on [6] and will reach out to students in the US and the EU.

Conclusions

The eHealth4all@eu project makes a contribution to upskill the (future) healthcare workforce that contributes to the adoption and meaningful use of health IT.

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