JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Virtual Chemistry Practical for future owing to the pandemic

***Beg Waseem Ahamad**

Department of Chemistry
Gokhale Education Societys'
RNC Arts,JDB Commerce NSC Science College Nashik-road, Nashik
Email: begwaseem02@gmail.com

Contact- 8329628368, 9923073900

Abstract: The Basic Practical Chemistry course's objectives are to give students a thorough understanding of practical chemistry's underlying principles and to help them hone their fundamental experimenting skills. The in-person lab sessions are regarded as one of the most crucial components of the course for students to engage in because many students enter the course with little or no prior lab experience. Recently, academic activities all around the world came to a halt as a result of the COVID-19 epidemic, and all in-person events were cancelled as a result of strict health laws.

In contrast to theory-based courses, which continued to be taught even during the pandemic through online teaching methods, there were very few alternatives available to keep practical-based courses running during the pandemic due to the inherent difficulties of effectively delivering practical-based content through online teaching methods. Open educational resources (OER) were used to develop a collection of virtual chemical simulations and animations to help students learn during the pandemic lockdown. Through the university's learner management system and specially developed MOOCs, it was made available to students online.

Key Words: COVID-19, Pandemic, Virtual Chemical Laboratories, Animations and Simulations.

Introduction:

The global COVID-19 pandemic epidemic that started in 2020 was unexpected and difficult to manage. All teachers worldwide were required to hold their classes online due to the COVID-19 pandemic. Students are completing their courses online while the majority of the instruction has been outsourced off campus. Despite this, the lab class/chemistry practical, one of the most essential elements of higher scientific education, has turned out to be challenging. 2

The relocation of experiments and laboratory activities was demanded because science and chemistry teachers had to synchronize the instruction of both theoretical and practical knowledge. The rise of information and communication technologies (ICTs) has opened up a range of options for students learning practical chemistry fundamentals through online classes. Schomann (2003)

Objectives:

The relevance of theoretical (content) and practical (process) development is focused more than in other academic subjects, such as chemistry. 4 Improving the practical components of the course curriculum while also teaching students experimental methodologies, observations, presentation skills, and laboratory techniques is all vital, right? Students' comprehension of chemistry is greatly influenced by experimental chemistry labs. 5 The discovering process seems to be what gives science its fundamental excitement, and laboratory experiments illustrate the interconnections between theory and practice. Aspiring scientists benefits from lab sessions in the development of both practical abilities and a grasp of the intellectual culture of the discipline. Without being given an opportunity to apply theoretical concepts in a lab setting, many students might not understand entirely some theoretical concepts. 6 Undergraduate chemistry courses must also include laboratory-based practical components in order for students to gain practical experience and knowledge of chemistry-related experiments. In general, practical chemistry techniques that can be seen and done in a lab are simpler to understand. Technology is therefore not used all that commonly while teaching practical chemistry material.

Methodologies:

All stakeholders in higher education obtained surveys on the benefits and drawbacks of virtual or online learning that were created in a Google form. In this study, responses are gathered and analyzed. On the basis of this, this part explores and discusses some of the perspectives of various stakeholders.

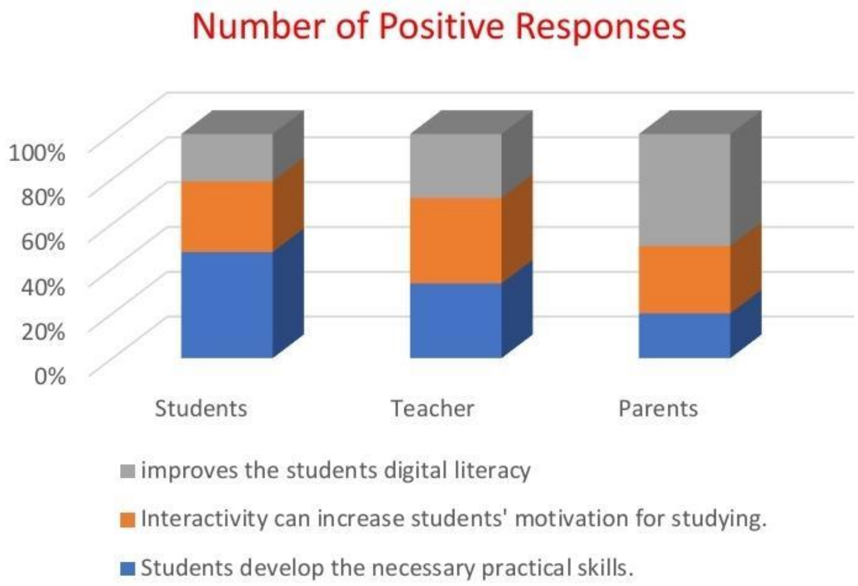
Even if technology is necessary for remote education, it is essential to think about how it can be utilized to impart knowledge to make sure it is successful. Evaluating whether or not an unique tool could be used to educate practical chemistry online was the study's main objective as a consequence. 7
While online course delivery has historically been utilized in fields of education where it is easy to execute, it has historically been used very infrequently in fields like practical chemistry.

Thanks to advancements in technology within the last few years, users can now imitate chemistry lab experiences digitally, without having to be present. Virtual reality simulations, according to the authors, are important in education because they provide students with realistic models that they can interact with to get real-world experience and a stable environment where they may repeat exercises without fear of being hurt. 2 Unquestionably, the current COVID-19 pandemic has changed the world's educational system, causing a swift shift away from traditional classroom-based instruction and toward a new type of online learning. As a result, technology was successfully used in the distribution of materials at the university level during the recent COVID-19 pandemic, according to a number of recent investigations.

Despite the widespread misperception that online education would enable academics to continue teaching regardless of their social constraints, a number of institutional, technological, and perceived barriers may limit the broad use of online content delivery systems. 8
The use of a virtual lab for education and assessment has significant downsides, and there is a scarcity of student support for it. Such restrictions have been attributed to basic impediments including a lack of required infrastructure, a technical skill gap, or even a lack of participant interest and drive. 9 Therefore, if technology is to allow effective information sharing, it is crucial that any potential restrictions be discovered and preventative measures be made to lessen their impact.

Researchers have examined students' performance in physical and virtual lab settings in research investigations. Students can benefit from virtual laboratories regardless of where they are when they participate. 10 Additionally, they contribute to reducing the amount of chemical waste generated. All of the experts suggest taking measures when adjusting or conducting additional study. Similar challenges arise for lab teachers due to the requirement to maintain social distance in crowded laboratory classes, even though restrictions are becoming less strict.

Fig 1: **Student, teacher, and parent perspectives on the advantages and disadvantages of the virtual laboratory**



Conclusion:

Following the first wave of the COVID-19 epidemic, academic activities were immediately resumed, and the students were welcomed back into the college to take part in the regularly planned laboratory-based practical sessions. 11 It was predicted that students who had used information and communication technologies (ICTs) to become familiar with the theory and procedures of the experiments covered in the session would complete the laboratory activity with more competency.

It is stated that, even while digital technologies have their place in the laboratory, they shouldn't completely take the place of the important activities. It should go without saying that laboratory activities must include both traditional labs and computer-assisted activities. Don't rely solely on one or the other.

References:

1. Ferraz-Caetano, J. (2021). *Towards Digital Laboratories*. 464–474. https://doi.org/10.4018/978-1-7998-6533-9.CH023

2. Wijenayake, L. A., & Iqbal, S. S. (2021). Going virtual with practical chemistry amidst the COVID-19 pandemic lockdown: significance, constraints and implications for future. *Asian Association of Open Universities Journal*, *16*(3), 255–270. https://doi.org/10.1108/AAOUJ-09-2021-0102

3. Youssef, M., McKinstry, E. L., Dunne, A., Bitton, A., Brady, A. G., & Jordan, T. (2020). Developing engaging remote laboratory activities for a non majors chemistry course during covid-19. *Journal of Chemical Education*, *97*(9), 3048–3054. https://doi.org/10.1021/ACS.JCHEMED.0C00792

4. Boschmann, E. (2003). Teaching Chemistry via Distance Education. *Journal of Chemical Education*, *80*(6), 704–708. https://doi.org/10.1021/ED080P704

5. Phipps, L. R. (2013). Creating and teaching a web-based, university-level introductory chemistry course that incorporates laboratory exercises and active learning pedagogies. *Journal of Chemical*

Education, *90*(5), 568–573. https://doi.org/10.1021/ED200614R

6. Van Heuvelen, K. M., Daub, G. W., & Ryswyk, H. Van. (2020). Emergency remote instruction during the covid-19 pandemic reshapes collaborative learning in general chemistry. *Journal of Chemical Education*, *97*(9), 2884–2888. https://doi.org/10.1021/ACS.JCHEMED.0C00691

7. Fergus, S., Botha, M., & Scott, M. (2020). Insights Gained during COVID-19: Refocusing Laboratory Assessments Online. *Journal of Chemical Education*, *97*(9), 3106–3109. https://doi.org/10.1021/ACS.JCHEMED.0C00568

8. Kennepohl, D. (2021). Laboratory activities to support online chemistry courses: A literature review. *Canadian Journal of Chemistry*, *99*(11), 851–859. https://doi.org/10.1139/CJC-2020-0506
9. Kennepohl, D. K. (2013). Learning from blended chemistry laboratories. *Proceedings - 2013 IEEE 5th International Conference on Technology for Education, T4E 2013*, 135–138. https://doi.org/10.1109/T4E.2013.40

10. Shidiq, A. S., Permanasari, A., Hernani, & Hendayana, S. (2021). Chemistry teacher responses to learning in the COVID-19 outbreak: Challenges and opportunities to create innovative lab-work activities. *Journal of Physics: Conference Series*, *1806*(1). https://doi.org/10.1088/1742-6596/1806/1/012195

11. Waycott, J., Dalgarno, B., Kennedy, G., & Bishop, A. (2012). Making science real: Photo-sharing in biology and chemistry. *Research in Learning Technology*, *20*(2). https://doi.org/10.3402/RLT.V20I0.16151