Journalof Educare (JoE)
(A Peer-Reviewed Biannual Journal)
ISSN: 3048-9652 (Online) *www.educare.aliah.ac.in*

A STUDY OF ONLINE TEACHING ON STUDENT'S LEARNING EXPERIENCES IN LABORATORY-BASED SUBJECTS AT HIGHER SECONDARY SCHOOL

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ABSTRACT

As a result of the spread of the coronavirus, all educational institutions were closed. However, the learning process continues with the introduction of online teaching. This study aimed to understand how online teaching impacts students' learning experiences in laboratory-based subjects. This study was conducted using a descriptive survey method. Fourteen questionnaires were developed for data collection from the four randomly selected higher secondary schools. The end of this study highlights that some students show that their confidence level is very high enough to perform different entrance exams. Very few students try to experiment alone in their homes (Which is possible). They have faced problems in the practical part of an online class. Experiments cannot be shown practically during online teaching due to Lack of infrastructure, low teaching quality, tuition dependency, high cost, etc. The researcher found that most teachers need to show experiments hand in hand while teaching lab-based subjects. These teachers need to gain more awareness about advanced technology and online laboratories. The researcher revealed that all the experiments with laboratory-based subjects are not possible through online mode. There are still many schools where proper laboratory equipment and infrastructure still need to be made available.

Keywords: Online Teaching, Digital initiatives, Learning Experiences, Laboratory-based subject.

INTRODUCTION

In the COVID-19 situation, the teaching activities of every institution came to a standstill, and online learning was chosen as an alternative.Currently, technology facilitates the creation of a virtual classroom by establishing a connection between educators and learners from the comfort of their homes. Modern technology has a significant role in the quality of online instruction, which is intended to simplify learning and improve comprehension of concepts related to laboratory-based courses. Online instruction is a student-centered approach that raises engagement and involvement levels in an online learning environment. It is important to know how active and aware students are of the impact of online teaching in every field of

education, especially laboratory-based subjects. Laboratory-based subjects refer to those subjects that require laboratory assistance, such as Chemistry, Biology, Physics, etc.

These subjects' contents can be understood through experimentation, which requires laboratory equipment and infrastructure. The impact of online teaching on students' learning experience in lab-based subjects through frequent ICT has led to the emergence of computers, multimedia, email, internet, MOOC, Google Meet, Zoom, etc. Advanced technology offers flexible learning opportunities, from online teaching to learners acquiring advanced knowledge. This study helps to understand the problems faced by students during online teaching. Online teaching acts as a vehicle for delivering knowledge and creating an active learning experience in lab-based subjects. However, the most important thing we should keep in mind is that the impact of online teaching always depends on active interaction rather than silent participation. Invariably, it does not impact the traditional face-to-face class setting as well. When we are not in a physical classroom setting, we cannot perform real lab activities due to the COVID-19 pandemic. Other reasons can be alternatives, such as dangerous chemical reactions, time concerns, and lack of equipment for online teaching and virtual laboratories. However, it is a big challenge towards the teaching end to make online teaching more useful. Online teaching refers to education through several devices such as mobile, laptops, desktops, tab, etc, for which the internet is mandatory. Anyone can start teaching from any place (Home or workplace) through online platforms such as Google Meet, Zoom, Swayam, Webex, and others. Virtually any topic or skill can be taught online. This type of teaching involves live classes, video conferencing, webinars, and other methods.

Online teaching: Online teaching means the act of teaching done online. Online teaching refers to education through several devices such as mobiles, laptops, desktops, tab, etc., for which internet connectivity is mandatory. Anyone can start teaching from any place (home, working place) through online platforms such as Google Meet, Zoom, Swayam, WebEx,and other methods. Virtually any topic or skill can be taught online. This type of teaching involves live classes, video conferencing, we binars, and other methods.

Learning experience: Learning experience refers to the activities that students acquire through online teaching strategies. The learning experience is the kind of experience of how the student learns or how the teacher makes them learn according to the nature of content, method, and objectives of the curriculum. Learning experience indicates the student's academic performance, effective communication with the peer group, teamwork, and critical thinking based on the objectives of the lab-based subject.

Laboratory-based subject: Laboratory-based subject refers to those whose content can be understood through experimentation and needs laboratory equipment and infrastructure. The laboratory-based subject includes Physics, Chemistry, Biology, etc.

BACKGROUND OF THE STUDY

various tools and resources used in education have been around for a long time, but e-learning is a relatively new concept. In the 1800s, correspondent courses were started for students who could not live on university campuses, and educational materials were delivered to students through parcel post. With the advent of radio waves and other technological advancements in the 1900s, remote education started. In 1989, the University of Phoenix began broadcasting educational programs over the Internet. In 1993, the University of Illinois Internet web browser initiative online education. Using DOS Commodore 64 computers, New York University Online became the first fully online program in 1980.

The Electronic University Network was established for this, and about three years later, the University of Phoenix established the wholly Online Collegiate Institute to launch the first bachelor's and master's degree courses. In this case, cutting-edge technology is essential to building an online platform. The internet dramatically facilitates access to learning.

SIGNIFICANCE OF THE STUDY

Instructors can employ multiple technologies and cater to different learning styles with more freedom when they teach online. This study is most helpful for teachers, students, and educators because the way of accessing, sharing, and facilitating information has been profoundly altered by the Internet, as has the way we communicate with one another. The study will assist administrators in determining the main obstacles that teachers face when teaching online, and they may also take action to address these obstacles. Students in higher secondary school need to know how to learn from online teaching and how active and aware students and teachers are towards online teaching. It is important to know the impact of online teaching in every field of education. Online teaching is very flexible for teachers, students, and educators to continue their work and studies.

REVIEW RELATED LITERATURE

Saraswathi (2023) conducted a study of problems faced by teachers and students in online teaching and online learning during the pandemic in Dharwad District. The research methodology used for this study was a descriptive survey. It was discovered that male secondary school teachers encountered more difficulties with online instruction during the pandemic than female teachers. According to this study, 178 students in rural schools had more difficulties with online learning during the COVID-19 pandemic than students in urban secondary schools.

Reena (2023) conducted a study on A study of online teaching about teacher trainees' academic stress and academic satisfaction. The study aims to address the problem teacher candidates face with Internet accessibility and availability and the electronic gadgets they use for online instruction. The study's primary conclusion was that 89.3% of teacher candidates knew about network problems they had experienced in online courses. During online instruction, 76.8% of the teacher candidates reported feeling as though there was less teacher-student interaction. 66% of teacher candidates needed help with teaching remotely.

Rajni (2022) conducted a study That looks at the professional commitment, job motivation, and self-efficacy of secondary school teachers who teach online using a sample of 600 instructors from two divisions in Punjab. The investigator employed a mixed-technique approach. Significant results showed that location and gender significantly interact with online teaching self-efficacy.

Shaheen & Hoque (2021) conducted a study on Online Teaching and Challenges of Teachers. This study listed a few of the difficulties that educators encounter. The only data sources used in the study are secondary ones. It is analytical, qualitative, and descriptive. The findings show that teachers' biggest obstacles when teaching online include time management issues, a lack of support from parents, a failure to adjust to new technologies, a lack of suitable materials, technical issues, indiscipline, and a lack of confidence. The administrators will find this article helpful in understanding the many obstacles teachers face when teaching remotely. Additionally, the study will support administrators and legislators in taking appropriate action to address the issues teachers at all levels confront.

Emilia (2021) in a research article titled Benefits and Challenges of Online Teaching During the COVID-19 Pandemic at Rundu Campus of the University of Namibia. The study's conclusions show that adopting online teaching and learning has several advantages, including flexibility, the capacity to instruct extensive courses, increased student-teacher contact and engagement, and more possibilities for lecturers to learn. The study also discovered that poor student attendance, loneliness, internet access and availability, and a lack of information and technological skills were some major difficulties lecturers faced while implementing online teaching and learning.

Paul & Jefferson (2019), in a research article titled 'A Comparative Analysis of Students Performance in an Online vs Face-to-Face Environmental Science Course From 2009 to 2016 ', focused on traditional classroom modalities as restrictive, inflexible, and impractical. For this study, 548 students were selected from environmental science classes. The study results show no significant difference in performance between online and traditional classroom students concerning modality, gender, or class rank in science ecological courses.

Rensburg (2018), in a paper entitled Effective Online Teaching and Learning Practices for Undergraduate Health Sciences Students: through the Use of Cutting-edge Online Teaching Techniques, an integrative review explored ways to increase student enrollment and alleviate the shortage of teachers in the health sciences. The study's key conclusions, which have a favorable impact on online teaching and learning strategies, can be applied to increase students' enjoyment and savingsproblems and obstacles in online teaching and learning point to the necessity of enhancing institutional infrastructure and resources.

Rowe et.al. (2017) studied a titled 'Efficacy of Online Laboratory Science Courses 'discussed on students gain knowledge and experience in science courses related to the subjects through virtual mode and lecture method survey of twenty items with a combination of yes/no and Likert Scale responses was done. The study concluded that virtual lab experiences were just as good as those in regular labs. The study also showed that they were able to save important time.

Satya Prakash & Sudhanshu (2014) conducted a study onthe effectiveness of multimedia teaching on achievement in biology. Using random and cluster sampling procedures, 77 samples were selected from two portions of the ninth standard for this study. The main conclusions of this study show that multimedia instruction greatly improves biology knowledge, comprehension, and achievement. Students who use multimedia profit as much as possible.

Nimavathi & Gnanadevan (2007) carried out 'The Impact of Multimedia for Developing a Favourable Attitude Towards Science. The study aims to determine how multimedia affects secondary school pupils' formation of a scientific mindset. Pre-test and post-test equivalent groups were created for this investigation. This study aims to determine whether the multimedia curriculum can foster positive attitudes toward science pupils in the nine standards.

RESEARCH GAP

After reviewing the many research studies, it is clear that several works have been done on the impact of multimedia development on attitudes toward science, students' achievement, and academic satisfaction. Few studies have been conducted on the benefits and challenges of online teaching and its effect on the science stream.

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There may be no studies on Online Teaching on students's Learning Experiences in Laboratory Subjects. Which appears to be a specific gap in context and, therefore, knowledge. So, the researcher conducted a study of online teaching on students' learning experience in laboratory-based subjects at the higher secondary level.

DELIMITATION OF THE STUDY

The proposed research is conducted in only four higher secondary schools from Dhuliyan city of Murshidabad district.

RESEARCH QUESTIONS

i. What is the learning experience in laboratory-based subjects through online teaching?
ii. What is the impact of online teaching on students' learning experience in laboratory-based subjects?
iii. What are the challenges faced during online teaching in the laboratory-based subject?

OBJECTIVES OF THE STUDY

i To find out the learning experience of students in the laboratory-based subject through online teaching.
ii. To explore the impact of online teaching on students' learning experience in laboratory-based subjects.
iii. To understand the challenges faced during online teaching in laboratory-based subjects.

METHODOLOGY

Considering the demand and nature of the present study, the study was conducted using the descriptive survey method. The population for the present study was students from higher secondary institutions in the Murshidabad district. Students from the Murshidabad district were purposively selected for the research, and from 8citiesy in the Murshidabad district, one city, Dhuliyan, was chosen randomly. This selected city of which four schools were randomly selected for the study. These four schools' data were collected from the students in the school. So, the total sample size of the student was 11+33+25+21=90.In this study, 14 questions were prepared for data collection. The researcher used the percentage technique for data analysis.

DATA ANALYSIS AND INTERPRETATION

Objectives:1: To Find out about learning experiences in laboratory-based subjects through online teaching
Table no:1.1-Teaching Method of Online Teaching
Table no:1.2.Conceptual Clarity of Students Through Online Teaching

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Table no:1.1-Teaching Method of Online Teaching

Response Type	Total Student	No of Respondents	Percentage(%)
Demonstration	90	7	7.78%
Lecture	90	34	37.78%
Demonstration and Lecture	90	49	54.44%
Experiment	90	11	12.22%
Other	90	17	1.11%

From the information and data collected by the researcher through the questionnaire, it is evident from Table no 1.1 that among the 90 respondents, 37.78% of students opined that while teaching lab-based subjects online, the teacher only used the lecture method. 54.44% of students responded that teachers only used demonstration and lecturer methods.

Table no:1.2.Conceptual Clarity of Students Through Online Teaching

Response Type	Total Students	No of Respondents	Percentage(%)
Excellent	90	16	**17.77%**
Average	90	68	75.55%
Very bad	90	6	6.66%

It is shown that among the 90 respondents, only 17.77% of students answered that their concept has cleared very well, and 75.55% of students opined that their idea has an average clear for teachers teaching lab-based subjects through online mode.

Table no:1.3.Self Experiments on Laboratory-Based Subjects during Online Classes

Response Type	Total Students	No of Respondents	Percentage(%)
No Never	90	19	21.11%
Always	90	13	14.44%
Sometimes	90	60	66.66%

It is evident from Table no 1.3 that Among 90 student respondents, 21.11% of students experimented by themselves with laboratory-based subjects. 14.44% of students have always experimented by themselves, and 66.66% of students sometimes experimented by self

Objectives: To explore the impact of online teaching on students' learning experience in laboratory-based subjects.

Table NO:2.1. Confidence Level of Learners in Different Entrance Exams After Complication Of Online Course

Response Type	Total Students	No of Respondents	Percentage (%)
Very Good	90	3	3.33%
Good	90	44	48.88%
Average	90	43	47.77%

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Among the 90 students, 3.33% have a high confidence level to perform different entrance exams. 48.88% of students answered that their confidence level is moderate to perform different entrance exams. 47.77% of students answered that their confidence level is average to perform different entrance exams.

Table no:2.2.Opinion of Learners Regarding Hands-on Self Experiments During Online Classes

Response Type	Total Student	No of Respondents	Percentage
I can do	90	17	18.88
I can not do	90	10	11.11
I will try	90	63	70

During online teaching, 18.88% of students said that after gaining knowledge about lab-based subjects, they could experiment hands-on, and 70 % said they would try experimenting with hands-on activity.

Objective 3: To understand the challenges faced during online teaching in laboratory-based subjects.

Table No:3.1. Learners' Confidence Level about their taught Subject to continuing Higher Education

Response Type	Total Students	No of Respondents	Percentage (%)
Very Good Confidence	90	9	10%
Unconference	90	4	4.44%
Average Confidence	90	77	85.55%

It revealed that 10% of students' confidence level is high when they can also continue with a specific subject at a higher-level education level. 4.44% of students' confidence level is deficient when they can continue their studies at a higher education level, and 85.55% is moderate when they can continue with the specific subject in higher education.

Table No:3.2.Problems Faced During Online Teaching

Response Type	Total Students	No of Respondents	Percentage (%)
Theoretical part	90	6	6.66%
Practical Part	90	53	58.88%
Both the Practical & theoretical part	90	31	34.44%
other	90	0	0%

It's revealed that during the online class, 58.88% of students faced problems in the practical part. 6.66% of students faced problems with the theoretical part., and 34.44% faced both practical and theoretical during online teaching in laboratory-based subjects. Most students faced difficulties in the practical part of online teaching.

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FINDINGS AND DISCUSSION

After a detailed data analysis, the researcher found that most teachers only employed the lecturing and demonstration approaches. There may be no facility for modern technology and teaching strategies. Higher secondary students theoretically understood the experiments because there was no facility or lab equipment. Teachers cannot teach students all topics of the higher secondary curriculum during online teaching. But Some students try to experiment by themselves in their homes (which is possible). Most students said that it helps a little quantity to understand the concepts of science courses. Teachers may need to conduct online laboratories for experiments in science courses properly. They have gained knowledge about laboratory-based subjects with help from both school classes and private tuition. Most schools do not conduct online classes, so these students take private tuition.

After a detailed analysis of data, the researcher found that students' learning experience only helps to solve their practical problems through online teaching in lab-based subjects. Because it is not possible through online teaching due to lack of laboratory infrastructure. Very few students show their confidence level is very high to perform different entrance exams. Maybe these students are gaining proper knowledge regarding lab-based subjects through self-study.52% of students felt doubt about of their knowledge when it is practical application in a real-life situation. Maybe these students are not getting opportunities during online education. A maximum of 85.55% of students said that their confidence level is moderate while they pursue higher education.

After a detailed analysis of data, the researcher found that most of teachers fail to show experiments hand in hand during teaching in lab-based subjects. These teachers have low awareness about advanced technology and online laboratory. Researcher revealed that all the experiments of laboratory-based subject were not possible through online mode. There are still many schools where proper laboratory equipment and infrastructure are not available. The students mostly faced problems in the practical part of their subject during online teaching. Practical part would be better in face-to-face interactions.

EDUCATIONAL IMPLICATION OF THE STUDY

- The study will assist administrators in determining the main obstacles that teachers face when Teaching online, and they may also take action to address these obstacles.
- Appropriate training of teachers can be arranged so that they can take laboratory classes online.
- This study emphasizes how to create an online laboratory class.
- This study will help overcome students remaining learning gaps and weaknesses.
  This study will be helpful to teachers, administrators, and policymakers to know how to use Online teaching in laboratory-based subjects.

CONCLUSION

After completing this study researcher can conclude that most government schools are not conducted online classes so these students gained learning experiences by helping with private tuition. By gaining knowledge during online classes Students' confidence level is moderate to perform the different exams. They have faced problems in the practical part during an online class. All experiment is not possible to show practically during online teaching due to lack of infrastructure, low teaching quality, tuition dependency, and high cost etc. There are different types of gaps and lacks present in laboratory-based subjects at the higher secondary level. In this study, different types of gaps and lacks have been identified. These problematic factors are creating obstacles in interest making process in students' minds.

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