



## EFFECT OF COVID-19 PANDEMIC ON SCIENCE PRACTICAL CLASSES: A STUDY ON HIGHER SECONDARY STUDENTS AND TEACHERS

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### RESEARCH ARTICLE



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### Abstract

The study was conducted on "Effect of Covid 19 Pandemic on Science Practical Classes of Higher Secondary Students in 24 South Pargana District of West Bengal." The objective of the study was to find out the problems faced by higher secondary students as well as teachers on science practical classes during covid-19 pandemic. For this study sample taken were higher secondary science students and higher secondary science teachers of South 24 parganas district of West Bengal. The number of sample collected was 120 higher secondary students and 30 higher secondary science teachers. In this study researcher had used purposive sampling technique. For this study, researcher used mixed type survey method. Questionnaire was used for collection of data which consists of 30 close ended questions and 5 open ended questions. After collection of data, it was analysed by using different statistical tools such as mean, median, mode, t-test, ANOVA and Pearson correlation (student and teacher). Finding of the study was that, there was an impact of covid-19 pandemic on students' as well as teachers' on science practical classes. There was significant difference in the mean score of students with respect to gender and family income. Around 70% of the respondents encountered difficulty in focusing in virtual learning environment while attaining science practical classes. Nearly 82% of respondents said that real observation of specimen would have been better than observing specimen through power-point presentation. There is a positive correlation between the effects of covid-19 pandemic on science practical of higher secondary science teachers and students. But the correlation was very less significant. It is recommended to higher authority that they should have look into the matter so that problems like internet connectivity can be solved. For school management system, it is recommended that they should have proper infrastructural facilities so that education can go smoothly. Teachers' have to be up to dated with the technology and various online applications.

**Keywords:** *Effect, Covid-19 Pandemic, Science Practical, Higher Secondary School Teachers and Higher Secondary School Students*

### Introduction

**COVID-19:** Corona virus disease (COVID19) is an infectious disease caused by the SARSCoV2 virus. Most people infected with the virus experience mild to moderate respiratory illness and recover without special treatment. However, some people become seriously ill and need to see a doctor. Elderly people and people with underlying illnesses such as cardiovascular disease, diabetes, chronic respiratory illness, and cancer are more likely to develop serious illness. Anyone can become infected with COVID 19 and become seriously ill or die of any age. The virus can spread from the mouth or nose of an infected person to small particles of liquid when coughing, sneezing, speaking, singing, or breathing. These particles range from larger respiratory droplets to smaller aerosols. It is important to practice breathing etiquette, for example by coughing on a bent elbow. If you feel unwell, stay at home and quarantine yourself until you recover.

**Science:** Science is an intellectual and practical activity that involves a systematic study of physical and natural structure and behaviour through observation and experimentation. Science (from Latin scientia, "knowledge") is a systematic company that builds and organizes knowledge in the form of testable explanations and predictions about the universe.

**Practical:** Practical refers to ideas or projects that are more associated with or related to practice than theory. It deals with experience or real applications. Practical science is a science that has been selected, organized, and studied in more detail as a guide to practice. Millar described the practical activity as "a science education and learning activity where students sometimes work individually or in small groups to observe or manipulate objects to gain a better understanding." (Miller, 2009). It is described in National Strategy as follows: "Any activity that allows students to have a direct, often practical connection to the phenomenon they are studying" (National Strategy, 2008). The practical subjects defined by the Department of Education (DE) (detailed in DE Circular 2004/05) are Science, Technology and Design, Home Economics, Art and Design, Physical Education (PE) and Music.

**Science Practical:** Practical work or experimental work associated with science is called science practical. In science different branches are there such as physics, chemistry, and biology at higher secondary level.

### **Objectives of the Study**

- To find out the problems faced by higher secondary students during covid-19 pandemic.
- To find out the problems faced by higher secondary teachers during covid-19 pandemic.
- To find out the level of problems on the basis of different categorical variables.

### **Significance of the Study**

Students were facing the problem of not being able to smoothly connect to different cellular companies. The challenge for these children is the home environment. The lack of space in the students' homes interfered with their ability to concentrate on their online classes during theory as well as practical especially in science, leading to problems with their classes. On the whole, students had fewer problems with their knowledge and skills when using the internet. The students had difficulty in submitting assignments including theoretical and practical subjects due to their lack of understanding of technology. Moreover, they also have less experience and skills in browsing data from trusted sources. Many students find it difficult to provide oral feedback to their teachers during online classes. Many studies have found that children who are exposed to a lot of screen time tend to have disturbed sleep schedules. This is a common problem now because students spend so much time on screens. On average, children between the ages eleven to eighteen need around seven hours of sleep. Besides problems faced in performing science practical during online classes, other problems were also faced by them. For this reason this study is significant.

During the pandemic, teachers faced the following challenges: most of them preferred offline classes to online classes, teachers found their home environment not very suitable for doing science practical. They found that during online classes there is not much interaction between teacher and students; also some group based activity during science practical requires interaction between peer groups, which is not possible in virtual mode of learning. Some teachers spend 1-3 hours in online classes, while some other teachers felt that it sometimes takes a lot of effort to explain simple concepts (both theoretical and practical) . Lessons/chapters in the online classroom, teachers felt that it is sometimes difficult to complete the demonstration of science practical due to online learning, they feel that online learning during the pandemic is a little stressful, they found sometimes it was a bit difficult to communicate with individual students through online learning, teachers felt they had difficulty in delivering a lesson in the online class and teachers always felt uncomfortable because of too much use of a mobile phone/laptop/tablet. To encounter different problems faced by teachers during covid-19 pandemic and how it can be minimized, this study is significant.

### **Review of Related Literature**

Mishra, L., Gupta, T. and Shree, A. (2020) conducted a research work on "Online teaching- learning in higher education during lockdown period of COVID-19 Pandemic". The finding of this review paper was conducting online practical classes during the lockdown period proved difficult because it required systematic demonstration of the whole process in the presence of the students. This review paper had a similarity with the recent study.

In another review paper, Mojica, E.R. and Upamcis, R.K. (2021) conducted research work on "Challenges encountered and students' chemistry laboratory course during the covid 19 pandemic." Their finding was that videos were beneficial for them to understand the aspects of different experiments, while kitchen-based experiment allowed students to experience performing hands-on experiment for better understanding of the concepts. This review paper is contradictory to the current study. In current study researcher found that most of the respondents faced difficulty in doing experiment at home with their home equipment during lockdown.

Wisanti, Ambawati. R., Putri, E.K., Rahayu, D.A. and Khaleyla, F. (2021) conducted research work on "Science online learning during the covid-19 pandemic: difficulties and challenges." The objective of this study was to identify the difficulties

experienced by science teachers during online learning and describe the efforts of science teachers to conduct online learning during the Covid-19 pandemic. Findings of the study were, science teachers (77.5%) got difficulty in managing online learning. The greatest difficulty was internet access which contributes to 42.4%. Other difficulties such as low motivation, lack of communication device came from student’s side which contribute to 21.5%. Difficulties such as explanation of concepts and use of online learning application came from teachers’ side which contribute to 36.1%. This review paper has similarity with the current study.

Elhaty, I.A., Elhadary, T., Gamil, R.E. and Kilic, H. (2020) performed a research work on “Teaching University Practical Courses Online during COVID-19 Crisis: A Challenge for E-Learning.” Objective of the study was to look into the difficulties of presenting practical classes in schools of science, and social sciences online. The study showed that 83.3% teachers and 53.4% students believed that practical skills are affected due to the lockdown. This research paper has similarity with this study.

**Hypotheses**

H<sub>0</sub>1: There is no significant difference in the mean scores of the effect of covid-19 pandemic on science practical of higher secondary students in respect to gender.

H<sub>0</sub>2: There is no significant difference in the mean scores of the effect of covid-19 pandemic on science practical of higher secondary students in respect to family income.

H<sub>0</sub>3: There is no significant relationship between the effects of covid-19 pandemic on science practical of higher secondary science teachers and students.

**Population:** Population was taken from higher secondary students and teachers from different schools in 24 South parganas district for this study.

**Sample and Sample Size**

**Sample:** In this study the sample taken were higher secondary science students and higher secondary science teachers from 4 different schools of 24 South Parganas. Sample size was 120 higher secondary students and 30 higher secondary science teachers’.

**Sampling Technique:** For this study, researcher had collected 150 samples from different schools of 24 South parganas district.

**Tools for Data Collection:** Two tools were developed by researcher on “Effect of Covid-19 Pandemic on Science Practical; A Study on Higher Secondary Students and Teachers’.” One tool was used for collection of data, while other tool was used for analysis of data. Tool used for data analysis was SPSS, while tool used for collection of data was Questionnaire. Questionnaire consisted of 30 statements concerning about the different problems, difficulties faced by the higher secondary students and teachers’ in science practical during covid 19 pandemic which were of close ended type. Along with this 5 open ended statements were also there.

**Tools for Data Analysis:** Collected data from higher secondary students and higher secondary science teachers were analyzed with the help of different statistical tools like mean, median, mode, t-test, ANOVA and Pearson correlation (student and teacher).

**Analysis**

**Hypothesis Testing**

**H<sub>0</sub>1:** There is no significant difference in the mean scores of the effect of covid-19 pandemic on science practical of higher secondary students in respect to gender.

Table-1 The details of mean comparison scores of the effect of covid-19 pandemic on science practical of higher secondary students in respect to gender.

Variable	Gender	N	Mean	SD	‘t’ value	‘p’ value
Student’s opinion on the effect of covid-19 pandemic on science practical	Female	120	110.7500	9.25078	2.467	.015
	Male		106.0875	10.00151		

The ‘t’ Value obtained for the variable Student’s opinion on the effect of covid-19 pandemic on science practical of higher

secondary student's with respect to gender is 2.467 and the P-value is 0.015. As P value is less than 0.05, Null hypothesis is rejected. So, we can say that there is a significant difference in the mean scores of the effect of covid 19-pandemic on science practical of higher secondary students in respect to gender.

It is observed from the table that the mean value of female respondent is higher (110.75) that the mean value of male respondent (106.08). It is also found as statistically significant at 95% level of confidence. Thus, female respondents were more affected during covid 19 pandemic on science practical. (t=2.467).

**H02** There is no significant difference in the mean scores of the effect of covid-19 pandemic on science practical of higher secondary students in respect to family income.

Table 2 The details of mean comparison scores of the effect of covid-19 pandemic on science practical of higher secondary students in respect to family income.

Variable	Family Income	N	Mean	SD	't' value	'p' value
Student's opinion on the effect of covid-19 pandemic on science practical	Below Rs.10,000	120	112.0714	9.10316	4.991	.000
	Above Rs.10,000		103.7656	9.08643		

Note: significant at 0.05 level

The 't' Value obtained for the variable Student's opinion on the effect of covid-19 pandemic on science practical is 4.991 and the P-value is 0.000. As P value is less than 0.05, Null hypothesis is rejected. So, we can say that there is a difference in the mean scores of the effect of covid 19-pandemic on science practical of higher secondary students in respect to family income.

It is observed from the table that the mean value of respondent with family income below Rs. 10,000 is higher (112.0714) that the mean value of the respondent with family income more than Rs. 10,000(106.08). It is also found as statistically significant at 95% level of confidence. Thus. respondents with family income below Rs.10, 000 were more affected during covid 19 pandemic on science practical. (t=4.991).

**H03:** There is no significant relationship between the effects of covid-19 pandemic on science practical of higher secondary science teachers and students.

Table 3 Pearson's 'r' for Effect of covid 19 pandemic on science practical of higher secondary students' and higher secondary science teachers'.

Variable	N	'r' value	'p' value
Effect of covid 19 pandemic on science practical of higher secondary students' and higher secondary science teachers'	150	0.123	0.517*

Note: significant at 0.05 level

The 'r' for variable Effect of covid 19 pandemic on science practical of higher secondary students' and higher secondary science teachers' is 0.123. Since the 'p' value (0.517) is more than 0.05, Null Hypothesis is failed to reject. Value of correlation (r) is 0.123, which means that there is a positive correlation between the effects of covid-19 pandemic on science practical of higher secondary science teachers and students. But the correlation was very less significant at 0.05 level.

### Findings

From Item wise analysis following findings were revealed:

- Nearly 67% of respondents faced a lot of issues in internet connectivity during online science practical classes.
- Nearly 82% of respondents said that real observation of specimen would have been better than observing specimen through power-point presentation.
- Around 73% of the respondents agreed they faced difficulty in doing experiment at home with their home equipment during lockdown.
- Around 87% respondents agreed with the statement that laboratory experiments that involve electrical/mechanical heavy equipment cannot be performed by us in online setting properly during pandemic.

- There is a difference in the mean scores of the effect of covid 19-pandemic on science practical of higher secondary students in respect to gender. From statistical analysis it was found that female respondents (higher secondary students) were more affected during covid 19 pandemic on science practical.
- There is a difference in the mean scores of the effect of covid 19-pandemic on science practical of higher secondary students in respect to family income.
- It was found that respondents with family income below Rs.10, 000 were more affected during covid 19 pandemic on science practical.
- There is a positive correlation between the effects of covid-19 pandemic on science practical of higher secondary science teachers and students. But the correlation was very less significant.

### **Educational Implications**

- During pandemic situation educational institutions continued with online classes. This study is important to know the different problems faced by higher secondary science students' as well as teachers'.
- Problems such as availability of internet connectivity, acquaintance with various online applications were faced by the respondents.
- Higher secondary students faced other problems while attaining online science practical classes.
- During physics practical classes students faced issues in understanding the concept of handling different apparatus.
- During chemistry practical the students faced problems in understanding the concept of chemical reactions.
- For biology practical real observation of specimen, performing experiments by their own issues were faced by students.
- In other words hands on experiment or learning by doing affected very much during pandemic.
- Not only students', higher secondary science teachers' also faced problems like acquaintance with various online applications, teachings students' practical online.
- Female respondents (higher secondary students) were more affected during covid 19 pandemic on science practical.
- Respondents having low family income were more affected that high family income.

### **Discussion**

Mishra, L., Gupta, T. and Shree, A. (2020) conducted a research work on "Online teaching- learning in higher education during lockdown period of COVID-19 Pandemic". The finding of this review paper was conducting online practical classes during the lockdown period proved difficult because it required systematic demonstration of the whole process in the presence of the students. This review paper had a similarity with the recent study.

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### **Recommendations**

- a. Digitalization should be implemented by the policy makers so that students and teachers can get access to the internet connectivity.
- b. It is recommended to higher authority that they should have look into the matter so that problems like internet connectivity can be solved.

- c. For school management system it is recommended that they should have proper infrastructural facilities so that education can go smoothly.
- d. Teachers' have to be up to dated with the technology and various online applications.
- e. Students' should be more familiar with the online learning systems.
- f. Female respondents were more affected; there should be provisions to provide them internet connectivity as well as to familiar them with various online applications.
- g. Government should take initiatives to provide economic facilities to the family having low family income so that they can access the internet facilities.

### Conclusions

In this study researcher had tried to find out some of the problems which were faced by higher secondary science students' and teachers' during covid 19 pandemic. Some of the issues were identified such as internet connectivity issues and knowledge about various online applications. During pandemic, online science practical classes were affected very much, both for higher secondary science teachers' and students. Understanding of knowledge, creation of concepts of the subject matter affected. In other words hands on experiment suffered to large extent for higher secondary students.

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