



## PERCEIVED IMPACT OF ONLINE LEARNING ON THE MENTAL HEALTH OF TERTIARY-LEVEL STUDENTS IN WEST BENGAL

Sekh Nur Hossain <sup>1</sup>  & Dr. Subhankar Ghosh <sup>2</sup> 

### RESEARCH ARTICLE



#### Author Details:

<sup>1</sup> Research Scholar, Department of Education, The University of Burdwan, Golapbag, Purba Bardhaman, West Bengal, India;

<sup>2</sup> Assistant Professor, Department of Education, The University of Burdwan, Golapbag, Purba Bardhaman, West Bengal, India.

#### Corresponding Author:

Dr. Subhankar Ghosh

#### DOI:

<https://doi.org/10.70096/tssr.260403050>

#### Abstract

The transition to online learning in higher education, especially after the COVID-19 pandemic, has transformed the way students learn globally. Although digital platforms offer increased accessibility and flexibility, they also pose challenges for students' mental health and their engagement with academic activities. The study concentrates on exploring the Perceived impact of Online Learning on the Mental Health of Tertiary-Level Students in West Bengal. A self-structured closed-ended questionnaire with 5-point Likert scale was administered for data collection from a sample of 284 tertiary-level students of West Bengal. Percentage, Mean, SD, t-test and ANOVA, were used to analyze the data. The study findings showed that online learning effects on students mental health and students have moderate impact, but study also uncovered that locality of students rural (M=63.24) and urban (65.63), Academic stream: Arts (M=64.75), Science (62.14) & Commerce (M=64.50) caste category: General (M=65.03), OBC (M=63.01), SC (M=64.74) and ST (M=61.89), Family type: Joint (M=62.78) and Nuclear (M=65.34) and Guardian's annual income [Rs. Below-50,000 (M = 63.83), Rs. 50,001-100,000 (M = 65.56), Rs. 100,001-250,000 (M = 59.57) Rs. 250,001-500,000 (M = 67.09), 500,001-Above (M = 58.11)] does not have any significance difference but male (M=61.89) and female (M=66.03) and PG students (M=65.76) and UG students (M=61.77) have any significance difference with relatively small to medium effect ( $d = -0.29$ ) and ( $d = -0.28$ ) respectively. The study also revealed the perceived challenges/difficulties during online learning.

**Keywords:** Online Learning, Mental Health, Tertiary-Level Students, Higher Education

#### Introduction

Within the teaching-learning process, students constitute the central focus of educational activities, and the achievement of desirable learning outcomes is largely contingent upon the effectiveness of students' learning processes (Biggs & Tang, 2011). In this context, students' mental health emerges as a critical determinant of effective learning (Rautela et al., 2024). Mental health, encompassing emotional, psychological, and social well-being, significantly influences students' capacity to actively engage in educational practices, adapt to learning environments, and achieve academic success (Geertshuis, 2019; Bolatov, et al., 2020; Song & Hu, 2024; WHO, 2025). Mental health in education directly impacts students' academic success, emotional resilience, and overall lifelong development (Song & Hu, 2024; WHO, 2025). During the COVID-19 pandemic, conventional learning strategies shifted abruptly to online learning in higher education institutions worldwide, leading to the emergence of innovative digital teaching methods that enabled students to continue their education through online or e-learning platforms (Dhawan, 2020; Mpungose, 2020; Baftiu & Pireva Nuci, 2021; Asgari et al., 2021; Abbasi et al., 2020). Online Learning refers to the use e-technology and e-media to support and enhance both teaching and learning, and it entails contact between students and teachers through the use of online content (Howlett, D. 2009). Transformation of this conventional mode of education (*greatly known as traditional mode or face to face education*) into online education on higher education institutions effects on students' academic performance and mental health have yet to be determined (Kahl & Cropley, 1986; Lazarevic & Bentz, 2020). Online learning has significant impact on communication and interpersonal relationships of the students'. Students' academic performance during online learning is affected by the most frequent depression and anxiety symptoms, as well as dissatisfaction with academic achievement. Mental health issues are a common obstruction to academic achievement. The motivation, concentration and social interactions of students can affect mental illness – which are the crucial factors for productive in higher education (Unger, 2007).

Therefore, the aim of this study was to conduct a survey-based study on Impact of Online Learning on the Mental Health of Tertiary-Level Students in West Bengal.

### Need and Significance

Education is a never ending process; rather it is an unstoppable and continuous. In the covid-19 pandemic era rapidly transformed teaching-learning process in education system, shifted to new paradigm as result of technological innovation (Mishra, et al., 2020). The pandemic has had a significant impact on the practices of higher education students in terms of academic work and life (Muthuprasad, et al., 2021) (e.g., the switch to online education, shutdown libraries, changed channels of communication for teachers and administrative support, new assessment methods, various workloads and performance levels. etc. (Aristovnik, et al., 2020). Universities, colleges and institutions moved quickly to shift various courses and programmes from face-to-face to online instruction or teaching-learning (Sahu, P. 2020). Most of time, students are interacting with online learning platform therefore few psychological & mental health issues intervening on their learning which are greatly affected their academic performance (Keckojevic, et al., 2020; Bijulakshmi, et al. 2020). Engaging the online learning platform, students are faced different challenges of online learning (isolated their peer groups, teachers and so on.) which result as mental health problems such as anxiety, depression and stress (Vahedian-Azimi, et al., 2020; Zhai & Du, 2020). So, for the understanding of students' mental health condition when they are appearing online learning platform and perceptions towards online learning, that researcher has to select this present study.

### Objectives

1. To determine students' perception levels regarding the impact of online learning on their mental health.
2. To assess students' perceptions regarding the effects of online learning on their mental health
3. To investigate whether perceptions of online learning impact on mental health differ with respect to their demographic variables such as: gender (Male & Female), Course (U.G. & P.G.) of the study, Academic Stream (Arts, Science & Commerce), Locality (Urban & Rural), Caste Category (General, OBC, SC & ST), Family Type (Joint & Nuclear) and Guardian's annual income.
4. To explore the challenges faced by the tertiary-level students during online learning.

### Methodology

This study was adopted quantitative as well as descriptive in nature and used the primary data for the analysis. Responses of a sample of 284 students selected from Colleges & Universities of West Bengal through random sampling technique which were recorded by imparting structured questionnaire filled up in Google-Form from focus groups. 24 items have been taken to be rated at Likert's Five Scale. In this study, mean; standard deviation; cut-off point, t-test; and F-test have been used to analysis the collected data.

### Method

The self-made questionnaire was distributed randomly through Google form for collecting the primary data. Social networking sites have been an important source of attempting to reach out to students who are the admitted in various universities and colleges of West Bengal. There are 284 valid responds that qualify for data analysis. The statistical software SPSS and M.S. Excel are used to analyse the data that has been collected through questionnaire. The demographic profiles of the students are presented below.

#### 1. Profile of the Sample Respondents

Table 1. Demographic and Personal Information of Sample Respondents (N = 284)

Variables	Frequency (f)	Percentage	
Gender	Male	122	43%
	Female	162	57%
Locality	Rural	164	57.7%
	Urban	120	42.3%
Course	UG	107	37.7%
	PG	177	62.3%
Academic Stream	Arts	179	63%
	Science	49	17.3%
	Commerce	56	19.7%
Caste Category	General	144	50.7%
	OBC	82	28.9%
	SC	49	17.3%
Family Type	ST	9	3.2%
	Joint	120	42.3%
	Nuclear	164	57.7%
Guardian's annual income	Rs. Below - 50000	116	40.8%
	Rs. 50001 - 100000	113	39.8%
	Rs. 100001 - 250000	23	8.1%

	Rs. 250001 - 500000	23	8.1%
	Rs. 500001 - Above	9	3.2%

In this research study, Table-1, shows demographic and personal information of the higher education students of West Bengal state who are considered as respondents, which are categorized on the basis of their *gender, locality, course, academic stream, caste category, family type and Guardian's annual income*. It was found from the aforesaid table-1, that maximum of the sample respondents of females were 57% ( $f=162, N=284$ ), whereas 43% ( $f=122, N=284$ ), were males. In relation to course of the study, 62.3% ( $f=177, N=284$ ) of the respondents belong to the existing P.G. course students and 37.7% ( $f=107, N=284$ ) were the course of existing U.G. students. For academic stream, 63% ( $f=179, N=284$ ) of the respondents came under the Arts group students, 19.7% ( $f=56, N=284$ ) were commerce group students and science group students were 17.3% ( $f=49, N=284$ ). On the basis of locality, 57.7% ( $f=164, N=284$ ) were rural students, whereas 42.3% ( $f=120, N=284$ ) were urban students. Another side of caste category, where maximum respondents come from general background 50.7% ( $f=144, N=284$ ), and then 28.9% ( $f=82, N=284$ ) were belong to OBC, 17.3% ( $f=49, N=284$ ) were belong to SC and 3.2% ( $f=9, N=284$ ) belong to ST category. In family type of the students, whereas nuclear family students 57.7% ( $f=164, N=284$ ) higher than Joint family students 42.3% ( $f=120, N=284$ ). In the Guardian's annual income variable category, most of students family income fall under 'Rs. Below - 50000' (40.8%,  $f=116, N=284$ ) and 'Rs. 50001 - 100000' (39.8%,  $f=113, N=284$ ) whereas, only few students 3.2% ( $f=9, N=284$ ) fall under 'Rs. 500001 - Above' annual income and 8.1% ( $f=23, N=284$ ) students fall under 'Rs. 100001 - 250000' & 'Rs. 250001 - 500000' annual income category of total sample. Therefore, fairly several groups of students have been included in the study to get their viewpoints.

**2. Use of Technological Device and Internet Connection**

This portion presents some technological device and internet which related to the information of the Colleges & universities students which they are used to continue online classes. Fig. -1 & 2, depicts the outputs of the questions which related to sample respondents that which device & internet connectivity are preferred for attaining their online classes.

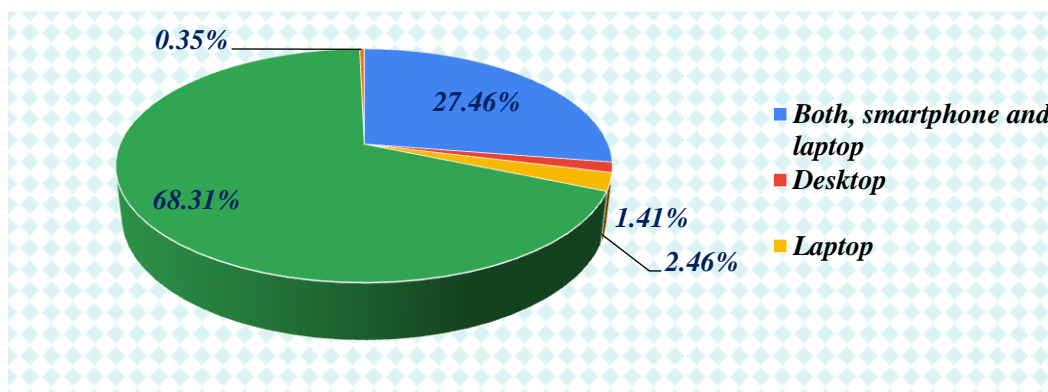


Figure: 1. Preferred Technological Device for Online Learning

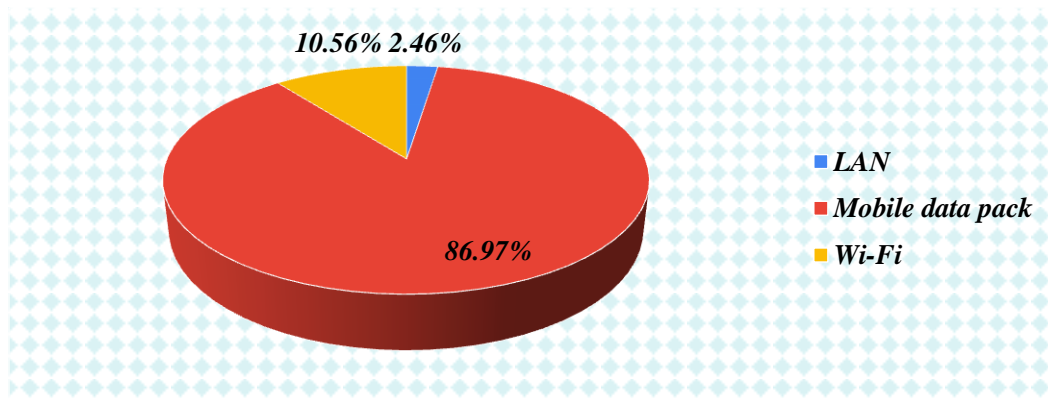


Figure: 2. Source of Internet Connection

Which technological devices students are used for attaining the online classes, Fig. 1, shows that large number of respondents 68.3% ( $f=194, N=284$ ) are use Smartphones, 27.46% ( $f=78, N=284$ ) respondents are use Both (*Smartphone & Laptop*), where 1.41% ( $f=4, N=284$ ) & 2.46% ( $f=7, N=284$ ) respondents are use Desktop & Laptop respectively and just 0.35% ( $f=1, N=284$ ) respondent use Tab. which types of internet connection students are used for attaining their online classes, Fig. 2, shows that

maximum of respondents 86.97% ( $f=247, N=284$ ) are use mobile data pack and 2.46% ( $f=7, N=284$ ) respondents are use LAN and 10.56% ( $f=30, N=284$ ) respondents are use Wi-Fi.

**Result and Discussion**

**RO1. To determine students' perception levels regarding the impact of online learning on their mental health.**

**Perception level of Students**

**Table: 2. Mean & SD score of Students perception**

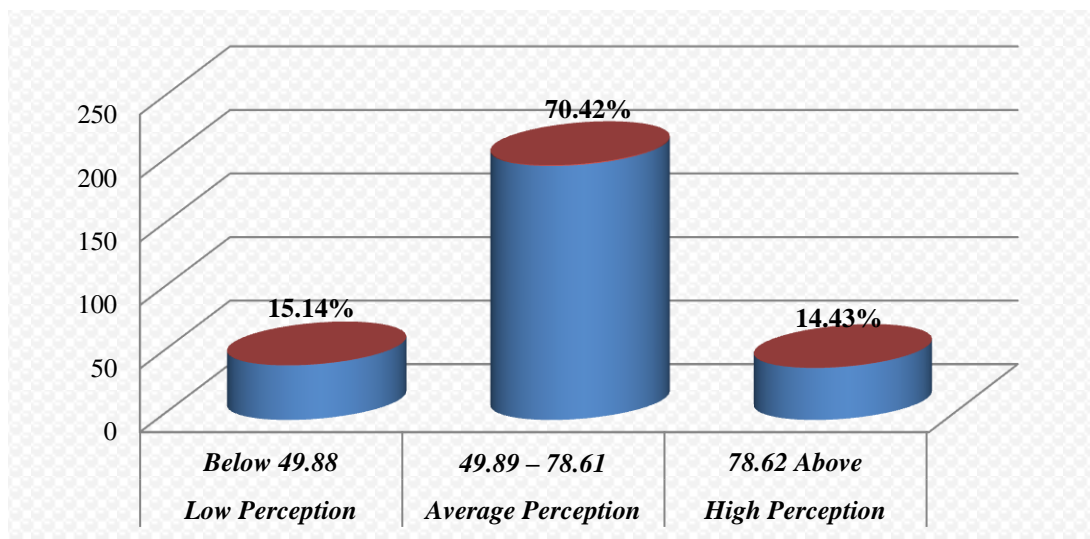
	N	M	SD
Students	284	64.25	14.37

\*Note: N=Number of Respondents, M=Mean, SD=Standard Deviation.

Cut off point was used for the perception level of higher education students in West Bengal. Researcher studied the RO1 with the help of cut-off point. Here cut-off point used as  $M + 1\sigma$  and  $M - 1\sigma$ . It means,  $N=284, Mean = 64.25$  &  $SD = 14.37$  score (cited in table 2). Therefore,  $M + 1\sigma$  is  $64.25 + 1 \times 14.37 = 78.62$  and  $M - 1\sigma$  is  $64.25 - 1 \times 14.37 = 49.88$ . Maximum number of students ( $f=197, N=284$ ) i.e., 70.42% of students were between 49.89 – 78.61 scores (cited in table 3). Hence, it can said that the perception of tertiary-level students of West Bengal is neither more high nor low impact on online learning i.e., average or moderate in impact.

**Table: 3. Perceived impact level of Students' online Learning on their mental health.**

Level	Score	Frequency	Percentage
Low Impact	Below 49.88	43	15.14%
Average Impact	49.89 – 78.61	200	70.42%
High Impact	78.62 Above	41	14.43%
<b>Total</b>		<b>100</b>	<b>100%</b>



**Figure: 3. Graphical representation of tertiary-level students' perception**

It is due to fact that large numbers of students have more attentive to continue their learning on online, but have issues such due internet (more economical of mobile data pack) & lack of internet connectivity (especially in rural areas because most of students are rural background), unable to used proper device with the mostly effect of low guardian annual income that their perceived impact level neither high nor low.

**RO2. To assess students' perceptions regarding the effects of online learning on their mental health**

**HO1: Online learning has no significant perceived impact on the mental health of tertiary-level students in West Bengal.**

A one-sample t-test was conducted to determine whether tertiary-level students perceived online learning as having an impact on their mental health. Statistical results indicated that the mean of mental health impact score ( $M=64.25, SD=14.37$ ) (cited table 4). Shapiro-Wilk statistics was not significant that indicated the assumption of normality was not violated.

Table: 4. Students' perceptions regarding the effects of online learning on their mental health

Variable	N	M	SD	test value	t	df	Sig.
Mental Health Impact	284	64.25	14.37	72	-9.08	283	.000

\*Note: N=Number of Respondents, M=Mean, SD=Standard Deviation, t=critical value, df=Degree of Freedom, Sig.= Significance

Result of this test was indicated that statistically significant at the 0.05 level of significance ( $t = -9.08, df = 283, p < .001$ ) from the (Test value = 72) (cited table 4). The (mean difference = -7.746), 95% CI (-9.43, -6.07). Therefore, the null hypothesis was rejected and result suggesting that students perceived online learning to have a significant impact on their mental health.

**RO3<sup>1</sup>: To investigate whether perceptions of online learning impact on mental health differ with respect to their gender.**

*HO<sub>2</sub>: There is no significant difference in perceptions of online learning on mental health with respect to their Gender.*

Result shows that mean and standard deviation score of male and female students  $M = 66.03, SD = 12.91$  &  $M = 61.89, SD = 15.86$  (cited table 5) respectively. On the basis of mean score female scored higher than male. A Cohen's *d* value of 0.29 lies between 0.20 and 0.50 (cited table 6).

Table: 5. Perceptions of online learning on mental health with respect to their Gender.

Variables	N	M	SD	M <sub>diff</sub>	SED	df	t	Sig.
Male	122	61.89	15.86	-4.13	1.71	282	-2.42	.016
Female	162	66.03	12.91					

\*Note: N=Number of Respondents, M=Mean, SD=Standard Deviation, M<sub>diff</sub> =Mean Difference, SED=Standard Error Difference, t=critical value, df=Degree of Freedom, Sig.= Significance

**Pooled Standard Deviation (SD<sub>pooled</sub>)**

$$SD_{Pooled} = \sqrt{\frac{(n_1-1)SD_1^2 + (n_2-1)SD_2^2}{n_1+n_2-2}} = \sqrt{\frac{(122-1) \times 15.86^2 + (162-1) \times 12.91^2}{122+162-2}}$$

$$= \sqrt{\frac{121 \times 251.5396 + 161 \times 166.6681}{282}} = \sqrt{\frac{30436.2916 + 26933.5641}{282}}$$

$$= \sqrt{\frac{57269.8557}{282}} = \sqrt{203.0846} = 14.25$$

**Cohen's d**

$$d = \frac{M_1 - M_2}{SD_{Pooled}} = \frac{61.89 - 66.03}{14.25} = \frac{-4.14}{14.25} \approx -0.29$$

Table: 6. Cohen's (d) standard

Small Effect	≈ 0.20
Medium Effect	≈ 0.50
Large Effect	≈ 0.80

An independent-samples t-test was conducted to evaluate whether there was a significant difference in scores between males and females. The results revealed statistically significant difference,  $t(282) = -2.42, p = .016$  (cited table 5), with a small effect size, Cohen's *d* = -0.29. Because the significance value ( $p = .016$ ) is less than the standard alpha level ( $\alpha$ ) of .05. Specifically, females scored significantly higher ( $M = 66.03, SD = 12.91$ ) than males ( $M = 61.89, SD = 15.86$ ). The 95% confidence interval for the difference between the two means ranged from -7.50 to -0.77. On the basis of the result, it inferred that we rejected the null hypothesis.

**RO3<sup>2</sup>: To investigate whether perceptions of online learning impact on mental health differ with respect to their locality.**

*HO<sub>3</sub>: There is no significant difference in perceptions of online learning on mental health with respect to their locality.*

An independent-samples t-test was conducted to compare scores between rural and urban students. Result revealed that mean and standard deviation score of rural and urban students are  $M=63.24, SD=13.61$  and  $65.63, SD=15.30$  (cited table 7) respectively. Therefore, the mean difference of rural and urban students is -2.39. There was no statistically significant difference in the scores for rural students ( $M = 63.24, SD = 13.61$ ) and urban students ( $M = 65.63, SD = 15.30$ );  $t(282) = 1.38, p = .167$  (cited table 7), because *p*-value (0.167) is greater than the standard significance threshold of  $\alpha = 0.05$ .

Table: 7. Perceptions of online learning on mental health with respect to their Locality.

Variables	N	Mean	SD	M <sub>diff</sub>	SED	df	t	Sig.
Rural	164	63.24	13.61	-2.39	1.72	282	-1.38	.167
Urban	120	65.63	15.30					

\*Note: N=Number of Respondents, M=Mean, SD=Standard Deviation,  $M_{diff}$ =Mean Difference, SED=Standard Error Difference, t=critical value, df=Degree of Freedom, Sig.= Significance

The  $M_{diff}$  (2.39) suggests that locality of students did not significantly influence the measured outcomes. These findings demonstrate that students living in rural environments perform similarly to those in urban settings. Consequently, the null hypothesis is retained.

**RO3<sup>3</sup>: To investigate whether perceptions of online learning impact on mental health differ with respect to their course of study.**

*HO<sub>4</sub>: There is no significant difference in perceptions of online learning on mental health with respect to their course of study.*

An independent-samples t-test was conducted to evaluate differences in scores based on course of study (U.G. & P.G.). A statistically significant difference was found between U.G. students ( $M = 61.77$ ), ( $SD = 14.89$ ) and P.G. students ( $M = 65.76$ ), ( $SD = 13.88$ );  $t(282) = -2.28$ , ( $p = .023$ ) (cited table 8) is less than the standard alpha level ( $\alpha$ ) of .05. The  $M_{diff}$  (-3.99) indicate that P.G. students achieved significantly higher scores than their U.G. students. The calculated effect size was (Cohen's  $d = -0.28$ ) represents a small-to-medium effect, indicated a significance difference in between the course of study.

Table: 8. Perceptions of online learning on mental health with respect to their course of study.

Variables	N	Mean	SD	$M_{diff}$	SED	Df	t	Sig.
UG	107	61.77	14.89	-3.99	1.74	282	-2.28	.023
PG	177	65.76	13.88					

\*Note: N=Number of Respondents, M=Mean, SD=Standard Deviation,  $M_{diff}$  =Mean Difference, SED=Standard Error Difference, t=critical value, df=Degree of Freedom, Sig.= Significance.

**Pooled Standard Deviation ( $SD_{pooled}$ )**

$$SD_{Pooled} = \sqrt{\frac{(n_1-1)SD_1^2 + (n_2-1)SD_2^2}{n_1+n_2-2}} = \sqrt{\frac{(107-1) \times 14.89^2 + (177-1) \times 13.88^2}{107+177-2}}$$

$$= \sqrt{\frac{23501.26 + 33906.40}{282}} = \sqrt{\frac{57407.66}{282}} = \sqrt{203.57} \approx 14.27$$

**Cohen's d**

$$d = \frac{M_1 - M_2}{SD_{Pooled}} = \frac{61.77 - 65.76}{14.25} = \frac{-3.99}{14.27} \approx -0.28$$

The empirical findings demonstrate that academic advancement corresponds with higher performance scores. P.G. students yielded a higher statistical mean ( $M = 65.76$ ) compared to U.G. students ( $M = 61.77$ ). When comparing these results to the earlier rural-urban data, geographic location played no meaningful role, whereas academic level functions as a statistically critical differentiator. This implies that academic experience and institutional engagement have a higher predictive value for this metric than regional demographics.

**RO3<sup>4</sup>: To investigate whether perceptions of online learning impact on mental health differ with respect to their Academic stream.**

*HO<sub>5</sub>: There is no significant difference in perceptions of online learning on mental health with respect to their Academic stream.*

An ANOVA was conducted to evaluate if overall impact scores differed based on students' academic stream: Arts ( $n = 179$ ), Science ( $n = 49$ ), and Commerce ( $n = 56$ ). The descriptive statistics revealed highly similar mean scores across the groups: Arts ( $M = 64.75$ ,  $SD = 13.52$ ), Commerce ( $M = 64.50$ ,  $SD = 13.57$ ), and Science ( $M = 62.14$ ,  $SD = 17.99$ ) (cited table 9). The omnibus test indicated no statistically significant difference in impact scores among the academic streams,  $F(2, 281) = 0.64$ ,  $p = .526$  (Cited table 10),  $\eta^2 = .005$ . The small eta-squared value indicated that academic stream accounted for less than 1% of the total variance in impact scores.

Table: 9. Descriptive statistic of students' perceptions regarding online learning on mental health with respect to their Academic stream.

Academic stream	N	M	SD
Arts	179	64.75	13.521
Science	49	62.14	17.990
Commerce	56	64.50	13.574
Total	284	64.25	14.375

\*Note: N=Number of Respondents, M=Mean, SD=Standard Deviation.

Table: 10. F test students' perceptions regarding online learning on mental health with respect to their Academic stream

	S <sup>2</sup>	Df	M <sup>2</sup>	F	Sig.
Between Groups	266.562	2	133.281		
Within Groups	58211.184	281	207.157	.643	.526
Total	58477.746	283			

\*Note: S<sup>2</sup>=Sum of Square, df=degree of freedom, M<sup>2</sup>=Mean Square, F=F critical value, Sig.=Significance.

Eta-squared ( $\eta^2$ )

$$\eta^2 = \frac{SS_{\text{Between Group}}}{SS_{\text{Total}}}$$

$$\eta^2 = \frac{266.562}{58477.746} = 0.004558$$

$$\eta^2 \approx .005$$

$\eta^2 = .01$  (Small effect)

$\eta^2 = .06$  (Medium effect)

$\eta^2 = .14$  (Large effect)

Because the overall F-test was non-significant, post-hoc pairwise comparisons using the Tukey HSD test confirmed no significant differences between Arts and Science ( $M_{diff}=2.61, p = .499$ ), Arts and Commerce ( $M_{diff}=0.25, p = .993$ ), or Science and Commerce ( $M_{diff}=-2.36, p = .680$ ). Consequently, the null hypothesis is retained, demonstrating that a student's academic stream does not significantly influence their overall impact score.

**RO3<sup>5</sup>: To investigate whether perceptions of online learning impact on mental health differ with respect to their caste category.**

*HO<sub>6</sub>: There is no significant difference in perceptions of online learning on mental health with respect to their caste Category.*

ANOVA was conducted to determine if composite impact scores differed significantly based on participants' caste categories. Participants were divided into four distinct groups: General (N = 144), OBC (N = 82), SC (N = 49), and ST (N = 9). Descriptive statistics indicated that the mean impact scores were closely aligned across all four social categories. The General category demonstrated the highest mean score (M = 65.03, SD = 14.20), followed sequentially by the SC category (M = 64.47, SD = 13.55), the OBC category (M = 63.01, SD = 15.41), and the ST category (M = 61.89, SD = 12.90) (cited table 11).

Table: 11. Descriptive statistic of students' perceptions regarding online learning on mental health with respect to their caste category

Caste Category	N	M	SD
General	144	65.03	14.198
OBC	82	63.01	15.412
SC	49	64.47	13.553
ST	9	61.89	12.898
Total	284	64.25	14.375

\*Note: N=Number of Respondents, M=Mean, SD=Standard Deviation.

Table: 12. F test students' perceptions regarding online learning on mental health with respect to their caste category

	S <sup>2</sup>	df	M <sup>2</sup>	F	Sig.
Between Groups	266.839	3	88.946		
Within Groups	58210.907	280	207.896	.428	.733
Total	58477.746	283			

\*Note: S<sup>2</sup>=Sum of Square, df=degree of freedom, M<sup>2</sup>=Mean Square, F=F critical value, Sig.=Significance.

Eta-squared ( $\eta^2$ )

$$\eta^2 = \frac{SS_{\text{Between Group}}}{SS_{\text{Total}}}$$

$$\eta^2 = \frac{266.839}{58477.746} = 0.00456$$

$$\eta^2 \approx .005$$

$\eta^2 = .01$  (Small effect)

$\eta^2 = .06$  (Medium effect)

$\eta^2 = .14$  (Large effect)

The analysis of the test was revealed that these marginal differences among the group means were not statistically significant,  $F(3, 280) = 0.428, p = .733$  (cited table 13),  $\eta^2 = .005$ . This negligible effect size indicates that caste category accounted for only 0.46% of the overall variance in the total impact scores, confirming a lack of both statistical and practical significance.

Consistent with the non-significant F-test, a post-hoc Tukey HSD multiple comparison test confirmed that no pairwise differences reached statistical significance (all  $p > .05$ ). The largest observed mean difference was between the General and ST categories ( $M_{diff} = 3.15, SE = 4.95, p = .921, 95\% CI [-9.66, 15.95]$ ), while the smallest difference was observed between the

General and SC categories ( $M_{diff} = 0.57, SE = 2.39, p = .995, 95\% CI [-5.60, 6.73]$ ). Because all 95% confidence intervals cross zero, the null hypothesis of equal group means cannot be rejected. The null hypothesis of equal group means is retained.

**RO3<sup>6</sup>:** To investigate whether perceptions of online learning impact on mental health differ with respect to their family type.  
*HO<sub>7</sub>:* There is no significant difference in perceptions of online learning on mental health with respect to their family type.

An independent samples *t*-test was conducted to evaluate whether composite impact scores differed significantly between students from Joint ( $N = 120$ ) and Nuclear ( $N = 164$ ) family structures. Descriptive statistics indicate that students from nuclear families reported a slightly higher mean impact score ( $M = 65.34, SD = 14.94$ ) compared to those from joint families ( $M = 62.78, SD = 13.48$ ). This yielded a  $M_{diff}$  (-2.56) points (cited table 13).

Table: 13. Perceptions of online learning on mental health with respect to their family type.

Variables	N	Mean	SD	$M_{diff}$	SED	df	t	Sig.
Joint	120	62.78	13.48	-2.56	1.72	282	-1.48	.138
Nuclear	164	65.34	14.94					

\*Note: N=Number of Respondents, M=Mean,  $M_{diff}$ =-2.56, SD=Standard Deviation, t=critical value, df=Degree of Freedom, Sig.= Significance

However, analysis of the result revealed that this marginal variance was not statistically significant,  $t(282) = -1.48, p = .138$  (cited table 13). Because the significance value ( $p = .138$ ) is well above the conventional alpha threshold of ( $\alpha = .05$ ), fail to reject (retain) the null hypothesis.

**RO3<sup>7</sup>:** To investigate whether perceptions of online learning impact on mental health differ with respect to their Guardian's annual income.

*HO<sub>8</sub>:* There is no significant difference in perceptions of online learning on mental health with respect to their Guardian's annual income.

An ANOVA was conducted to evaluate whether composite impact scores differed significantly across family income levels. Students were categorized into five distinct monthly income groups: Rs. Below-50,000 ( $N = 116$ ), Rs. 50,001–100,000 ( $N = 113$ ), Rs. 100,001–250,000 ( $N = 23$ ), Rs. 250,001–500,000 ( $N = 23$ ), and Rs. 500,001–Above ( $N = 9$ ) (cited table 14).

Descriptive statistics indicated that mean impact scores were relatively similar across the economic tiers. The Rs. 250,001–500,000 group displayed the highest mean score ( $M = 67.09, SD = 16.65$ ), followed by Rs. 50,001–100,000 ( $M = 65.56, SD = 13.91$ ), Rs. Below 50,000 ( $M = 63.83, SD = 13.78$ ), Rs. 100,001–250,000 ( $M = 59.57, SD = 14.85$ ), and Rs. 500,001–Above ( $M = 58.11, SD = 18.59$ ) (cited table 14.).

Table: 14. Descriptive statistic of students' perceptions regarding online learning on mental health with respect to their Guardian's annual income

Guardian's annual income	N	M	SD
Rs. Below - 50000	116	63.83	13.783
Rs. 50001 - 100000	113	65.56	13.910
Rs. 100001 - 250000	23	59.57	14.847
Rs. 250001 - 500000	23	67.09	16.654
Rs. 500001 - Above	9	58.11	18.591
<b>Total</b>	<b>284</b>	<b>64.25</b>	<b>14.375</b>

\*Note: N=Number of Respondents, M=Mean, SD=Standard Deviation.

Table: 15. F test students' perceptions regarding online learning on mental health with respect to their Guardian's annual income

	$S^2$	df	$M^2$	F	Sig.
Between Groups	1242.951	4	310.738	1.515	.198
Within Groups	57234.795	279	205.143		
<b>Total</b>	<b>58477.746</b>	<b>283</b>			

\*Note:  $S^2$ =Sum of Square, df=degree of freedom,  $M^2$ =Mean Square, F=F critical value, Sig.=Significance.

Eta-squared ( $\eta^2$ )

$$\eta^2 = \frac{SS_{\text{Between Group}}}{SS_{\text{Total}}}$$

$$\eta^2 = \frac{1242.951}{58477.746} = 0.0212$$

$$\eta^2 \approx .021$$

$\eta^2 = .01$  (Small effect)

$\eta^2 = .06$  (Medium effect)

$\eta^2 = .14$  (Large effect)

The *F* test was revealed that these mean variations were not statistically significant,  $F(4, 279) = 1.515, p = .198$  (cited table 15),  $\eta^2 = .021$ . This small effect size indicates that annual family income accounts for only 2.12% of the total variance in the impact metrics. Reflecting the non-significant omnibus outcome, a post-hoc Tukey HSD test confirmed that no pairwise group comparisons reached statistical significance (all  $p > .05$ ), with all 95% confidence intervals cross-cutting zero.

**R04: To explore the challenges faced by the tertiary-level students during online learning**

**RQ1. What are challenges faced by the tertiary-level students during online learning?**

The investigators obtained the following replies from 284 students in order to determine the challenges of learning in online as perceived by the students in table 16.

Table: 16. Showing challenges faced by the tertiary-level students during online learning

Sl. No.	Challenges/Difficulties	Perceived by Students	%	Rank
1	Ability to focus on academic work	98	34.50	2
2	Difficulties with online learning	155	54.60	1
3	Inadequate Internet / Wi-Fi / Computer access	77	27.10	4
4	Completing assignments and tests	46	16.20	6
5	Communication with instructors	78	27.50	3
6	Other	67	23.60	5

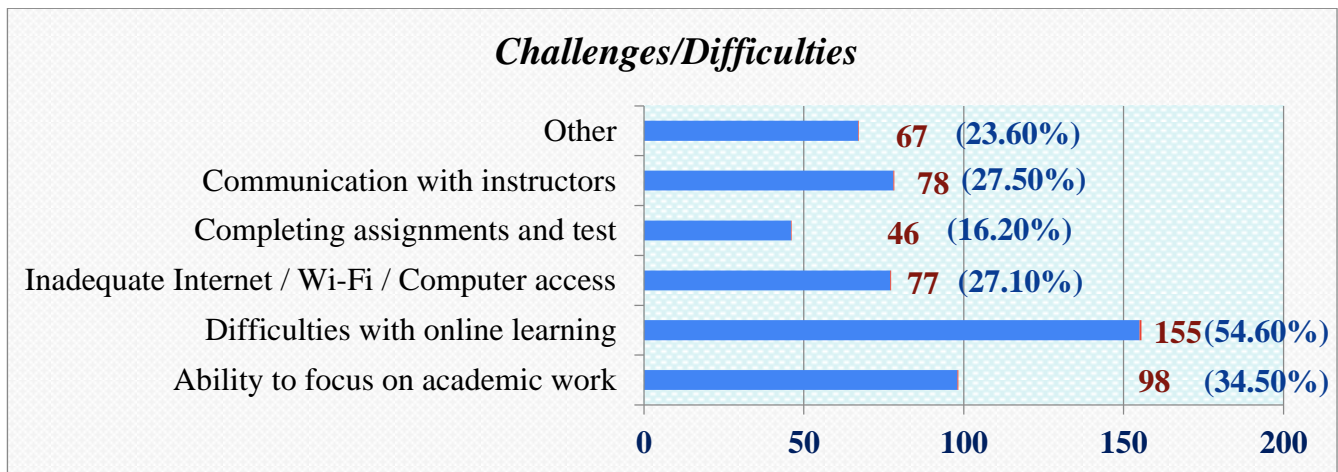


Figure: 4. Challenges/Difficulties faced by the tertiary-level students during online learning

From figure 4, the researchers found that there are several challenges/difficulties that the students are faced in leaning via online such as difficulty with ability to focus on academic work, difficulties with online learning (*not easily access*), and problem with poor internet connection, unable to proper technological device, Wi-Fi connection. Here the large number of students perceived that they have to problem to learn with online. The study also revealed that poor level communication with instruction and problems with accomplished their assignments & test and so many other problems problem also associated with online learning that greatly effect on students' mental health.

**Major Findings**

1. The study revealed that the perception of tertiary-level students of West Bengal is indicated average or moderate impact level i.e., neither more high nor low on online learning.
2. Tertiary-level students of West Bengal perceived online learning to have a significant impact on their mental health.
3. The study found that there is significance difference between male (M=61.89) and female (M=66.03) students in relation to the impact of online learning on their mental health and impact differences is relatively ( $d = -0.29$ ) small to medium effect.
4. The study revealed there is no significant difference between rural (M=63.24) and urban (65.63) students in relation to the impact of online learning on their mental health.
5. The study explored that there is significance difference between PG students (M=65.76) and UG students (M=61.77) in relation to the impact of online learning on their mental health and impact differences is relatively ( $d = -0.28$ ) small to medium effect.
6. The study revealed there is no significant difference in perceptions of online learning on mental health with respect to their Academic stream: Arts (M=64.75), Science (62.14) & Commerce (M=64.50). The small eta-squared value ( $\eta^2 = .005$ .) indicates that academic stream accounted for less than 1% of the total variance in impact scores.

7. The found that there is no significant difference between General (M=65.03), OBC (M=63.01), SC (M=64.74) and ST (M=61.89) students in perceptions of online learning on their mental health. The eta-squared value ( $\eta^2 = .005$ ) is less than 1% indicates that possibly no effect.
8. The study explored that there is no significant difference Joint (M=62.78) and Nuclear (M=65.34) family in perceptions of online learning on their mental health.
9. The found that there is no significant difference between Guardian's annual income [Rs. Below-50,000 (M = 63.83), Rs. 50,001–100,000 (M = 65.56), Rs. 100,001–250,000 (M = 59.57) Rs. 250,001–500,000 (M = 67.09), 500,001–Above (M = 58.11)] in perceptions of online learning on mental health with respect to their Guardian's annual income. The eta-squared value ( $\eta^2 = .021$ ) small effect size indicates that annual family income accounts for only 2.12% of the total variance in the impact metrics.
10. The study also revealed that most of students 54.60% (N=284) have difficulties with learn in online and 34.50% (N=284) students have hitches to focus on their academic work.

## Conclusion

Based on the results and findings of the study, it has been concluded that tertiary-level students have perceived so many challenges on online learning which impact on their mental health is greatly. The impact that online learning has had on the mental health of tertiary-level students has been quite average or moderate impact. The result found that students have a significant impact on their mental health. The online mode learning is being found un-enjoyable and the students have less social support from their friends and peers, also problem to communicate with their instructors, completing test and online assignments. Students staying in rural areas have some network issues and not a suitable learning environment for their study purpose. Another thing revealed that rural areas students' guardians' annual income is low. Hence, they have faced the challenges to bearing online learning. Therefore, students are felt frustration; less-interest, stress, demotivation and worry were elicited due to online learning. Students found it hard to pay attention in class and procrastinated on their academic work. It is hard for them to fall asleep easily, which might be an indicator of their mental fatigue.

**Acknowledgment:** No

**Author's Contribution:** *Sekh Nur Hossain:* Data Collection, Literature Review, Methodology, Analysis, Drafting, Referencing; *Dr. Subhankar Ghosh:* Literature Review, Methodology, Drafting, Referencing

**Funding:** No

**Declaration:** The authors have given consent for the publication.

**Competing Interest:** No

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