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Pharmacy Teaching and Studying in the University of Helsinki during the Covid-19 Epidemic

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Covid-19 epidemic abruptly interrupted and distorted the University research, teaching and learning activities throughout Europe in Mid-March 2020. Almost overnight all the courses were transferred into a remote mode. In Helsinki, only vitally important maintenance of research infrastructure (animals, cell cultures) and equipment was allowed until June 2020. Thereafter, research activities in Viikki Campus were gradually restored, and laboratory teaching in groups of less than 50 students at a time allowed. Now in November 2020, the only teaching activities not in remote mode are the laboratory practices, where safety distances (1.5-2 m), hand hygiene, face masks and a strict rule of not coming to laboratory with even mild symptoms, have enabled to keep the laboratories open until now. All other courses are held remotely. Hopefully the second and later waves of the epidemic are avoided and a preventing vaccination developed rather sooner than later. This article describes some exemplary actions taken to guarantee the high levels of teaching and learning also during the epidemic.

Course exams and alternative means of evaluation

Starting from the very first days of the exceptional situation declared by the University of Helsinki, all the lecture hall exams were cancelled. The cancellation of lecture hall exams has since been extended to the ongoing autumn term and will cover also the spring 2021. Out of the 17 lecture hall exams scheduled for spring 2020, only 2 were not organized at all, while the remaining 15 were organized either as remote Moodle exams or done via Examinarium, UH's electronic exam platform involving video-supervised computer rooms harbouring computers with restricted internet access. Throughout the epidemic, these facilities have been kept open, yet the capacity has been reduced to approximately half of its previous normal user capacity, allowing the students to keep the distances when entering for an exam. Given the short notice for the rearranging the exams during the spring 2020, many teachers relied on Moodle exams as they were readily familiar with the platform. However, the longer the teachers had time to consider the rearrangements, the more popular the Examinarium platform has become.

Laboratory teaching

The beginning of the lockdown in March 2020 coincided with the first days of a lab course targeted to the first-year Pharmacy students. The lab course was postponed, but carried out with minor contents modifications during June and August. This was enabled by the hygiene guidelines formulated by the collaboration between teachers and Faculty's epidemic steering group.

The four-page guideline document includes detailed instructions on the compulsory use of a face mask, as well as behavioural guidelines both inside the course lab and in everyday life prior to and during the lab course. With minor modifications, the same guidelines have been used also during the autumn term, allowing us to conduct laboratory teaching according to the normal curricula.



Besides guaranteeing student and teacher safety in the course lab, a central objective of the guidelines is to prevent any carryover between the course lab and research laboratories of the Faculty. By November 2020, seven out of the 160 students in the lab courses have entered a corona test due to exposures taken place outside the University premises. To the best of our knowledge, no transmission of covid-19 infection has occurred within the teaching laboratory premises.

Interactive and collaborative teaching in various remote-teaching platforms

In our Faculty we have gained a lot of experience on various interactive ways of teaching using f.ex. Zoom and Teams. As an example, we have been able to conduct the patient counselling practical courses within Zoom in a form of role play between pharmacists and patients with videos on. A collaborative teaching method, “the learning café”, using the breakout room function of Zoom was conducted successfully and got positive feedback from the participating students. Also, Teams and its channel function enable small group work within a course. End of degree two-day practical test was conducted solely in remote fashion, where student groups made videos of their solutions to challenges.

Student experiences

Our students show remarkable variation in terms of their experiences on the remote teaching. A University-wide questionnaire was conducted in May 2020 to gain information on this topic. Based on this data, the mean scores of students’ self-assessment on their study capacity or exhaustion showed no statistically significant difference to those obtained under normal circumstances. However, the deviation within the data collected during the epidemic was remarkable, illustrating the polarization of the student population in their performance under the exceptional situation. A similar trend has been observed in the end-of-term feedback questionnaires of our Faculty: while some students report that their studies have proceeded much better during the remote teaching period, others express their difficulties in reaching the goals they had set.

Data shows that pharmacy students’ finished grade points were increased 39% during the epidemic. End-of-the-term questionnaires showed that some of the students expressed the wish to get back to the normal situation, as they missed the peer support and group working in face-to-face mode. Also, they missed face-to-face interaction with teachers and teachers live feedback. Others were pleased with the remote teaching and the flexibility it offers. Some students were happy as their long-distance commuting to campus was not necessary because of the remote teaching. Further, those students who are oriented to deep learning tended to overburden themselves, whereas those students whose self-regulation is weak, were not able to concentrate sufficiently on their studies while learning remotely. The total closure of laboratories and libraries clearly delayed the Master Thesis processes during the Spring of 2020.

Digital tools and Mixed reality open new digital worlds for pharmacy education

Transition to remote teaching in the epidemic circumstances took place very quickly. Although remote lecturing could support the achievement of learning outcomes in the same manner as face-to-face teaching in lecture halls, teaching laboratory sciences necessitated finding of new ways. In the Faculty of Pharmacy, the interest in use and development of digital learning tools had taken place prior to the epidemic, which assisted in transition. The Faculty had been a project member of the University of Helsinki Digital Leap (2017-2020). In the project, the teachers of the Faculty had been active in exploring innovative digital technologies for teaching and evaluating their pedagogical value. Furthermore, new skills had been obtained in making high quality audio-visual teaching materials and other digital materials. Digital learning materials, such as educational videos on laboratory procedures, facilitated remote learning opportunities. Introducing mixed reality tools offered new digital worlds for the learners.

Mixed reality can be used as an umbrella term to describe digital technologies and virtual learning environments that allow the learner to interact with the digital contents as if they were real, or the digital content can provide added information to the learner. Mixed reality merges real and virtual worlds to produce new environments and visualizations. It may, for example, consist of interactive 360-degree materials, which enable the student to engage the virtual environment in unexpected ways, either by watching on a 2D screen or by wearing VR-headset. Mixed reality includes virtual reality (VR) and augmented reality (AR) technologies. In VR, the real world is hidden, and the learner is completely immersed in a digital environment via VR-headset. The learner can interact with the objects of virtual environment with haptic controllers. In augmented reality, AR overlays digital information in the field of vision at the same time when the student is operating in real world. AR-equipment consists of smart-glass or mobile device with an interactive AR-software.

Variety of mixed reality tools were developed in the digital leap project, especially for science lab education. A VR game, in which the student practices aseptic manufacturing procedures in a virtual GMP facility, and an AR laboratory guide, which interacts with the learner, supports performance and guides the learner to focus on learning objectives. These were developed in collaboration with IT-professionals (Department of Information Technology, University of Helsinki, Sciar Company, Finland). The technology and the equipment are available for the students at the Campus. From the variety of mixed reality tools, the interactive 360-degree materials were particularly suitable for remote teaching purposes during the epidemic. Several virtual 360-degree environments were developed, such as virtual aseptic laboratory (series of 360-degree materials on procedures carried out in virtual aseptic laboratory and aseptic manufacture of dosage forms) and virtual pharmacy (materials for marketed drug products, patient counselling). The ability to play 360-degree videos on computers, mobile devices and tablets, make the 360-degree materials readily accessible to the learner.

The 360-degree digital learning materials offer several advantages. The visual and interactive nature, as well as immersion, could allow more efficient processing of the topic than traditional educational videos or text materials. In a 360-degree environment, the learner can explore the virtual world in a rather authentic manner (Fig. 1). Various kinds of teaching materials and information contents can be embedded to the platform to generate an interactive learning environment. Such contents can be in various forms, like videos, text, voice or a learning quiz. The formative evaluation can be built in the platform and instant feedback can be expected to facilitate learning. In addition to 360-degree materials, we used an H5P-tool, which enables making a rich variety of interactive materials, such as interactive videos. We utilized H5P to build up virtual patients based on a branching scenario. The virtual patient is composed of a video with several paths (branches). As the learner makes decisions, the story unfolds in different ways. Like interactive 360-degree materials, interactive videos with branching scenario could make learning interaction engaging and result in better learning results. However, relatively scarce research data is available on the effects of these new technologies on learning outcomes. In the Faculty of Pharmacy, several research projects are ongoing to evaluate the pedagogical value of these new teaching interventions.



Figure 1. A 360-degree environment of aseptic manufacturing facilities. The learner can explore the space by moving around and clicking the objects. Various kinds of information contents, like videos, text, voice or a learning quiz, can be embedded to the platform to generate an interactive learning environment.



Applying to the degree programs of the Faculty of Pharmacy during the COVID-19 epidemic in spring 2020

Covid-19 epidemic changed dramatically the entrance examinations in the University of Helsinki. The Faculty of Pharmacy (1592 applicants), which normally prepares the entrance examination in national collaboration with the Universities of Eastern Finland (1046 applicants)

and Åbo Academy University (91 applicants), had to prepare an entry examination for 2729 applicants following national safety rules, for example limiting the gathering to less than 20 persons, keeping the 1-2-meter distances, and ensuring hand cleaning.

The student recruitment process was thus changed substantially. Traditional paper-based exams normally held at the University Campus area were changed to two-phase electronic examinations. Helsinki University made use of the University of Applied Sciences exam platform (AMK), but it was only allowed to be used for the 1st phase preliminary examination (no guarantee against cheating in the examination). The Faculty of Pharmacy Council decided to weed out applicants in the first round, so that only twice the number of applicants, compared to open degree positions, were admitted to the second-round exams physically present in the University premises. The first phase of the entrance examination was arranged as a remote online examination without supervision. Applicants were responsible for their devices and the internet connection. This was possible, as in the upper secondary school, all students possess a device for their daily studies. The second part of the entrance examination was kept as a Moodle classroom electronic examination with applicants bringing their own devices. ID of the applicants were verified in person. The Faculty of Pharmacy was the first to arrange such an examination for 124 applicants in the University of Helsinki.

As for the risks and opportunities, the examination exceeded expectations. There were almost no problems in either of the exam rounds despite of the recognized risks:

new version of the platform that had not been tested with such high applicant volumes, security breaches, uncertainty of compatibility of applicants' devices, substantial risk of cheating due to no supervision, quality and reliability of the network connections etc. What comes to opportunities, the applicants did not have to travel during the first phase of the examination, and during the second phase they could take the exam in closest cities compared to earlier practice, where they had to travel to the University they had applied into. Also, all the traditional paper printing, sorting, and questions of confidentiality were diminished. The grading of the exams was automatic and fast, too. Appeals against the grading were decreased. Finally, the risk of Covid-19 infection was reduced as we found out later that none of the applicants or supervisors had been infected.

Final remarks

Covid-19 epidemic has forced the teachers and students alike to find out new ways of teaching and learning. For some students the dramatic change has not caused unsurmountable difficulties, while for others true problems of motivation exist and learning skills in a remote fashion are lacking. Today it seems inevitable that some of the novel teaching innovations will prevail also after the epidemic is over – hopefully sooner than later.

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