Lessons Learned from an Interprofessional European Summer School in Health Informatics

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Abstract. The aim of this European interprofessional Health Informatics (HI) Summer School was (i) to make advanced healthcare students familiar with what HI can offer in terms of knowledge development for patient care and (ii) to give them an idea about the underlying technical and legal mechanisms. According to the students' evaluation, interprofessional education was very well received, problem-based learning focussing on cases was rated positively and the learning goals were met. However, it was criticised that the online material provided was rather detailed and comprehensive and could have been a bit overcharging for beginners. These drawbacks were obviously compensated by the positive experience of working in international and interprofessional groups and a generally welcoming environment.

Keywords. Interprofessionalism, Summer School, Health Informatics

1. Introduction

Health Informatics (HI) is a large field with many different branches which translates into practical eHealth applications. Technology is becoming ever more ubiquitous in all care provision workflows and settings, increasing the need for the interprofessional healthcare workforce to be prepared for the changes [1]. Challenges of such educational initiatives are well-known: Different backgrounds of the students in terms of prior knowledge, skills and understanding can make these undertakings a complex task.

While interprofessional HI courses or course tracks may not fit into classical curricula, e. g. in medicine or nursing, summer schools can fill this gap. Given their less formal environment, they lend themselves to bringing together graduate students with diverse professional experiences and backgrounds. International HI Summer Schools can

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draw on previous examples, e. g. for medical students [2] and for biomedical and health informatics students [3].

The aim of this European interprofessional HI Summer School was (i) to make advanced healthcare students familiar with what HI can offer in terms of knowledge development for patient care and (ii) to give them an idea about the underlying technical and legal mechanisms. In order to level prior knowledge and skills, online educational material for self-paced learning should prepare the students for this Summer School. The research question of this study was: How do the participants evaluate and experience the HI Summer School from the perspective of the learning outcomes, the interprofessional setting and the didactic approach?

2. Methods

2.1. The Educational Pipeline

The interprofessional European HI Summer School was planned as a face-to-face activity enriched by digital learning. To select the appropriate theme and choose the right didactic and digital approach, an educational pipeline was employed (Fig. 1).

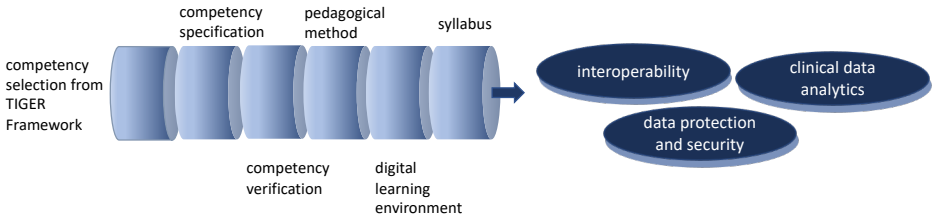

Figure 1. The educational pipeline of the European Summer School.

- **Educational recommendations:** The Summer School intended to address health informatics competency areas for the role "direct patient care (nurses, physicians, physiotherapists)" and "clinical/administrative executives" as these roles well reflected the field of studies of our potential participants. Following the interprofessional TIGER (Technology Informatics Guiding Education Reform) recommendations on HI [4], competencies for "information and knowledge management in patient care" encompassing the close relationship between data and knowledge were chosen as the overall theme.
- **Specification**: A scoping review on health informatics competencies served to learn from others. The findings from 28 studies that were selected emphasised the importance of a good mix of transferring knowledge and practising skills.
- **Verification**: Focus groups with 22 healthcare professionals (in direct patient care and management) from Finland, Germany and Portugal to verify the competencies regarded "information and knowledge management" highly important, together with "data protection/security" and, to some extent, also "data analytics". Competencies in "interoperability" were debated diversly but esteemed relevant.
- **Pedagogical method:** Problem-based learning (PBL) was considered because of its high capacity for activating students. A scoping review was conducted on how to best translate PBL into a digital format. Out of 1007 publications, the seven selected studies demonstrated the feasibility of digital PBL in a blended or fully

online fashion. The blended PBL approach chosen for this Summer School focused on a clinical case for each module. Deviating from the classic 7 step PBL method, self-studies were replaced by group work.

- **Electronic learning environment**: Given its flexibility in content organisation and previous good experience, the Summer School organisers used Moodle as the learning platform for content management and activity support.
- **Syllabus**: Following the syllabus, the summer school was divided into a) an online learning phase using videos, quizzes, and other material to get acquainted with the topics beforehand and b) a face-to-face event where mini lectures were given, the students had to work on a case and finally to present their findings to the plenary.
- **Courses**: Based on the educational recommendations and focus groups, we decided to keep the overall theme "Information and Knowledge Management", following a reasoning line that focused on the life cycle of health information. This rationale included the path of the production and management of interoperable data to the generation of newly derived knowledge in the context of "secondary use of patient data", keeping legal and security concerns transversal to this data flow. Hence, the three interconnect courses Interoperability, Data Analytics and Data Protection and Security were prepared.

The expected learning outcomes were defined as (i) to explain the value of interoperable data and law-compliant data management for secondary use of patient data and (ii) to practically apply the knowledge in selected cases. Table 1 provides the detailed learning goals per course and table 2 the overview of the overarching case.

Table 1. Learning goals for the three courses and course responsibility

Interoperability (U Porto)	**Data Protection and Security (U Eastern Finland)**	**Data Analytics (Osnabrück UAS)**
To understand the key elements of structural and semantic interoperability in a heterogenous setting.	To understand the meaning of privacy, confidentiality, integrity and security for personal data.	To develop a statistical prediction model using logistics regression applied to a diabetes data set.
To understand the importance of structured coded data for data sharing and data analysis.	To understand the main tenets of the EU General Data Processing Regulation (GDPR).	To understand the area under the curve (AUC) as a tool to select the optimal model.
To understand the main concepts and resources of HL7 FHIR and apply them in a clinical case.	To analyse particularly informed consent and explain how it can be put into practice.	To interpret the findings in terms of their applicability for clinical decision support.

Table 2. Overview of the overarching problem-based learning case

A group of doctors and nurses from primary and secondary care wished to improve the quality of care by early detecting patients at risk for diabetes. To do so, patient data from two different types of electronic patient records had to be merged. It was unclear whether they were allowed to share the patient data across settings. Finally, they wanted to develop a risk prediction model from their own data and compare it with the literature.

The Summer School

The Summer School took place at the Faculty of Medicine of the University of Porto, Portugal, from September 8th to 14th, 2022, as a face-to-face event. The participants were recruited from the participating universities (Tab. 3). The students (mean age 36 years, 10 females, 2 males) had mixed prior knowledge in the three fields. A certification (2.5 European Credit Points) was issued upon completion of the Summer School. The three courses had been successfully given in 2021 for a similar audience in a complete digital format (due to COVID-19).

Table 3. Characteristics of participants

Students	Finland	Germany	Portugal
Number	4	5	3
Level	PhD	Master	PhD
Background	Health Informatics	Nursing, Physiotherapy, Public Health, Management	Medicine, Nursing, Engineering

2.2. Evaluation Methodology

The aim of the evaluation was to obtain information about the teaching arrangements and students' experiences covering the learning goals of the three courses, interprofessional education and problem-based learning. All in all, the questionnaire included 103 items, the large majority were closed questions. The survey took place at the end of Summer School. Additionally, an open discussion took place.

3. Results

Figure 2 shows main selected findings from the survey. Interprofessional education was very well received. Also, problem-based learning was rated rather positive. The learning goals of the three courses were met for the majority of the students.

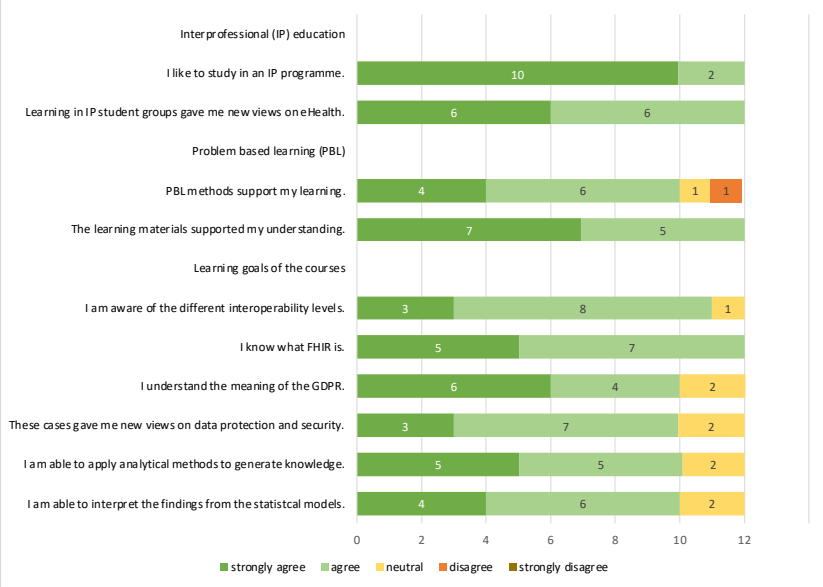

Figure 2. Results of the survey (n=12). Legend: GDPR: General Data Protection Regulation

The open discussion revealed further insights as the following six comments reflect:

1. *The courses gave me inspiration and motivation to continue with my work back at home.*
2. *I enjoyed the week and would recommend participating in a summer school like this.*
3. *I felt very welcomed.*
4. *I think more students would have participated if the information about the program, travelling and financial support would have been given earlier and more transparent.*
5. *Sometimes difficult because of the different education levels.*
6. *Bad communication about the uploaded learning materials - a lot of stuff – it wasn't clear if it was necessary to work through all the stuff. If you have no basic knowledge, it's hard to understand it.*

4. Discussion

As the survey findings and the open discussion demonstrate, the Interprofessional European Summer School was esteemed successful by the large majority of the participants. The goals were met, interprofessional education was highly appreciated and the case-based version of PBL worked well. However, there were also some difficulties encountered. As it was not clear if the Summer School could take place as a face-to-face event due to COVID-19, students were informed rather late about the details. Furthermore, the preparation phase prior to the Summer School was scheduled for the summer vacation, a less favourable time window. The online material provided was rather detailed and comprehensive. For beginners, this could have been a bit overcharging. These drawbacks were obviously compensated by the positive experience of working in international and interprofessional groups and a generally welcoming environment. This Summer School gives evidence for the positive attitude of graduate students towards interprofessional education in HI. It also underlines the value of Summer Schools for demanding topics. Promoting these skills is an influencing factor in the successful implementation and acceptance of eHealth applications [5].

The educational pipeline proved to be time-consuming but rewarding. It offers a rationale for systematic course development which otherwise would have been based on experience only. This procedure pays off, however, only if the courses are given repeatedly. Therefore, the universities involved plan to offer further HI Schools in the years 2023 and 2024. Recent recommendations in biomedical and health informatics [6] will have to be incorporated.

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