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Virtual laboratories during coronavirus (COVID-19) pandemic

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Abstract

Coronavirus (COVID-19) disease is an emerging situation that brought challenges to all sectors, including academia and research. Undergraduate and postgraduate students in biochemistry and molecular biology have been affected significantly due to the recent laboratory closures. Experiments have been suspended for long causing extreme stress to the students. Virtual laboratory is a powerful educational tool that enables students to conduct experiments at the comfort of their home. An excellent opportunity to engage students with technology and in parallel to avoid unforeseen disruptions, as happened recently due to pandemic.

KEYWORDS

COVID 19, postgraduate students, undergraduate students, virtual laboratories

The current pandemic of coronavirus (COVID-19) created a great uncertainty in research and education. Traditional laboratory-based disciplines including biochemistry and molecular biology are significantly affected by the laboratory closures. Globally, hundreds of practical sessions in academia have been suspended without any clear indications for 2020/2021. A very challenging situation causing extreme stress and anxiety in the academic world. Experiments are a vital part of sciences, in which students can gain valuable experience in various techniques and develop the necessary skills for their future employments in industry and academia. Virtual laboratories have been used for teaching purposes in biology, chemistry and natural sciences.¹ Students can perform experiments at home and laboratory sessions to run as normal, despite the unforeseen circumstances of COVID-19 pandemic.

Virtual laboratories cannot replace entirely the physical experiments in traditional laboratories. However, in academic settings virtual and physical laboratories can

work together. Especially now during COVID-19 pandemic, students can perform the experiments online without any time limitations, receive instant feedback, familiarize with health and safety regulations, repeat the experiential activities and generate data for their assessment. Also, they are engaged with technology and prepare more productively for their physical laboratories.² Virtual experiments can be conducted into groups permitting social interaction and collaboration among the students.³ Important aspects in social distancing that enable communication and reduce feelings of isolation and loneliness. Apart from education, online simulators are frequently used for research purposes.⁴ Thus, a relevant training on virtual laboratories at an undergraduate level prepares students for future careers in those fields.

In terms of research, doctoral projects could investigate the impact of virtual laboratories during pandemic. Nowadays there is a great need for research scientists with multidisciplinary skills in physical and

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online experiments. Furthermore, virtual laboratories provide a great opportunity for doctoral students and postdoctoral researchers to gain teaching experience. Familiarize with important teaching approaches in virtual education such as the scenario-based teaching and inquiry-based learning.^{2,3} Also, to participate towards the development of virtual laboratories, place theory into practise and assess reports. Additionally, a unique opportunity to work in highly interdisciplinary teams from academics to graphic designers. Teaching is an important aspect for a successful career in academia. However, doctoral and postdoctoral researchers need to discuss their teaching contributions always with their supervisors to avoid potential delays in their research.

To conclude, students in experimental disciplines like biochemistry and molecular biology are heavily affected by the recent social distancing regulations. However, virtual laboratories can provide a powerful solution in tertiary education for undergraduates and postgraduates (doctoral students) during COVID-19 pandemic. Undergraduate students can progress to their studies without any disruptions since important experiments can be conducted online at home. Whereas doctoral researchers can possibly investigate the effect of virtual laboratories in biochemistry/molecular biology during pandemics and emerging situations. Furthermore, post-doctoral scholars

and doctoral students can gain teaching experience in virtual education by helping academic staff.

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