Plight of Chemistry Teachers in Remote Teaching during COVID-19 Pandemic

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Abstract

Sudden emergence of COVID-19 pandemic disrupted the whole system across the globe, severely affecting the social, economic and education system affecting the pattern of teaching from traditional face-to-face (F2F) teaching-learning to remote learning. Remote teaching is defined as the technology-enhanced teaching methodology where both the students and teachers are separated at both geographical and time differences and the process of teaching and learning takes place outside the four walls of the classroom and in a setting most suitable to their situation. This work focuses on the challenges encountered by Senior Secondary teachers of Chemistry subject from Private or Government Schools and Inter Colleges in Patna District, Bihar, India and some pre-service teachers' questionnaire-based survey with 55 respondents. The survey indicates that the major problem in remote teaching is the assessment of students, providing feedback to the students and other issues pertaining to adaptability, arranging for resources along with technical errors and internet connectivity. A solution to all the problems can be achieved when teachers are more acquainted with internet-based technologies and online teaching tools, adjust their teaching plans and teaching methods, and quickly adapt to the new situation. Enhanced interactions among each other, maintenance of interest, consistent motivation and support to be dispended to learners as well as teachers for improvement in the teaching-learning process.

Keywords: *COVID-19, Remote teaching, Online teaching-learning, Senior Secondary Chemistry Teachers, Pre-service teachers.*

Introduction

The SARS –CoV-2 virus or the Corona virus which first originated in China in December 2019, was first reported in India on 30 January 2020. (India Today, 30 January 2020). This virus infected the respiratory tract and has been the reason of millions of deaths worldwide. Due to the surging active cases of COVID-19 across the globe, WHO declared COVID-19 as a pandemic(WHO, March 12, 2020). After that, there was a mandatory lockdown imposed across the country causing closure of institutions and organizations. The pandemic caused pronounced social and economic obstruction and has had

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obvious short-term and predictable long-term effects on education. "Deferral of face-to-face instruction and student assessment with the necessity of social distancing preventing the social gatherings common to all learning environments" (Hermanns et. al., 2020). Online teaching was no longer a choice but a necessity of the times. This affected the pattern of teaching learning from traditional face-to-face (F2F) teaching-learning to remote learning, where both the students and teachers were far from the four walls of the classroom and connected to each other virtually.

Remote teaching is defined as the technology-enhanced teaching methodology where both students and teachers are separated at both geographical and time differences and the process of teaching and learning takes place outside the four walls of the classroom and in a setting most suitable to their situation.

This online teaching is classified as synchronous online teaching and asynchronous online teaching. Synchronous method of teaching involves the participants to be online at the same time and mutual interface sharing. In asynchronous teaching method, study material is shared by the teachers on online platform which is made accessible to students. Asynchronous method is advantageous in terms of time, place, pace which has restrictions in case of synchronous teaching. Because of unfamiliarity with the virtual environment, disturbances and hesitation increased on both the sides. Therefore, the researchers decided to work on these problems faced by the chemistry teachers in carrying out their teaching process amid this pandemic in a setup improvised at their homes. The researchers also studied the views of chemistry teachers on some remedies which are being applied in other countries and states during these times and how they are coping up during this unexpected shutdown. All institutions shifted to online platforms and educators took this situation as an opportunity to innovate, experiment and create an era in the realm of remote online teaching.

Objectives

1. To study the common problems faced by the chemistry teachers and pre-service student teachers in remote teaching, specifically in content preparation and delivery, time and resource management, communication and assessment.
2. To assess their responses, acknowledge their experiences and review their views on the remedial steps implied by them in online teaching.
3. To compare the responses of the chemistry teachers according to their gender (M/F), type of management of the institution (Private/Government) and their teaching experience (more experienced and less experienced teachers).

Methodology

Questionnaire-based survey form containing some quantitative and exploratory questions along with general personal information of chemistry teachers was prepared entitled "A Questionnaire Survey Form on Plight of Chemistry teachers in Remote Teaching". The form is divided into 6 sections which is categorized into: Section 1 includes Personal Information; Section 2 includes questions pertaining to problems faced by teachers in content preparation; Section 3 includes problems pertaining to time and resource management; Section 4 includes problems in communication and assessment; Section 5 includes other problems like distractions during class and views on support from institutions during the course. Finally, Section 6 contains the views of teachers on remedies to overcome the problem arising in the teaching learning process. The content for the form was prepared on Google sheet form and its link was generated i.e., https://forms.gle/ZP84sUqzwGxAtiFMA.

The questionnaire was developed following a sequence of steps, in which the first step was to conduct exploratory research from available literature and preliminary informal interviews from known targeted respondents. Next, population of interest was formulated

based on the objectives of research, keeping in mind the expected parameters of age, gender, experience, etc. Plausible ways of reaching out to the respondents were next planned in which emailing of the questionnaire, interview through telephone and through text message was expected to be found most convenient. Development of content of questionnaire evaluating their authenticity in fulfilling the objectives was the next step undertaken for the development. In order to ensure variability and enrichment of the objections, open-ended and exploratory questions were included as part of dummy survey form. Questions developed at this level were sent to potential respondents for validity check, after which a few questions were eliminated on the recommendations of the responses. After that, questions were arranged in meaning format and order with proper closing questions and later developed on Google forms whose link is provided in the previous paragraph.

Participants

Senior Secondary Chemistry teachers of Government Schools and Inter Colleges in the Patna district of Bihar were approached with the help of B.S.E.B website and also enquired from reliable sources for getting the contact information of the Chemistry teachers for the study. Similar data collection was done for private school teachers from popular schools and teachers were contacted through email-id and mobile number and survey form was shared to all of them.

Data Collection and Analysis

The responses to the Google form was kept open for two weeks which was shared to the teachers via their WhatsApp or email. Sixty respondents (teachers and student teachers) were contacted for the survey out of which 55 respondents filled the Google form.

Results and Discussion

Lack of face-to-face interaction in real classroom teaching and restricted freedom of implementation of variations in teaching methodologies posed problems in online remote teaching. Problems which were being faced by teachers in adapting to these changes (43.6%), preparing e-content and its delivery as there is lack of formerly prepared content on online platforms majorly for state curriculum (40%), problems arising due to resources (23.6%) and internet connectivity (45.5%) but the major inconvenience for the teachers is in assessment and feedback of students (52.7%) and in checking progress in achievement of learning outcomes. Problems in online teaching was summarised and the percentage of responses were analysed which is shown in Figure 1.
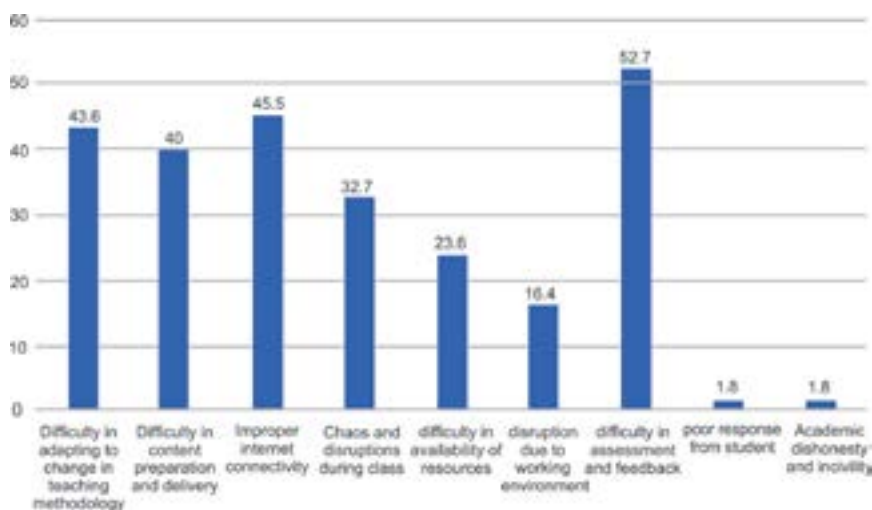

Fig 1: Graph of data presenting the percentage of responses to the problems

These problems were further elaborated and enquired in detail from all the respondents whose data analysis shows availability of resources, increased doubts from students and institutional support holds great significance and posed problems to the teachers irrespective of gender, experience and institutions to which they were associated with. During the pandemic, the pattern of examination and the type of questions underwent a complete transformation. Results as shown in Figure 2.
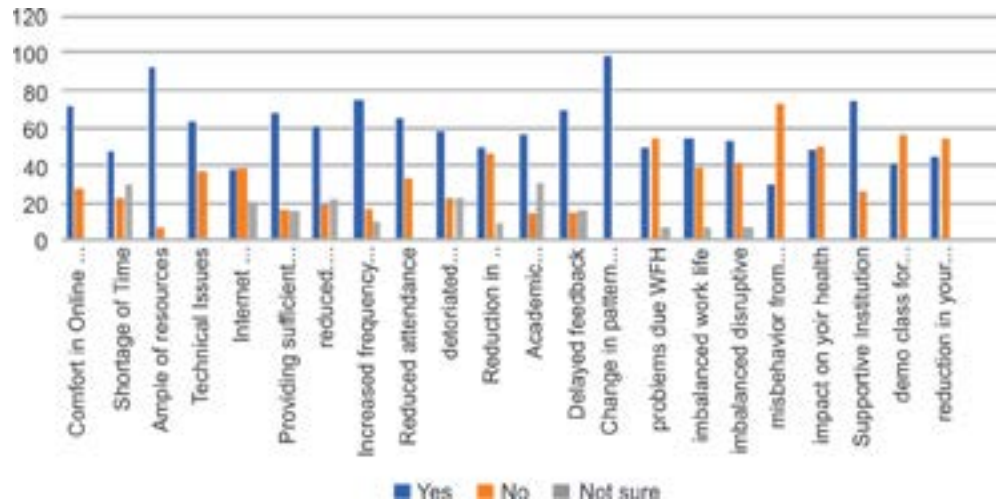

Fig. 2: Graph of Problems (on x axis) versus percentage responses (on y axis)

The study was further extended towards a comparative study where gender, experience and institutional background were taken as the basis. For comparative study between sample of different sexes, problems were mainly focused because of the responses obtained from who were contacted prior to this research work and of the responses available on the Quora platform. A relation was observed in case of issues with time management and problems arising due to work-from-home. Female teachers were found to have more problems in working from home and had an imbalance in their work life due to these changing situations and also faced a bit more amount of misbehavior from students than the male teachers. Teaching from home also took toll on the health of teachers and thus an observable difference can be seen in case of male and female teachers. A very distinct difference was observed in overcoming of technical issues while handling of hardware and software used to carry out a smooth teaching. This huge difference in the values shows low efficacy of female teachers towards technology. (Figure 3)
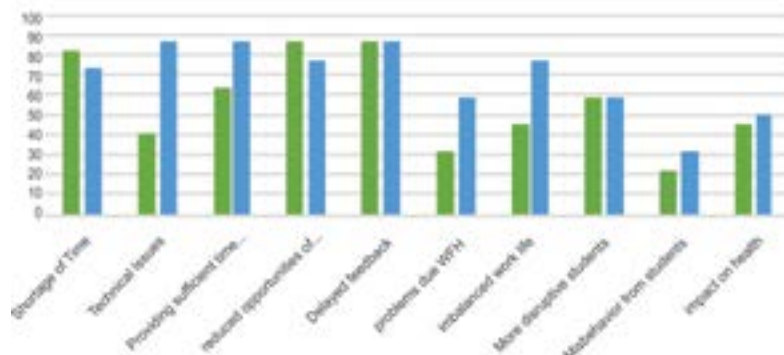

Fig. 3: Problem analysis based on the gender of population of interest

Other comparison between teachers from institutions governed by the state and private schools, the problems mostly arose due to work pressure from higher authorities.

These values are percentage of the teachers out of the 19 Private School teachers and 25 Government School and Inter College Teachers.
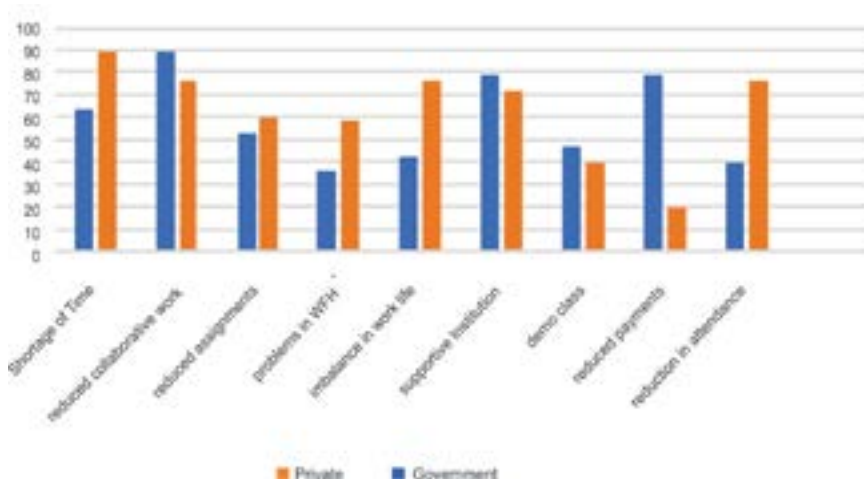

Fig. 4: Analysis of the percentage responses of the respondents belonging to different institutional backgrounds

As expected, comparable differences were observed in case of private and government employees. Due to pressure from the school authorities and targets to achieve the goals on time, private school teachers were found to be more habitual to these deadlines and thus faced lesser problems in working from home and in balancing their work. A very distinct difference in the bars shows reduction in payments of private school employees thus suffering from financial support from their institution. The difference in attendance of students was also very significant as the state government schools were not providing regular online classes and thus observed a reduced attendance than private school students. (Figure 4)

The comparative study was also carried out on the basis of teaching experience. For better distinction and understanding, teachers with experience equal to or less than 15 years, were treated as less experienced whereas the teachers having more than 15 years of experience were treated as more experienced. (Figure 5)

Surprisingly majority of responses to the four mentioned problems were contradictory to the anticipated thoughts. According to the observed results, it is clear that less experienced teachers faced more problems while working from home as compared to the more experienced teachers with similar case in balancing of their work life.
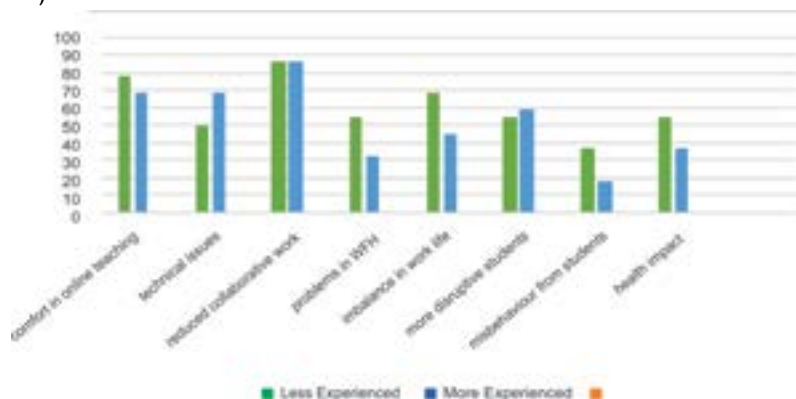
Fig. 5: Analysis of the responses by the teachers with varying teaching experience

From the responses received from these student-teachers, it is clear that even though they had resources to carry out smooth teaching-learning, various other distraction and disruptions made their path more difficult. Lack of experience and difficulty in adapting to these sudden changes in teaching methodology greatly influenced their function as a teacher.
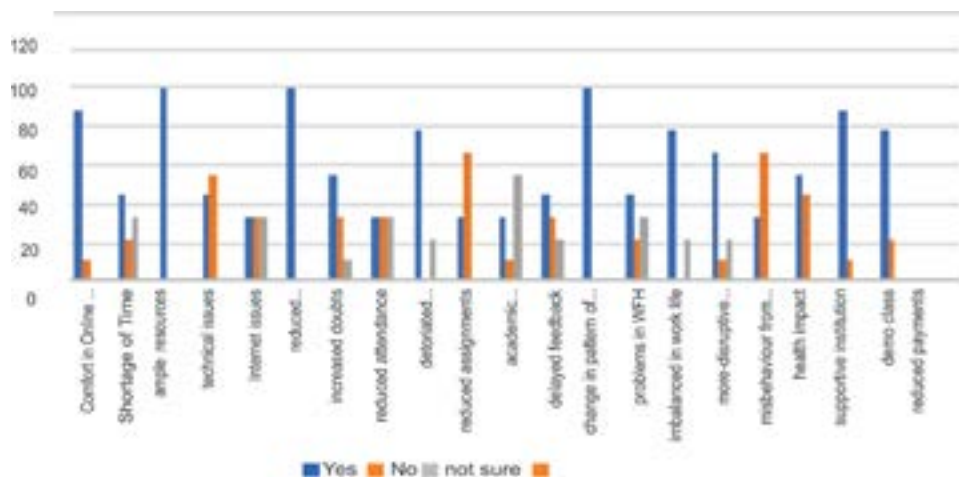

Fig. 6: Responses from pre-service teachers and their percentage to the questions on y axis

Teaching the practical aspect of chemistry posed great problems to the teachers. In theoretical portions developing content viable for online platforms was a difficult task for many as they responded in the survey form and thus the process of remote teaching was delayed. Due to sudden emergence of numerous software, lack of a consistent server and internet breakdown was also observed. Teaching inorganic chemistry was much easier than other disciplines of chemistry. Advanced features available in the installed apps in systems enabled the easy content preparation but writing equations in physical and organic reactions was tedious to many respondents.

Lack of efficient applications for drawing the structure of organic molecules in easy and fast way posed problems to many. A major problem arose for delivering the practical chemistry lessons, as any science discipline without practical knowledge, is incomplete and that too in real life setup — is of utmost importance. Earlier there were also not many resources available for senior secondary practical simulations. So, teachers took help of other existing resources whose details are available below. Many achieved in delivering the content for the practical classes and also encouraged the students and assisted them in using various online platforms. (Figure 7)
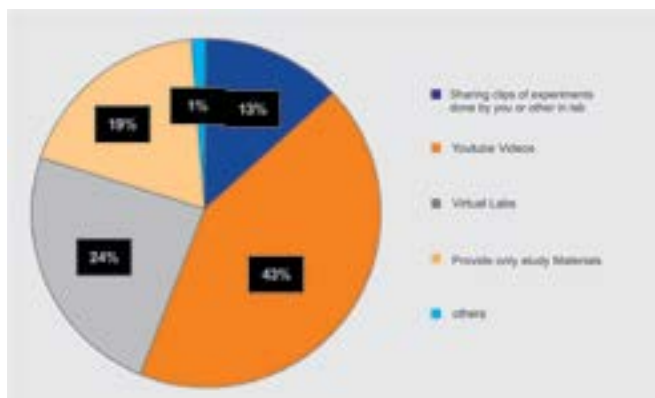

Fig. 7: Pie chart for the extent of use of available mediums for teaching practical chemistry

It is evident that YouTube has been the most accepted and trusted form (43%) used for teaching Practical chemistry, 24 per cent of the teachers have approached the use of virtual lab software signifying the extent of awareness of these advanced technological developments in crating online laboratory application.

The last part of the questionnaire focused on some complaints and problems that students conveyed to their teachers, which in turn affected their teaching-learning process. Students faced non-availability of either mobile phones or laptop all day long or at class hours because of reasons like having siblings or working parents and there are fewer devices in the family. Shortage of internet packs was most common in all families irrespective of their economic status and residential background along with issues of low bandwidth internet thus interrupting the learning. Lack of privacy and silent area affected the learners. Another problem was that students had to overcome various technical issues like problems in logging in, setting of audio and video, settings of chats, insufficient time to express their thoughts and put forth questions while attending online live lectures which caused loss of continuity of interest of learners. Improper time management during class leads to alienation among students.

Conclusions

To revive interest, various tools and methods must be implemented by the teachers like teaching channels (SWAYAM Prabha, NPTEL) sponsored by government, own YouTube channels, sync classes, discussions, textual content matter, alternative assessment methods (tests, quizzes, assignments and projects) and activities in collaboration for better learning outcomes. The teachers need to modify their ways of teaching facilitating active learning by taking help of different activities like modeling, group discussions, animations, etc., to make it more virtual and technology driven. It is also important to understand the technical aspects like use of digi-boards and learning management system and web technologies which can assist in their pedagogy. It is highly recommended to keep the course more organised by making it well labeled, formatted and accessible as it would lead to likeliness of being more understandable and retainable for the students. Create a FAQ for addressing the questions students commonly have. Teachers must make it compulsive for creating a steady platform where students can collaborate, cooperate and communicate with classmates and ensure active participation of students. Conduction of classes on devices that uses lower bandwidth must be used. Be open and honest with students.

Carry out a survey to allow students to give feedback anonymously during the course.

Make improvements in course structure based on student feedback.

More interactive platforms are needed while teaching and subjective answers evaluation.

Counseling for parents and students are required to realize the significance devices and internet connectivity as parents do not want to invest on internet.

Good app and positive thought process of school, students and government will bring revolution in remote learning.

To create awareness among students about the teaching styles of various institutions is very helpful in improvised teaching learning.

Most perplexing reply was that they have lost the habit of writing on board and feel that this online teaching is not suitable for school students at all. They find this method of teaching-learning very mechanical and wish for immediate revival of traditional method. Among all these, some of the teachers also claimed that they have now been accustomed to this new normal and with gradual passing of time, have excelled themselves in achieving their goals and paved way for learning in this adversity. They believed that with gradual passage of time, they had brought modifications and enhancement in their teaching style and will continue to do so till the end of this new normal.

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