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MULTIDISCIPLINARY TEAMWORK PROMOTES LEARNING AND INNOVATIONS

The NICCoLLa project aims to improve education in the field of social and health care, engineering, and ICT. The purpose of the curriculum development is to increase students' knowledge of the use, implementation, design and development of innovative technology solutions and ICT in the health and wellbeing sector. (Tuusjärvi et al. 2020.) An important part of the development of the course content has been students' participation in the process.

One of the key activities carried out to achieve this goal are intensive study programmes (ISPs) for students from project partner countries (Finland, Spain, Netherlands) and different fields of education. Alongside the development of the curriculum and course content, a key part of an ISP is to promote the students' ability to work in multidisciplinary teams to innovate user-driven technological solutions in the field of health and wellbeing.

The first ISP of the NICCoLLa project was organized by LAB University of Applied Sciences. Due to the Covid-19 pandemic, classroom teaching and travelling were prohibited and because of that, the ISP was implemented online. The two-week intensive programme was based on challenge-based learning. Challenge-based learning is a pedagogical approach where complicated real-life problems are given to students to be solved (Malmqvist et al. 2015). Such learning supports collaboration between higher education and working life, where students, teachers and working life professionals develop innovative solutions in answer to clients' needs.

The aim of the two-week ISP was that after the programme students are able to:

- recognize the differences and similarities in the use of digital services and wellbeing technology in social and health care in the project partner countries,
- identify future technological solutions and innovations for social and health care,
- analyze the ethical aspects of health and wellbeing technologies, and
- apply service design and co-creation methods in the development of technological solutions for social and health care.

During the ISP, students worked in multidisciplinary and multicultural teams and attempted to produce potential solutions to the real health and wellbeing challenges they were given at the beginning of the ISP. To solve the selected challenges, the work of the student teams was based on a service design method, and they adopted a co-creative perspective during the process.

Solving real-life challenges

The student teams sought to solve the challenge case by following the four stages of the service design process, referred to as the double diamond model (Naar et al. 2018). The four stages are: discover, define, develop and deliver (Figure 1).
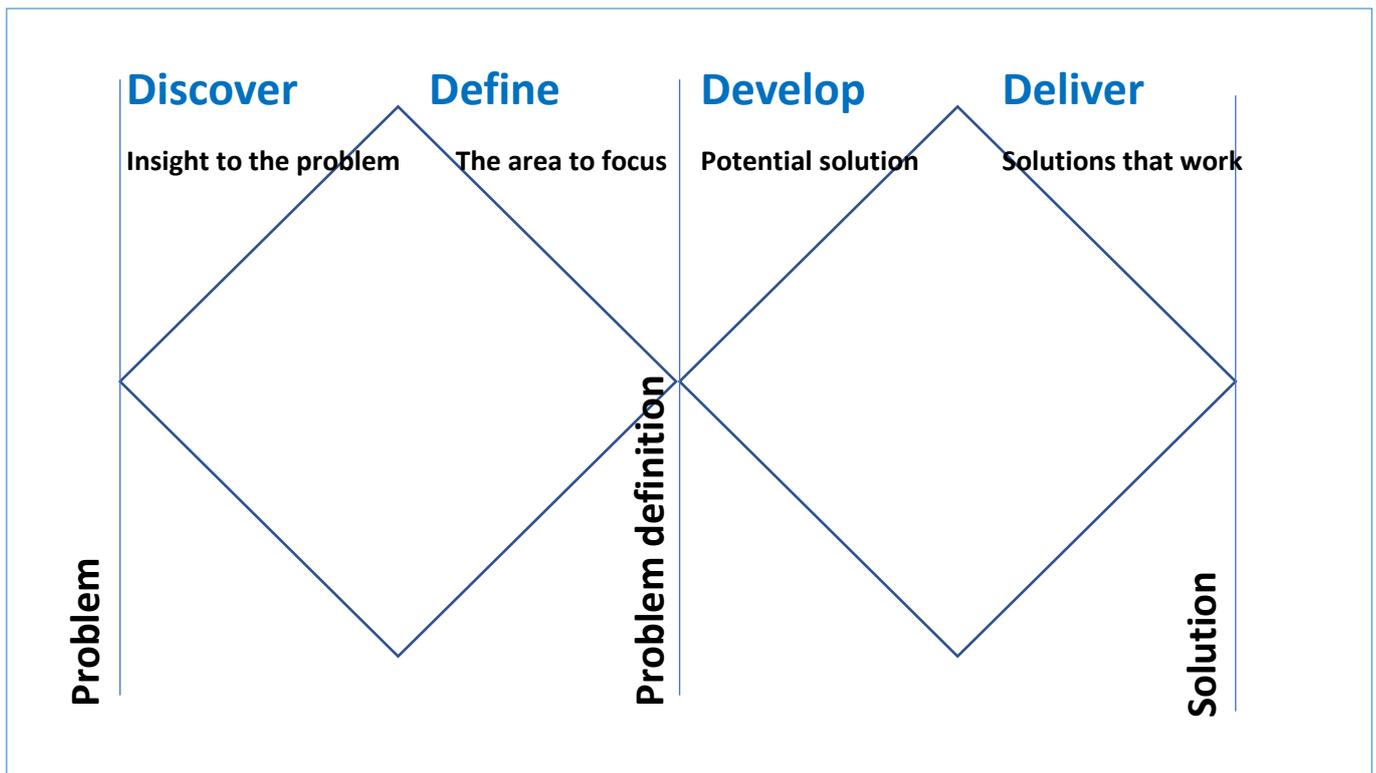
Figure 1. Double diamond model. (Naar et al. 2018, edited)

The first phase was to **discover** the problem area by gathering as much diverse information as possible about the problem, empathizing with the needs of the target group for which a new solution was being developed.

At this point, the student teams were given a very broad description of the challenge cases, and they needed to find as much information as possible on the problem. It was important to see the world through the eyes of different people involved in the case: the patient, the clinician, the caregiver, or other stakeholders in the system. The aim was to seek information and the needs of target groups to serve as inspiration for new ideas.

There were eight challenge cases from which the student teams chose four challenges to solve. These were:

1. To support medication taking by elderly persons and remind of medical appointments,
2. To improve quality and comfort in long hospital stays, reducing stress, pain, and uncomfortable treatment,
3. To find new technologies for improving the independence level at home of people with some degree of need concerning specific control and assistance, and
4. To monitor blood glucose levels for elderly users.

The second step in the process was **defining** (making sense of) all the possibilities identified in the discovery phase. It may happen that the identified problem needs to be redefined, expanded, or contracted based on the gained information and new ideas. The goal at this stage was to create a clear understanding of the challenge case and the agreed problem. Additionally, visualization was used to highlight how the different parts of the service link together (Figure 2).
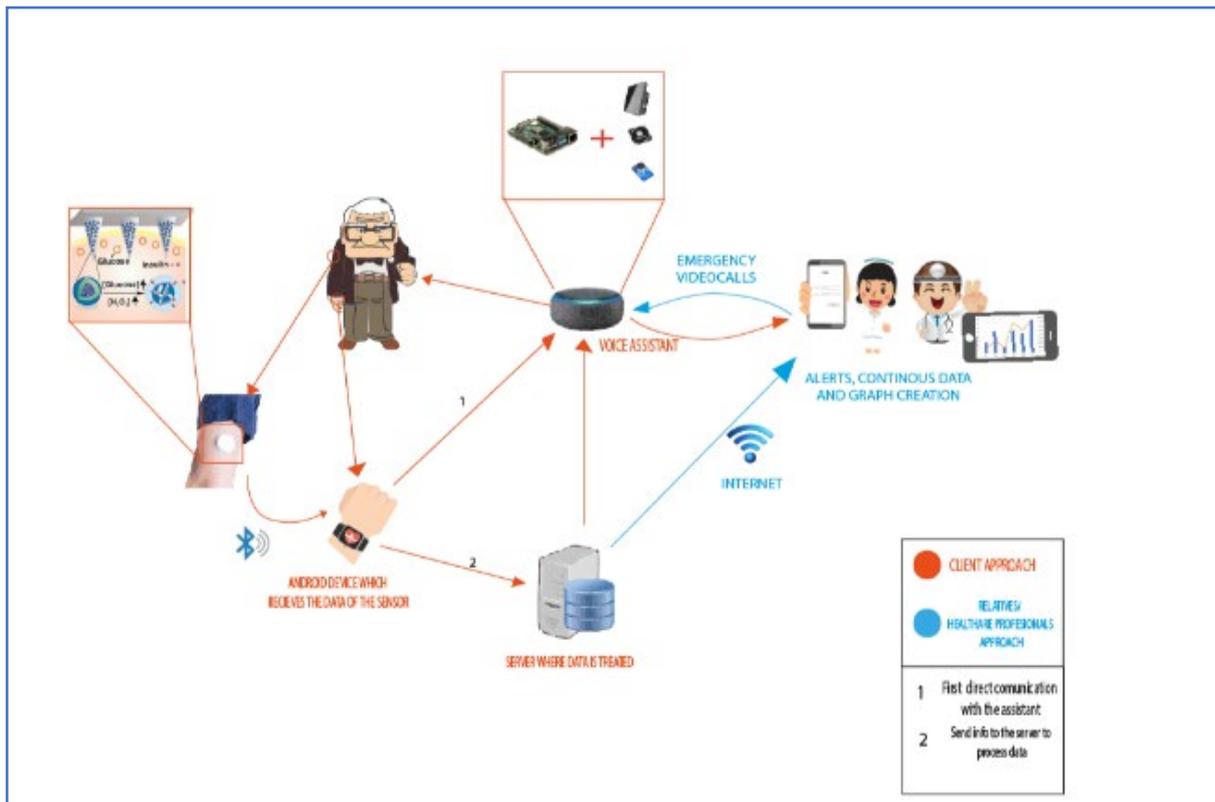
Figure 2. Glucose monitoring solution for the elderly, general scheme of the GeeSeM service (Gisbert et al. 2021).

For example, a stakeholder map visually shows who is involved in a particular service and how they are connected to each other. A consumer journey visualizes the path of how the user experiences the service, including the user's interactions and feelings.

The third stage in the process was **development.** The aim was to generate a solution which could be a prototype in the form of text and visualization, describing the solution. The fourth phase was **delivery.** The student teams planned how to evaluate the solution and how to launch the developed solution. Some teams wrote a blog to deliver their solutions.

Multidisciplinary co-creation and learning processes

As the student teams had a common challenge to solve, different disciplines offered different points of view and competences to solve the challenge. Technological students contributed competence in the development of technological solutions, and students of social and health contributed their competence concerning user perspectives and social and health care. The student teams worked using a co-creation approach when designing the challenge solutions.

Co-creation is essential in the development of health and wellbeing technologies. The process includes a description of the value chain, the service or care production process, a description of the current activities from the clients' perspective as it occurs now, a description of the target situation, including what the client really needs and how he or she experiences the process. (Korte et al. 2020).

Co-creation is empowering and pays attention to the voice of each participant. It also has a unique influence on the participants, the knowledge created, products and services developed, and the potential for their implementation. Co-design uses the tacit knowledge of the participants. The co-creation process ensures collective ownership of outputs created and makes them visible (Langley,

Wolstenholme, Cooke 2018). The co-creation approach is based on five principles, which are: 1) equal participation, 2) recognising different aims of participants, 3) finding common aims and interests. 4) from ideas to concrete doing, and 5) license to act differently and fail also. Suitable places and counselling, timing, manuscript, and planned processes are also necessary. Emotions during active process should be accepted, respected, and encouraged.

In processes promoting health and wellbeing it is important to notice that the language used matters. When we want people to engage positively in their self-care and to work with professionals on their journey to recovery and good health, it is important to choose positive language instead of negative blaming words. Additionally, engaging people matters, the place matters, and the vision and value matter, as well as creativity and fun (Davies et al. 2013).

Customer value-creating activities should be identified together with each partner (i.e., medical staff, companions and other customers) in their service value network. Each type of customer co-creation activity should have a positive effect on the core value of service delivery, including the perceived service quality and service satisfaction (Kim 2019), Co-creating something together with patients and service providers has a greater impact on the perceived service quality and service satisfaction. It is crucial to add value to the services offered to the elderly patients to avoid vulnerability and to recognize customer characteristics in promoting of wellbeing in the context of health care (Jiyoung 2019). Key elements in the value co-creation for advanced technologies in health care services include ease of access, credibility, and the intention of patients to participate in value co-creation in terms of personal, social, and economic experiences. The realization of the value co-creation promotes satisfaction, and recommendation of services (Lee 2019).

Student feedback on multidisciplinary teamwork and a real-life challenge

The students found the ISP week and the challenge-based learning interesting because they were able to develop a real project from start to finish. In the teams, students had different and daily changing roles, such as chairing for the day, responsibility for communication, documenting and reporting on their daily work. According to the feedback, the daily change in the roles strengthened the members' commitment to the teamwork.

Working in multidisciplinary teams taught the students to see challenges that they may face in real working life, and this also received positive feedback. According to feedback from technology students, the opportunity to work with social and health care students increased their understanding of clients' ability to use and benefit from the technological devices or digital applications when developing such solutions. In addition, discussions in multidisciplinary teams and solving challenges with technology, increased the interest of social and health care students in new technology.

> "The course stimulated and created a zeal to learn more about technology."

> "Everyone had an opportunity to take up active roles which was a very good idea. This improved our commitment."

According to students' feedback, they enjoyed the multidisciplinary teamwork and were ready to increase it.

In the first phase, it was challenging for the group to define customer needs and possible solutions to the given challenges. The students searched for information on the challenges which they had private-specific experience of (e.g., grandparents or patients), or had an interest in respect of their field of study (e.g., technological opportunities). Therefore, the students would like the teachers not

only to ask if the tasks were done, but also to provide ideas and a wider perspective to the challenge.

The teachers were available to the students daily, visiting the groups and supporting students' work. However, even more feedback during the ISP week could have improved the students' work and a named team mentor for each team during the entire working process could have been beneficial.

According to the student feedback, online learning can be an effective and beneficial way of learning, but some sort of interactive virtual gamification could also be included in the study programme. In the time of the pandemic and studying mainly online, students put forward the idea that during e-learning, they could get together through a real-life game to improve their learning and interaction with each other. As Serdyukov (2021) notes, learning in an online environment disrupts social relationships. Therefore, all opportunities to promote student interaction during online work should be taken into use.

Overall, the implementation of the ISP weeks online and the chosen learning processes received positive feedback from students. The students were willing to put more effort into learning online if they found it interesting and challenging enough.

Conclusions

The implementation of the first intensive study programme of the NICCoLLa project shows that challenge-based online learning promotes active learning processes in international teams. Challenge-based teaching and learning is an excellent pedagogical approach to challenge the students and include real-life cases in the course. In addition, a multidisciplinary approach and international perspective makes it attractive and motivating for higher education students to broaden their areas competences. Multidisciplinary working, discussions, sharing ideas and understanding different viewpoints are essential when the aim is to solve complex tasks and to innovate new solutions for working life needs.

The experience of the ISP will be utilized in the next task in the NICCoLLa project, which is to prepare six, five-credit Massive Open Online Courses (MOOCs), for a total of 30 ECTS. The content of the courses combines technology, care, and well-being. These will address, for example, future technologies in social and health care, ethical issues in technology, patient safety and the development of new technological solutions with professionals and clients or patients.

In the future, MOOC courses will provide an opportunity for students to study independently, regardless of time and place. In this sense, teachers developing MOOC courses will face challenges. The challenge includes how to include real-life cases in online learning processes and, also, how to create such interesting and engaging online courses, that they manage to get students interested in the technological solutions used in social and health care.

The NICCoLLa project will have a broad impact on social and health care in the future. This will be achieved by promoting education that facilitates the development of the technical skills and competences of social and healthcare professionals to provide digital services to clients and to guide them in the use of different devices. Also, by improving the expertise of engineers to develop new technological solutions and digital services for patients and clients in social and health care. The development of education of "future-proof professionals" will also facilitate the application and adoption of new wellbeing technology to promote client wellbeing. In addition, future social and health care professionals, as well as engineers, will need to be competent to innovate social and

health care technological solutions and take into account the ethical aspects of health and well-being technology.

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