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Original Article

Impact of COVID- 19 Pandemic on Undergraduate Life Science Teaching-Learning: A Gender- Based Qualitative Student Survey

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Abstract

A qualitative survey was carried out on undergraduate students of Life Sciences (*viz*. Botany, Zoology, Biochemistry, Microbiology, Environmental Science) of different colleges of Kolkata metropolis to study the impact of COVID-19 on the teaching-learning of Life Science. The gender-based survey revealed that lady students are more sensitive to environmental challenges and crises than men. They adapted to online teaching-learning of Life Science, comprehended and understood the theoretical matter better than their male counterparts and did their best to connect with the surrounding natural environment. The results of this study might provide useful guidelines and information for framing future teaching-learning strategies in Life science.

Keywords:- *Gender, Life Science teaching, Pandemic, Sustainability education.*

Introduction

COVID-19 posed several challenges to the academia and teaching-learning was no exception. Subjects which require practical exposure, hands-on training, field study etc. were the most affected. Online classes could not entirely fulfil the needs of the students and they lost out immensely in the process. Teachers tried to fill the vacuum with online practical demonstration classes, virtual field tours, informative and activity-based teaching-learning materials and others. Through webinars and online presentations, teachers tried their best to enhance the teacher-student interaction and communication. Many academicians felt that there were certain advantages of the online mode and that post-pandemic a blended mode would perhaps be the best form of teaching-learning that could be executed.

Objectives

Post COVID, it was found necessary to conduct a qualitative gender-based survey on the overall paradigm shifts in the life style and teaching learning process caused by the pandemic on the Life Science UG students. The present study intends to study the following –

i. To assess whether the UG students of Life Sciences faced technological problem in the form of inadequate smart phone and data, lack of internet connection, poor network or connectivity during online mode of education.
ii. To assess if the principles/theories/facts/problems were explained well by teachers on online mode.

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iii. To survey whether students were satisfied with Life Science online demonstration-based teaching learning without laboratory based experiential or hands-on learning exposure.
iv. To assess whether students were confident of the subject matter without field study and site visits.
v. To assess whether students were satisfied with observation based learning without the practical use of instruments, equipment and apparatus.
vi. To find out whether the student-teacher interaction and communication on the online mode was satisfactory.
vii. To assess whether students are satisfied with online multimedia teaching –learning materials.
viii. To survey whether the students spent time with locally available flora and fauna during lockdown to enhance their knowledge.
ix. To assess whether students are satisfied with online correction of practical note books and projects.
x. To assess whether the students got engaged in life science related activities like gardening, care of indoor environment etc. during the 'lockdown'.
xi. To assess the opinion of the UG Life Science students regarding the blended learning process in the post pandemic phase.
xii. To survey whether the UG students of Life Sciences felt uncertain and demotivated about their future during prolonged 'lockdown'.

The study could give us an insight whether gender and choice of Life Sciences as the principle discipline of selected participants determined their awareness, perspective and concern about the teaching learning process of this particular subject.

Material and Method

Variables:

Dependent Variable:

- Teaching Learning Processes of Life Science

Independent Variable:

- Gender (male and female UG students)

Delimitations:

The data was limited to 258UG students [both male and female] from different urban colleges of Kolkata, West Bengal.

Tools:

An information schedule cum questionnaire was formulated and standardized by the researchers for collecting data.

Methodology:

The study was designed on a survey based descriptive research methodology. The questionnaire was administered on the selected sample to collect data and the data qualitatively analyzed (by percentage analysis) to describe further.

Sample:

The sample comprised of 258 UG students out of which 136 were UG female students and 122 were UG male students, from different urban colleges of Kolkata between 18 - 22 years of age (Figure 1).

Incidental sampling technique was adopted here in this study.

Results and Discussion:

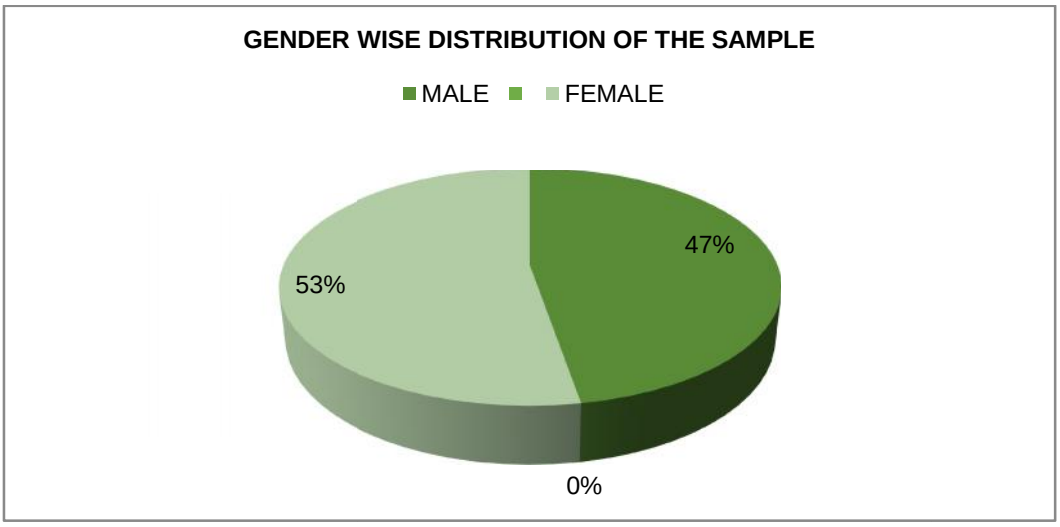

Fig. 1 : Gender wise Distribution of Sample

Figures Based On Gender [Item-wise Percentage Analysis of the Sample]

1. Whether the UG students of Life Sciences faced technological problem in the form of inadequate smart phone and data, lack of internet connection, poor network or connectivity during online mode of education.

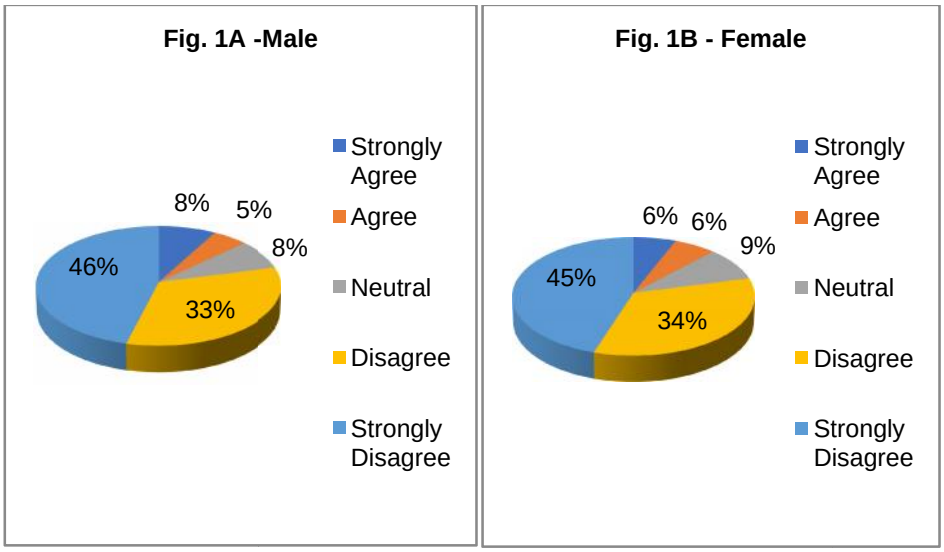

Fig. 1A. Male Students' opinion on technological problem during online teaching-learning
Fig. 1B.Female Students' opinion on technological problem during online teaching-learning

Since the data were collected from life science students of colleges located in Kolkata metropolis, it may be expected that the students did not belong to weaker economic sections and could afford to pursue UG courses in Life Science which include laboratory fees, excursion or field trip charges, purchase of several practical laboratory files, slides, dissection boxes and others. Students, both males (Fig. 1A) and females (Fig. 1B) hailing from such socio-economic backgrounds will naturally not be affected by lack of smart phones or poor internet connectivity.

2. If the principles/theories/facts/problems were explained well by teachers on online mode.

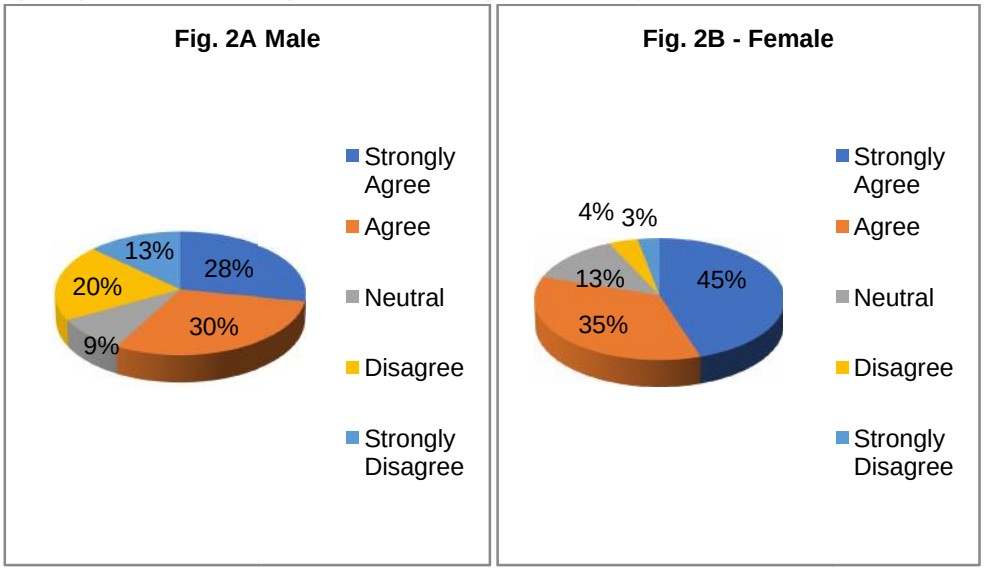

Fig. 2A. Male Students' opinion on teachers' theoretical explanations during online teaching-learning

Fig. 2B.Female Students' opinion on teachers' theoretical explanations during online teaching-learning

In this aspect, the female students (Fig. 2B) proved to be more attentive than their male counterparts (Fig.2A). The female students strongly agreed to a large percentage that the teachers well explained the theoretical parts online whereas the males showed a relatively lower percentage.

3. Whether students were satisfied with Life Science online demonstration-based teaching learning without laboratory based experiential or hands-on learning exposure.

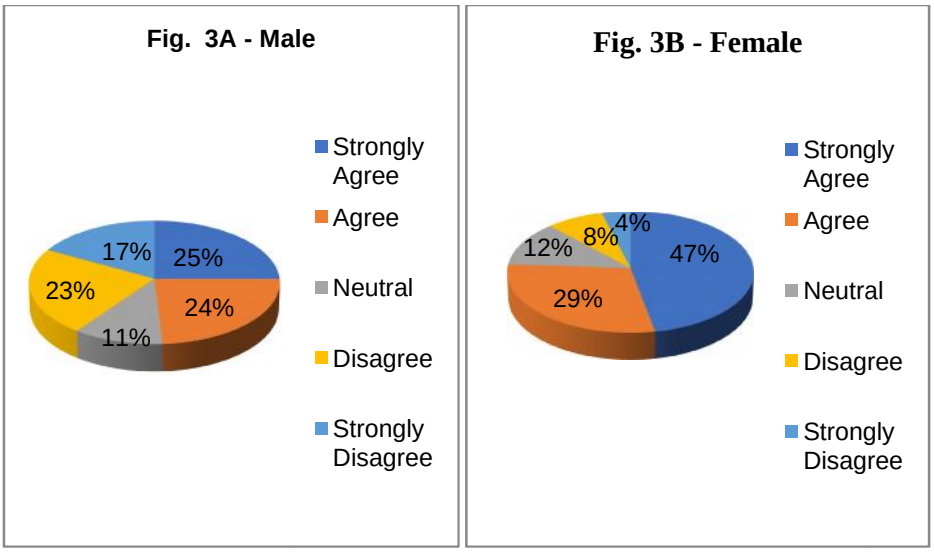

Fig. 3A. Male Students' opinion on demonstration based online teaching-learning

Fig. 3B.Female Students' opinion on demonstration based online teaching-learning

In this aspect too, the female students were largely satisfied with online demonstration-based teaching of Life Science (Fig.3B) than the male students (Fig.3A). Women being more sensitive to environmental causes and effects (Sen, 2020a, 2022) could easily be convinced that there was no

other option other than online demonstration. Lady students being more serious about their academics and careers would put in their own efforts to learn by visiting other university websites and the like.

4. Whether students were confident of the subject matter without field study and site visits

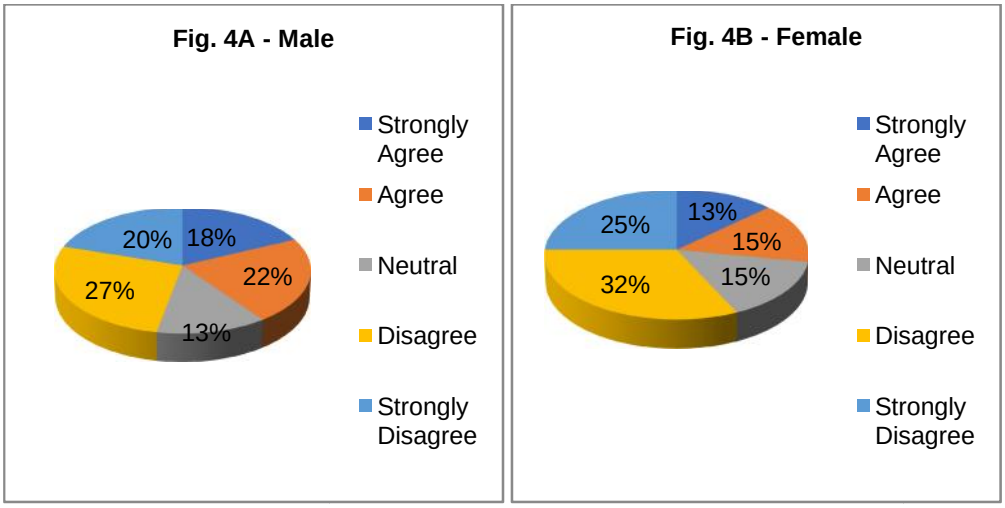

Fig. 4A. Male Students' opinion on online teaching-learning without experiential exposure
Fig. 4B.Female Students' opinion on online teaching-learning without experiential exposure

Life Science is a discipline which requires extensive experiential learning with field work and field study with sufficient exposure to flora and fauna (Sen, 2013). Hence both genders felt the strong need for field studies and site visits (Figs. 4A and 4B). Online mode has this extreme shortcoming of not being able to provide hands-on training experiences and exposure so necessary for skill development in this particular subject.

5. Whether students were satisfied with observation based learning without the practical use of instruments, equipment and apparatus.

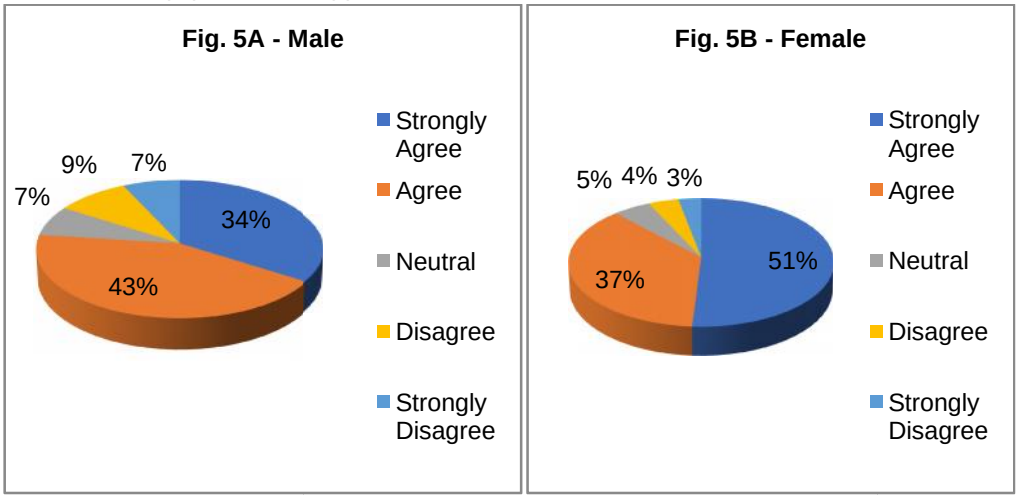

Fig. 5A. Male Students' opinion on observation-based online teaching-learning
Fig. 5B.Female Students' opinion on observation-based online teaching-learning

Students of both genders (Figs. 5A and 5B) realized that observation based learning was only option at that time. Practical classes were impossible to be conducted and hence they made the most of the available option.

6. Whether the student-teacher interaction and communication on the online mode was satisfactory.

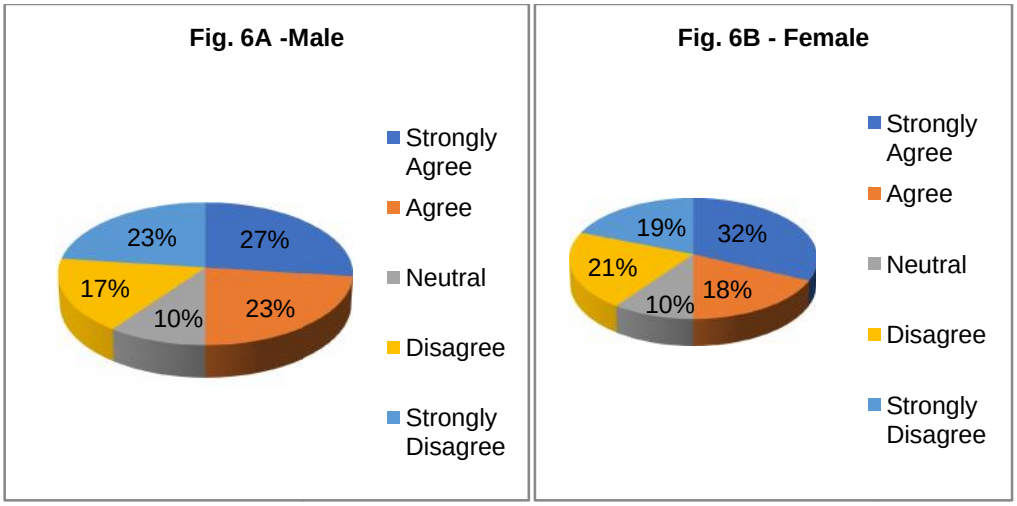

Fig. 6A. Male Students' opinion on student-teacher interaction during online teaching-learning

Fig. 6B.Female Students' opinion on student-teacher interaction during online teaching-learning

Mixed responses were obtained from both genders (Figs. 6A and 6B) in this case. Some students felt teachers were more accessible and were doing their best to support online education. They could be contacted via emails/messenger/whatsapp and various other apps. Some preferred the traditional classroom model of teaching-learning and could not make the best of the online mode.

7. Whether students are satisfied with online multimedia teaching –learning materials (TLM).

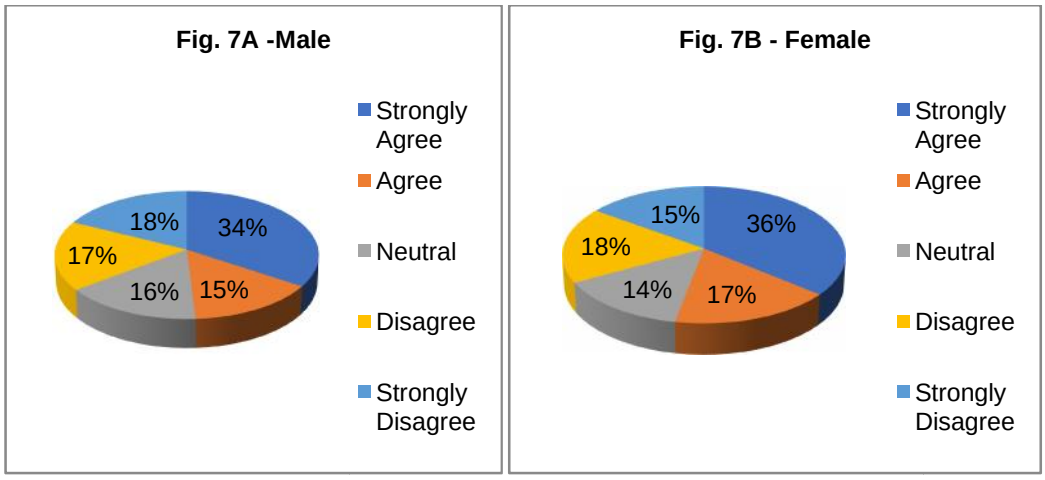

Fig. 7A. Male Students' opinion on multimedia teaching –learning materials during online teaching-learning

Fig. 7B.Female Students' opinion on multimedia teaching –learning materials during online teaching-learning

Most students of both genders (Figs 7A and 7B) strongly agreed that teachers in the absence of regular classroom environment provided students with self-explanatory, comprehensive and

interesting online multimedia study materials. Students could well utilize them for concept and skill development.

8. Whether the students spent time with locally available flora and fauna during lockdown to enhance their knowledge.

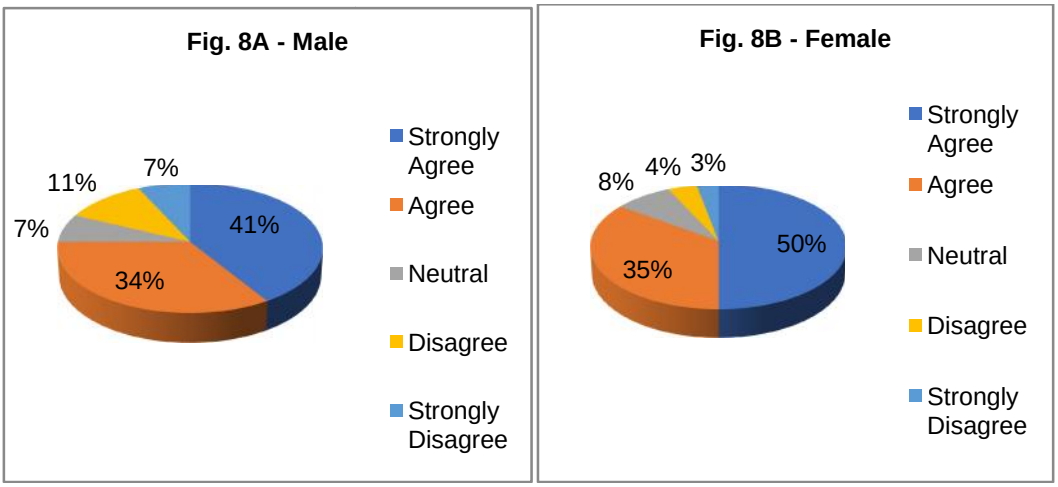

Fig. 8A. Male Students' opinion on time spent with local flora-fauna
Fig. 8B.Female Students' opinion on time spent with local flora-fauna

Since most students live in and around the urban metropolis, their exposure to local flora and fauna was so far limited. However with the imposed lockdown, students learnt the value of locally available bio-resources whether it be flora or fauna (Sen 2020b). They took more interest in local parks and gardens (Sen, 2014; 2018) where they could easily visit without having to really travel considerable distances. In this way they tried to equip themselves for the Practical classes they missed. Lady students (Fig.8B) once more showed greater commitment over their male counterparts (Fig. 8A).

9. Whether students are satisfied with online correction of practical note books and projects.

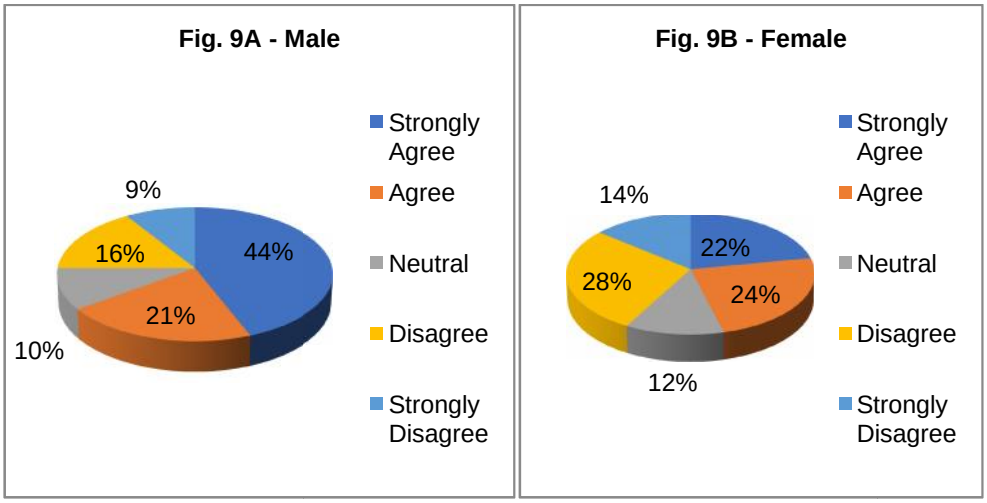

Fig. 9A. Male Students' opinion on online correction of practical assignments
Fig. 9B.Female Students' opinion on online correction of practical assignments

In this case the male students enjoyed their 'freedom' of not having to prepare regular lab note books or projects and they could easily get online help or support from different websites (Fig. 9A). Female students being more regular and disciplined did not quite accept the online correction of practical work (Fig. 9B) and felt they contributed little to actual skill development.

10. Whether the students got engaged in life science related activities like gardening, care of indoor environment etc. during the 'lockdown'

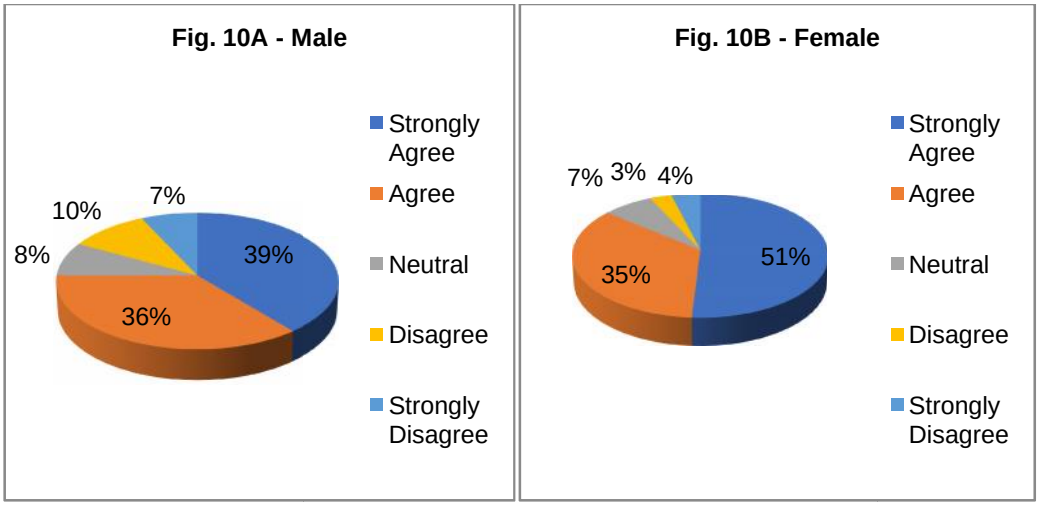

Fig. 10A. Male Students' opinion on engaging with life science related activities during lockdown

Fig. 10B.Female Students' opinion on engaging with life science related activities during lockdown

In an earlier survey by Biswas and Sen (2020a) reported the people under isolation and lockdown preferred to be in association with nature with greens, which provided a positive therapeutic effect on the mind (Sen, 2019). Hence gardening, maintaining roof gardens, terrace gardens, care of indoor plants seemed the most obvious choice providing physical exercise as well as mental calm (Sen, 2020b).

For students of Life Science it would be the most natural choice as it would give them that real life exposure to flora and fauna that were missing due to lockdown and subsequent closure of educational institutions. The lady students (Fig. 10B) showed more interest and affinity to such hobbies than males (Fig. 10A).

11. Assessing the opinion of the UG Life Science students regarding the blended learning process in the post pandemic phase.

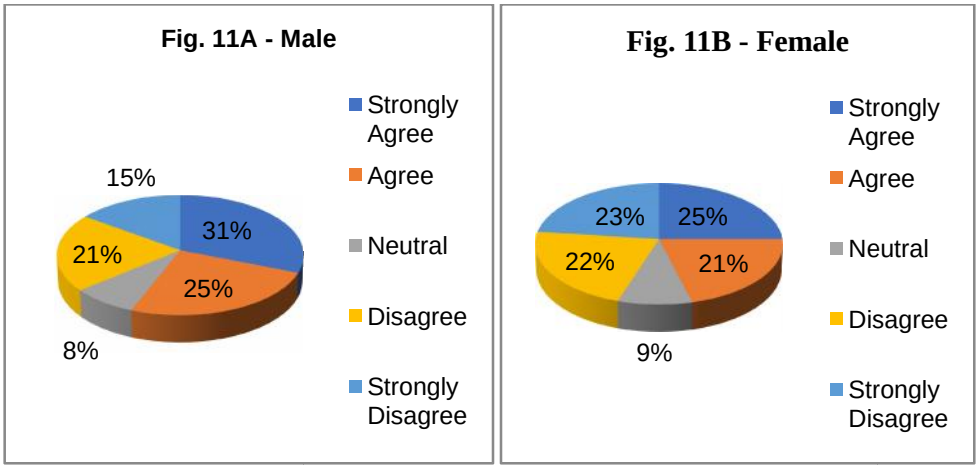

Fig. 11A. Male Students' opinion on blended learning post pandemic

Fig. 11B.Female Students' opinion on blended learning post pandemic

In an earlier work carried out by Ray *et al.* (2022) it was suggested that the blended mode of learning would be the future teaching-learning process even in UG and PG courses. Both males and females agreed to this proposition and as expected percentage of males was higher (Fig. 11A) than females (Fig. 11B), as the blended mode would give them more freedom to pursue other jobs, training *etc*.

12. Whether the UG students of Life Sciences felt uncertain and demotivated about their future during prolonged 'lockdown'.

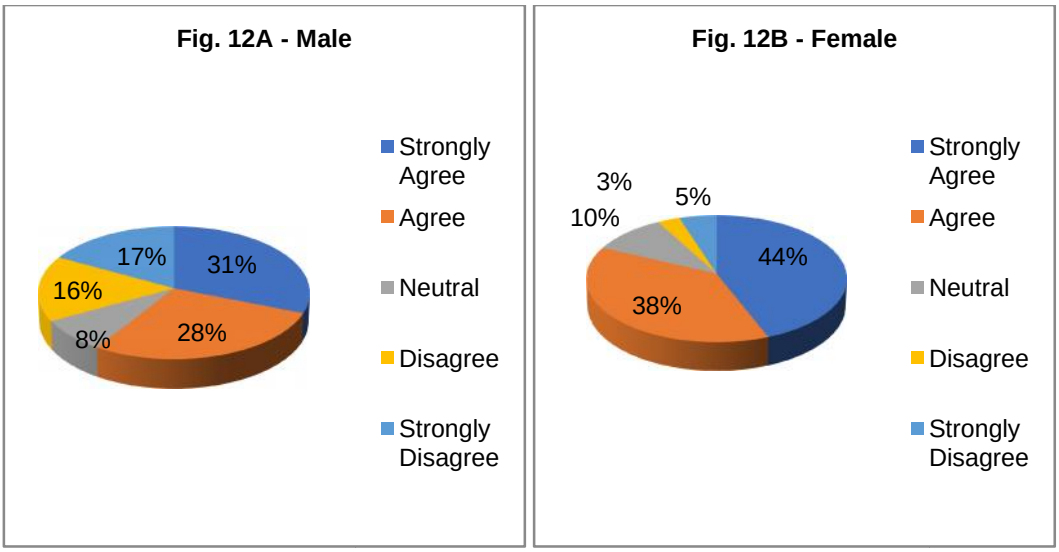

Fig. 12A. Male Students' opinion about future uncertainty during lockdown
Fig. 12B.Female Students' opinion about future uncertainty during lockdown

In an earlier survey by Biswas and Sen (2020a) the pandemic and prolonged lockdown led to a sense of anxiety, depression and uncertainty among learners. Women being more sensitive to such drastic changes in life style showed a higher percentage of demotivation (Fig.12B) than men (Fig. 12A).

Conclusion

From the above survey, we can conclude that women are more sensitive to environmental challenges and crises than men and the undergraduate students are no exception. The female students adapted to online teaching-learning of Life Science, comprehended and understood the theoretical matter better than their male counterparts. Their commitment to their subject is also evidenced by the reports that they adjusted better to online demonstration/observation based teaching without field study or practical exposure during the pandemic. The female students are more aware of their immediate natural environment –flora and fauna and tried to combat the sense of uncertainty and hopelessness by associating with greenery like gardening, care of indoor plants *etc.* in a higher percentage as compared to males. Similar results were obtained in previous surveys with different populations (Biswas and Sen, 2020b; Pal and Sen, 2017). Where blended learning is concerned the male students preferred this mode more for the post pandemic phase as that would give them for opportunity for employment or other options.

The results obtained from this study on the students may provide valuable guidelines for teaching-learning in Life Science for the future.

Conflict of Interest

The authors have no conflicts of interest to declare with regard to the content of this article.

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