

Education of prospective physics teachers during spring 2020 COVID-19 lockdown

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Abstract. Most European countries found themselves in a complete lockdown in March 2020 due to the COVID-19 pandemic. Classes were transferred to online environments, even lab and school practice courses for prospective physics teachers. We investigated students' and instructors' experiences with these two courses and their reorganization at universities in Croatia, Austria, and Germany by means of interviews and questionnaires. Both students and instructors believe that well-guided home experimentation used as a replacement for lab work has increased their creativity and boosted students' confidence. In contrast, reorganized school practice courses offered no benefits and if possible, should not be held online.

1 Introduction

During the first COVID-19 lockdown, laboratories for prospective physics teachers and school practice courses were transferred to an online format. The goal of this research was to investigate and compare different online formats for these two courses at three universities in Croatia, Austria, and Germany. We aimed to do so by answering two research questions: 1. What are students' and instructors' experiences with the online laboratory courses for prospective physics teachers during the lockdown? 2. What are students' experiences with school practice courses during the lockdown? Answering these two questions can help to guide course instructors to better organize these courses for the following lockdowns.

2 Practical courses for prospective physics teachers

Lab courses for prospective physics teachers teach students to design and perform experiments by combining pedagogical content knowledge (PCK) [1] and experimental skills with interactive teaching techniques [2]. School practice courses prepare students for their work as physics teachers in schools by acquiring hands-on experience by working and interacting with students.

At the three mentioned universities, during the first COVID-19 lockdown, reorganization of these courses included e.g., doing home experiments and using simulations for the lab course or preparing teaching materials for students and participating in virtual classrooms for the school practice courses.

3 Methodology

Our interview and questionnaire research took place during the summer semester of 2020. First, students attending the lab courses for prospective physics teachers and school practice courses (N=12) were interviewed and afterwards, a questionnaire was prepared and distributed to students attending these two courses (N=118). Last, results from the interviews were also used to formulate an open-ended questionnaire for instructors of the lab course for prospective physics teachers (N=8). The interview data was structured and summarized by rules of qualitative content analysis [3]. The questionnaire data underwent standard frequency analysis.

4 Results

Students experienced positive and negative aspects of the online lab course. Some positive aspects include managing their own time for performing home experiments, being creative while designing and doing home experiments, and now believing that more experiments can be done in schools than previously thought so. The comparison between the three different universities showed that students, who did not receive support and guidance with home experimentation (such as working with an online partner and/or discussing their experimental designs during videoconferences) generally did not like performing them and thus did not experience the benefits of doing them. A negative aspect emerged concerning the enhanced workload and time consumption. This aspect was also stressed by most of the instructors.

During the reorganized school practice course, majorly all students attending school practice courses reported working on creating tasks and materials for school students. They usually conducted online lessons using videoconferencing, worked with the schools' learning platforms and/or recorded educational videos. Students did not see many benefits with the reorganized school practice since they could not experience the classroom environment.

5 Conclusion

Analysis of the data showed positive outcomes concerning the adapted lab course from which we conclude recommendations for future courses: For instance, students' creativity and confidence about designing and performing experiments could be strengthened by home experimentation, if they are supported and guided

during the experimental process. In contrast, not many benefits can be ascribed to the reorganized school practice courses.

References

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Primary authors: JELICIC, Katarina (Faculty of Science, University of Zagreb, Croatia); GEYER, Marie-Annette (Faculty of Physics, Physics Education Research, Technische Universität Dresden,); IVANJEK, Lana (Faculty of Physics, Physics Education Research, Technische Universität Dresden); KLEIN, Pascal (Faculty of Physics, Physics Education Research, University of Göttingen,); KÜCHEMANN, Stefan (Department of Physics, Physics Education Research Group, Technische Universität Kaiserslautern,); DAHLKEMPER, Merten (Faculty of Physics, Physics Education Research, University of Göttingen); SUSAC, Ana (Department of Applied Physics, Faculty of Electrical Engineering and Computing, University of Zagreb)

Presenter: JELICIC, Katarina (Faculty of Science, University of Zagreb, Croatia)

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