

## **PRE-SERVICE TRAINEE TEACHERS' EXPERIENCES ON COMPUTER-MEDIATED LEARNING DURING THE COVID-19 PANDEMIC REVEALED THE NEED OF REVAMPING ONLINE PEDAGOGY IN INDIA**

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### **ABSTRACT**

This study attempted to understand the perceptions of Indian pre-service teacher trainees towards computer-mediated learning after two months of exposure to synchronous online classes in 2020 that came along with the outbreak of the COVID-19 pandemic. The survey-based approach employed Likert-rating scales (and items) and open-ended questions to elicit the experiences of 180 final-year students enrolled in pre-service teaching courses at Regional Institute of Education (a constituent unit of the National Council of Educational Research and Training) Bhubaneswar, OD, India. The semi-qualitative analysis of the responses reported that more than one-third of the pre-service trainee teachers (36.6 %) considered online classes as a poor mode of teaching while about one-third (30.6 %) are in a state of confusion. Given the present social situation of self-isolation and unpredictable arrival of 'normal' life, this study could help to improve the teaching practices, considering its applicability across a large swath of different educational disciplines. In addition to that, this paper aims to be a valuable resource to improve computer-mediated learning in India since future teachers have been considered as the sample of this study.

**Keywords:** COVID-19, India, Online classes, Pedagogical issues, Pre-service trainee teachers

### **INTRODUCTION**

The 2020 outbreak of the novel SARS CoV 2 virus was not veiled from anyone- from children to the aged, from jobless to white-collar jobs, from students to professionals- the entire society was and still is crippled, being refrained from normal lives. The World Health Organization (WHO) announced it as a global public health emergency of international concern on 30th January 2020 and subsequently a pandemic on 11th March 2020 (Cucinotta & Vanelli, 2020). Given that viral transmissibility is through contact with the respiratory droplets of the infected individuals (Zhu et al., 2020), the medical fraternity has resorted to the solution of 'social distancing' to curb the spread of the pandemic (Wilder-Smith & Freedman, 2020). Social distancing was tagged as a credible non-pharmaceutical measure (Fong et al., 2020) and that was adopted by governments across the globe to announce 'lockdowns' in their respective countries (Coccia, 2021). Eventually, this administrative intervention resulted in the closure of academic institutions- schools, colleges, and universities- in approximately 107 countries (Mahmood, 2021), endorsing the idea of online classes.

Globally, the developed countries are acquainted with the concept of computer-mediated online classes (Ramij & Sultana, 2020)- it dates back to as early as the 19th century when the western academicians opined that conventional education demanded extra cost in light of increasing population and expanding economies (Moore & Kearsley, 1996) and online classes could be a socially congenial solution. Alternatively known as distance learning, online classrooms turned out to be an affable teaching-learning medium considering the costs of storing and transmitting information got much easier (Çakıroğlu, 2014). This new advancement in education was gradually approved by the instructors and they honed their pedagogical skills accordingly (Loniie & Andrews, 2009). In a pre-pandemic study, it was reported that there is seemingly an inverse relationship between a teacher's physical presence in the traditional classroom and increased technology use in the online classroom setting (Arrosagaray et al., 2019). It has been reported that instructor facilitation is the most crucial aspect to ensure students' engagement in online classes (Markova et al., 2017; Martin & Bolliger, 2018). The features of online classrooms like video-

conferencing, whiteboards, and chat windows are found to be facilitative in the student-instructor and student-student interactions (Stewart et al., 2011). It has also been observed that the post-assessment performance of students remotely taking exams (online classrooms- no invigilation) is similar to students conventionally taking exams (regular classrooms- with invigilation) (Goldwater et al., 2012). Bolliger & Martin (2018) highlighted the importance of inter-student communication and collaboration as an aid in rendering the learning experiences more 'engaging'. Quite similar to this observation, a 2010 study on students' participation style in collaborative online classes revealed a unique blend of their behavior- less contribution, coordination emphasizing, communicative or task-oriented (Chiu et al., 2010). Landrum (2020) added students' confidence to learn through online classes is the decisive parameter of satisfaction and academic utility of online classes. Now, the unprecedented arrival of the COVID-19 pandemic pushed the situation in a way that online classes turned out to be a necessity than an option (Dhawan, 2020). A qualitative study on Arabic pre-service teachers' perceptions of online learning during the COVID-19 pandemic indicated that their basic needs concerning online classes are: competence, arousal, self-determination, and relatedness (Batmang et al., 2021). Another study with a similar objective was carried out with Albanian university students and the authors found that the students are quite reluctant to accept online learning (Xhelili et al., 2021). The suggestion derived from this paper (Xhelili et al., 2021) was to integrate the online teaching modules gradually into the regular curriculum with attention being bestowed on students' characteristics. A study conducted on private and public universities in Iraq reported that both these higher education sectors are showing a low level of readiness to embrace the online classes that were introduced due to the pandemic (Budur et al., 2021). Ali (2020), in his meta-analytic study on online learning in higher education institutes during the COVID-19 pandemic, asserted that the adoption of online classes is not only a technical but also a pedagogical and instructional challenge. In a case study on online teaching during the COVID-19 lockdown in the UK, the authors vented their concern on equity- access to stable internet connection and sufficient infrastructure- among the learners during the online classes (Peimani & Kamalipour, 2021). In a similar study conducted in China during the pandemic, Clark et al. (2020) conveyed that students using computers in online classes have shown more progress in academic achievement than students using smartphones. A review article exploring the global impacts of the COVID-19 pandemic on teaching-learning processes realized the degree of motivation among the learners as one of the limiting factors in academic achievements (Pokhrel & Chhetri, 2021). For instance, innately motivated students will be relatively unaffected during online teaching as compared to the students from the vulnerable group (like, with learning difficulties) (Pokhrel & Chhetri, 2021). Rafique et al. (2020) examined the online learning readiness of Pakistani students enrolled in library and information sciences during the pandemic where they found that males show significantly greater computer/internet and online communication self-efficacy than females.

Having said much about global studies on online education before and during the COVID-19 pandemic, the Indian education system still believes in the conventional teaching-learning transaction wherein the physical presence of teachers is considered imperative. The latest study, during the pandemic, revealed that 98% of the students enrolled in an undergraduate degree at an Indian medical college realized the need for a blackboard as an effective teaching media (Padmalatha, 2020). Muthuprasad et al. (2021) conducted a similar study with the agricultural graduates in an Indian university where the students responded in favor of recorded classes with quizzes at the end rather than synchronous online classes. Additionally, the students pointed out that online learning during such a pandemic situation can be a lucrative option, given that there are no technical constraints and an instructor can effectively communicate during the classes (Muthuprasad et al., 2021). Slightly deviating from the usual notion, Kesharwani (2020) opined that the onset of the pandemic and the subsequent conception of online classes has indirectly ameliorated the technical abilities of both teachers and students in India. In another study, the authors distributed online google forms to 500 students from different Indian schools/colleges/universities and it was found that 78.4 % of students were not willing to participate in online classes during the pandemic (Raj & Fatima, 2020). In a study to inspect the impact of lockdown caused by COVID-19 on undergraduate and postgraduate learners of various colleges and universities of West Bengal (India), it was reported that 12.6 % of students felt that their home learning environment is not amiable for the online classes (Kapasia et al., 2020). A comparable, qualitative study was conducted with randomly selected teachers and students from four cities in Uttar Pradesh (India) through the lockdown and it was deduced that only 36% of those surveyed agreed to the possibility of online examination during the pandemic (Agarwal & Dewan, 2020). Citing to a 2021 survey concerning the north-eastern undergraduate students (Assam) of India, 46.21 % and 19.70 % of students perceived online learning amidst the

pandemic as partially effective and ineffective respectively (Rahman, 2021). As one of the merits of online learning during the lockdown in India, Jena (2020a) pointed out that physically challenged learners and female students from conservative families can find this mode of learning easily accessible. As a demerit of online learning during the lockdown in India, Jena (2020b) felt that online classes may broaden the social gap between the financially privileged and unprivileged students. Further, Jena (2020c) mentioned that the closure of schools, due to the COVID-19 lockdown, deprived the indigent students of the mid-day meal(s) which is usually an incentive for the students to attend classes. A cross-sectional study was performed among school-going students and parents from different parts of Rajasthan and Uttar Pradesh (India) to study their perceptions of online learning amidst lockdown38- the authors observed that parents are relieved that their children are safely studying through online classes, albeit they are concerned about their wards' anxiety issues and mental health due to a significant increase in the screen times for the classes. Naik et al. (2021) surveyed 874 responses from students, faculties, parents, and the general public/other professionals to understand the state of online teaching and learning of higher education in India during the COVID-19 lockdown. After the study, they found that 72.4 % of participants felt that the online classes affected their individual growth and 72 % of the respondents are not curious about online classes (Naik et al, 2021). In a study on student engagement in online learning during the period of the COVID-19 pandemic in India, Deka (2021) listed the factors- instructor characteristics, course design, student characteristics, learner's environment, course content, technology/administrative support- as determinants of learner engagement in online classes.

Considering the research hitherto, it is evident that studies on the relationship between COVID-19 and academia (curricula/contents based on the national needs) are quite context-specific and differ from each other (Al-Hattami, 2005; Reyes-Chua et al., 2020; Seymour-Walsh et al., 2020). Literature on educational research indicates a gap in studies on the future Indian teacher students' perceptions of online learning, though the subjective attributes of the pandemic are an integral part of the search for the best learning model during the pandemic, especially in the pandemics of India. Therefore, the present study aimed to explore the perceptions of pre-service trainee teachers after experiencing synchronous online classes for two months after the announcement of the national lockdown in India. Given that the sample population of this study is the future teachers of India, the suggestions and feedback from the qualitative analysis will aid in reconsidering the academic attitude towards how can the online learning platforms be improved, how the learning should be assessed in the online format, and how to ensure inclusive online learning experiences to foster an empowered student and teacher base. The implications of this study are valid for policy-makers, educators, curriculum designers, and technology experts worldwide since the responses are coming from the prospective teachers of the second-most populous country, India. Besides, it is transparent from the literature survey that the teacher-student interaction is of paramount importance in online learning (Malhotra & Bhatia, 2021), therefore, a pre-service trainee teacher should be able to decipher the online pedagogical technicalities like planning online lessons, discussions during webinars, and organizing online assessments through their own experiences. That is why this study is of cardinal value in global education to enquire about their readiness to engage in a computer-mediated educational environment in this time of uncertainty where 'new normal' is social distancing.

With that in mind, the present study is an attempt to address the following research objectives:

- I. Understanding the pre-service trainee teachers' experience and satisfaction regarding different aspects of teaching-learning transactions (Interaction, Engagement, and Assessment) in online classrooms.
- II. Exploring the advantages and disadvantages of online classrooms through pre-service trainee teachers' perceptions.
- III. Interpreting the acceptability of online classrooms as a future media of education from the viewpoints of prospective teachers.
- IV. Summarizing the suggestions of the respondents to get a clearer picture of what is that lacks in the online classroom settings

## **METHOD**

### **Research model and procedure**

The research model adopted for this study was inspired by the Technology Acceptance Model (TAM) proposed by Davis (1986, 1989, 1993) dedicated to investigating technological impacts on the users (Liu et al., 2010).

Multiple papers dealing with the educational experiences of students during the COVID-19 pandemic have borrowed their idea from the TAM model (Lazim et al., 2021; Mailizar et al., 2021; Quadir & Zhou, 2021; Vladova et al., 2021). The research design and thereafter, the development of tools followed the given schema of TEAM-

*T*- Technological access of the pre-service trainee teachers to attend online classes.

*E*- Experiences and acceptability of online classes reported by the pre-service trainee teachers.

*A*- Assessment of the satisfaction with the student-teacher interaction during the online classes

*M*- Marking the challenges, benefits, and limitations of online classes through the responses of pre-service trainee teachers.

The procedure of this research was limited to the purview of the online platform (google forms) since we can't fetch the physical presence of the respondents in light of the COVID-19 pandemic. For the study, different kinds of questions about feasibility, flexibility, technicality, variability, utility, intractability, profitability, and difficulty of online classrooms were structured. The questions were crafted in such a manner that they catered to the different opinions held by the pre-service trainee teachers- be it a 2nd year or a 4th-year student(s). The initial questions were devoted to gathering the demographic profile (name (optional), gender, email address) of the respondents which helped the investigators to record the demographic details. The google form was made available to the entire cohort of 4 years integrated B.Sc.B.Ed. pre-service trainee teachers for 2 weeks. The settings in the form were such that a given respondent (with a google mail id) can fill the form only once. The forms bore an option of the consent of participation with no compulsion for mentioning the names of the respondents and the respondents were assured of confidentiality regarding their identity through the forms.

### **Research context, sample, and data collection**

As stated earlier, the context of this study was to unveil the experiences of the pre-service trainee teachers in the online classes during the COVID-19 pandemic. Hence, the study was conducted within the Regional Institute of Education (RIE), Bhubaneswar wherein the 4 years integrated B.Sc.B.Ed. (2nd, 3rd, and 4th year) students (pre-service trainee teachers) were provided with google forms containing the questions/items. Located in the eastern state of Odisha (India), this institution is one of the constituents of the National Council of Educational Research and Training (NCERT)- the apex body of the Government of India which caters to policies and programs about school and teacher education. The experimental protocols were approved by the Ethical and Scientific Committee of the Department of Education in Science and Mathematics and the Department of Education, Regional Institute of Education (NCERT), Bhubaneswar.

The first half of the google form collected the quantitative data of the respondents that included names (optional), gender, and email addresses. In addition to that, this section consisted of their consent to participate in the survey. To unveil the technical limitations that the pre-service trainee teachers might be facing, this section also contained a question on their access to personal computers during the classes. Further, the google form was designed with individual Likert items (questions related to study hours, engagement with household chores, feedback, and future of education as online classes). The Likert scale was envisioned to understand the teacher-student interaction in the online classes, so, three Likert items containing different aspects of classroom interaction were developed (rating the interaction during class, rating the interaction/doubt clearing after class, teacher's ability to engage the students/trainee teachers). The open-ended questions were meant to explore the challenges, benefits, and limitations of the online classes from the perspectives of the pre-service trainee teachers.

### **Description of Tools used and their validation**

The research tools for the study were a 5-point Likert rating scale(s) and 5-point Likert item(s) followed by open-ended questions. Likert scales are commonly used tools in educational research to elicit responses from the different actors involved in the formal education system. The bipolar Likert scales have considerably evolved from measuring respondents' approval (Agree-Disagree) to forms like measuring frequency (Often-Rare) or importance (Not at all important-Very important) (Harpe, 2015). Uebersax (2006) has used the term 'Likert-type scales' for the latter examples; in the present paper, the authors have unanimously used 'Likert rating scale or Likert scales' to avert any ambiguity since there is no significant variance between the two names of the similar tools. The Likert rating scales majorly occur in two forms- symmetric and asymmetric- depending on the position of the neutral

option (Joshi et al., 2015). Symmetric Likert scales have the position of the neutral option (Neutral/Don't know) in the middle of the two extremes of strongly disagree and strongly agree. Asymmetric Likert scales have the option of neutrality inclined towards either extreme, thus offering fewer choices on either side of the neutral option (Boone & Boone, 2005). Since teacher-student interaction has been observed to be the crucial element during online classes, it is gauged using the Likert scale for the given study.

The second research tool was a 5-point Likert item which is defined as unique, single, Likert-type questions that are planned with some aspects of original Likert response alternatives (Desselle, 2005; Willits et al., 2016). A Likert item is a specific statement concerned with the quantitative assessment of the attitude/opinion/experience of a given respondent (Subedi, 2016). The primary philosophy behind the Likert items is single items may be a useful reflection of the comprehensive appraisal of a complex experience of the respondent(s) (Harwell & Gatti, 2001). It differs from the Likert scale in the fact that Likert items won't be combined into a composite scale (Clason & Dormody, 1994) to conclude a common attribute of the referents. Therefore, it can be considered that a Likert scale consists of multiple, similar Likert items to conclude, while Likert items, when not a part of the scale, are individual response sets of attitudinal measurement (Subedi, 2016). Nevertheless, both Likert scales and Likert items collect ordinal data and need to be analyzed carefully to avoid type-I errors (Harwell & Gatti, 2001; Jakobsson, 2004).

Open-ended questions have been observed to be a potential tool in social science research because of their ability to stimulate responses that are otherwise ignored in the close-ended framework (Reja et al., 2003). It is observed that the close-ended questions provide the respondents with no scope to put words to their opinions/responses due to (pre-designed) limited options (Foddy, 1993). In addition to that, it is often observed with the students/young respondents, that the multiple options provided in close-ended questions serve as an easy alternative to restrict their answers (Schuman & Presser, 1979; Schuman & Scott, 1987).

The validation of the research tools was performed through the face and content validity. The face validity (Trochim, 2005) was calculated through two methods to ensure that tools were apropos to measure the perceptions of the pre-service trainee teachers towards online learning- first, 10 pre-service teacher educators with M.Ed. the degree were consulted to rate the tool according to clarity (use of language and words), precision (clear dissemination of message), and understanding (ability to derive a meaning out of the statements). Fleiss' kappa index (evaluates inter-rater agreement) was calculated to account for agreement among the raters (acceptable range- 0.41-0.60) (Osorio & Jaimes, 2019). These raters were contacted through emails for individual distribution of the google form and were requested to assign 1 or 0 to clarity, precision, and understanding for each statement/question in the form. Second, the level of comprehensibility was measured to ensure face validity- for this, 10 faculties of Education from the Regional Institute of Education (NCERT) Bhubaneswar were asked to assign percentages for comprehensibility (equal to or greater than 85 % = high comprehensibility; 80-84.9 % = moderate comprehensibility; and less than 80 % = low comprehensibility) of tool statement/question catering to the research objectives (Osorio & Jaimes, 2019). This was also followed by an estimation of Fleiss' kappa index. The content validities of the tools were measured through 10 online pedagogy experts for an overall remark on its content- each statement/question of tools was categorized as essential, useful but not essential, and not necessary and the individual experts nodded in favor of the category. Further, content validity ratio (CVR) was computed (González et al., 2016) through the Lawshe index and any item whose CVR was less than 0.62 (n= 10) was planned to be dejected:

$$CVR = \frac{n_e - \frac{N}{2}}{\frac{N}{2}}$$

where,  $n_e$  = number of experts who marked the "essential" category

$N$  = total number of experts

Content validity index (CVI) of the tool is the average of the CVRs of the accepted items.



### Data analysis of responses

The excel-based analysis yielded the validity indices of the tool following the methods mentioned above. The quantitative analysis involved descriptive statistics like percentages to sort the responses from the Likert items and Likert scale into three categories as given below:

Negative extremities (Unsatisfied/Disagreed/Decreased)  
Neutral option (Don't Know/Neither Agree nor Disagree/No change)  
Positive extremities (Satisfied/Agreed/Increased)

In addition to that, statistics inference like paired t-tests and one-way ANOVAs were performed to interpret statistically significant ( $\alpha < 0.05$ ) relationship between participants and their opinions. The semi-qualitative analysis of the responses to the open-ended questions was graphically represented using pie charts. All the analyses were performed in PAST 4.0 software with a probability level of 0.05.

## RESULTS

### Validity of the Tools

The tool validity was determined through face and content validity as discussed in section 2.3. Now, the face validity was tested through two methods: the first one was through the rating of the tools for clarity, precision, and understanding (Table 1) and the second one was through percentage scoring of tools' comprehensibility (Table 2).

Tool type	Clarity	Precision	Understanding
<b>Likert Items</b>			
How would you rate your study hours in the present scenario?	1	1	1
How would you rate the Feedback from teachers regarding the assignments/projects?	0.9	1	1
How will you rate your engagement with household chores?	0.9	1	1
Consider that in the near future, there is no chance to resume physical classes. How would you rate the Virtual classes as a Future course of Education?	1	0.9	1
<b>Likert scale on teacher-student interaction</b>			
Interaction with teachers during online classes.	1	1	0.9
Interaction with teachers after the class hours (doubt clearing).	0.2	1	0.3
Teachers' ability to engage in the lectures.	0.4	1	0.2
<b>Open ended questions</b>			
What do you find most challenging in the Virtual Classes?	0.6	0.7	0.6
What do you like the most in Virtual Classes?	0.2	0.2	0.4
Please state any "two" suggestions that you would be happy to find in the online classes as a mark of improvement.	0.3	1	1

The Fleiss' kappa index of inter-rater agreement was determined for clarity (0.419), precision (0.516), and understanding (0.457). The acceptable range of Fleiss' kappa index falls in the range of 0.41 to 0.60 and values greater than 0.61 are labeled as good or very good<sup>67</sup>. Therefore, it can be inferred that there is acceptable agreement among the 10 raters (pre-service teacher educators) concerning the clarity, precision, and understanding of the statements/questions in the tool. For comprehensibility, the Fleiss' kappa index was found to be 0.476 which also falls in the acceptable range. Within the tools, 5 statements/questions lay in the range of moderate comprehensibility (80- 84.9 %) and 5 statements/questions lay in the range of high comprehensibility (85 % and above). Therefore, combining both the results, it can be affirmed that the tools in this study are having acceptable face validity. The content validity ratios (CVRs) were calculated through the Lawshe index as tabulated in Table 3; since the CVRs were more than 0.62 (n= 10), none of the statements/questions were rejected. The overall content validity index (CVI) was obtained to be 0.9 which supports the validity of the questions/ statements used in the tools.

Table 1. Inter-rater agreement of the 10 pre-service teacher educators regarding the criteria of clarity, precision, and understanding for the statements/questions of the research tools.

Tool type	Comprehensibility (in %)
<b>Likert Items</b>	
How would you rate your study hours in the present scenario?	87.9
How would you rate the Feedback from teachers regarding the assignments/projects?	88.9
How will you rate your engagement with household chores?	84.2
Consider that in the near future, there is no chance to resume physical classes. How would you rate the Virtual classes as a Future course of Education?	83.3
<b>Likert scale on teacher-student interaction</b>	
Interaction with teachers during online classes.	80.1
Interaction with teachers after the class hours (doubt clearing).	80.3
Teachers' ability to engage in the lectures.	81
<b>Open ended questions</b>	
What do you find most challenging in the Virtual Classes?	91.9
What do you like the most in Virtual Classes?	93.5
Please state any "two" suggestions that you would be happy to find in the online classes as a mark of improvement.	91.6

Table 2. Inter-rater agreement of the 10 faculties of Education regarding the comprehensibility of the statements/questions of the research tools.

Tool type	Essential	Useful; non-essential	Non-essential	CVRs
<b>Likert Items</b>				
How would you rate your study hours in the present scenario?	9	1	0	0.80
How would you rate the Feedback from teachers regarding the assignments/projects?	10	0	0	1.00
How will you rate your engagement with household chores?	9	0	1	0.80
Consider that in the near future, there is no chance to resume physical classes. How would you rate the Virtual classes as a Future course of Education?	10	0	0	1.00
<b>Likert scale on teacher-student interaction</b>	10	0	0	1.00
Interaction with teachers during online classes.	9	0	1	0.80
Interaction with teachers after the class hours (doubt clearing).	10	0	0	1.00
Teachers' ability to engage in the lectures.	9	1	0	0.80
<b>Open ended questions</b>	9	0	1	0.80
What do you find most challenging in the Virtual Classes?	10	0	0	1.00
What do you like the most in Virtual Classes?	9	1	0	0.80
Please state any "two" suggestions that you would be happy to find in the online classes as a mark of improvement.	10	0	0	1.00
<b>CVI</b>				0.90

Table 3. Content validity ratios (CVRs) and content validity index (CVI) of the statements/questions used in the tool

### Demographic analysis and technological access of respondents

The total number of participants in the survey was 180- it is evident in every Regional Institutes of Education of India that female trainee teachers outnumber the male trainee teachers. To circumvent any biases concerning a greater number of female respondents, all the analyses are done in percentages. Fig. 1 depicts the gender demographics of the respondents which reflects the higher number of female pre-service trainee teachers (70.6 %) followed by male pre-service trainee teachers (28.9 %). One respondent chose not to specify the gender which accounted for 0.6 %. From Fig. 2, we can conclude that more than half of respondents don't have access to personal computers (55 %) while 45 % of respondents own a computer in their homes. It is also one of the majorly marked limitations of online classes as commented by the respondents (discussed in section 3.4).

### **Experiences of pre-service trainee teachers concerning online classrooms**

The Likert items were concerned with quantitative aspects of online classrooms that included present study hours, feedback patterns, engagement of household chores, and acceptability of Online classes as the future learning platform.

The majority of the respondents (45 %) considered that there is no notable change in the study hours in the present social situation of online classes (Table 4). 30 % of respondents opined that their study hours have decreased or extremely decreased through online classes. The absence of a proper learning environment is believed to create the regression of study hours.

Assessment is one of the vital features of the teaching-learning process. Pre-service trainee teachers' contentment with the assessment pattern is important for the successful transmission of knowledge and acceptance of the learning process. The data of the present study (Table 4) showed that 33.9 % of respondents believed that no difference in the assessment process prevailed before the advent of online classes from the one they are being subjected to in the present times. 21.6 % of pre-service trainee teachers were dissatisfied/extremely dissatisfied with the assessment patterns while 44.5 % of respondents were satisfied/extremely satisfied with the assessment patterns. The difference in the responses to the given Likert item is levied on individual preferences and also linked with subject specificities; the investigators asked this as a general statement and not confined to a given subject. Being at home also brings responsibilities that include household chores like cleaning, washing, and cooking. The hostel accommodation (in the normal times) is quite different from the home-dwelling- because almost every student at Regional Institute of Education (NCERT), Bhubaneswar lives in the hostels, the investigators were interested to know the Pre-service Trainee Teachers' involvement in household chores in the present time. 35.6 % of respondents realized no difference in their involvement in the household chores in the present day if compared with the past. This response can be interpreted as the self-dependent lives students lead in the hostel and thus, they practice the same at their homes. More than half the respondents (56.2 %) reported that they are quite busy with the chores and therefore, one can assert that their productivity concerning studies might be indirectly hampered in these trying times (Table 4). Only 8.4 % of respondents considered their participation in household activities to be less- the disparity in the responses between the two extremities can be the financial background of the pre-service trainee teachers. Regional Institutes of Education (5 at present) across the nation encourage inclusive education and the low financial charges of courses in these institutions allow pupils from economically poor families to get enrolled. Staying at home in the present situation, the pre-service trainee teachers have to engage in household chores to help their families and the high percentage of responses against the right extremity can be explained through this context.

The Likert item i.e. the acceptability of online classes as the future platform of teaching-learning transaction not only helped us to understand the success of the online classes in the present situation but also showed the attitude of future teachers toward the notion of online classes (Table 4). The extremities are nearly equal to each other with a small difference. 36.6 % of respondents considered online classes as a poor mode of the teaching-learning transaction while 32.8 % of respondents embraced online classes as a good mode of learning for future generations. 30.6 % of respondents displayed confusion (not sure) about the adaptability of online classes as a good learning platform.

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#### **Ranks**

1	2	3	4	5
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Likert item(s)	Negative extremities		Neutral/Don't Know/ No change	Positive extremities	
	Responses are in percentages				
1) Pre-service Trainee Teachers' perception of study hours during Lockdown (viz. online classes)	8.89	21.11	45	19.44	5.56
2) Pre-service Trainee Teachers' satisfaction level of Assessment patterns being practiced in online classes	4.44	17.22	33.89	33.89	10.56
3) Pre-service Trainee Teachers' involvement in the household chores	0.56	7.78	35.56	35.56	20.56
4) Pre-service Trainee Teachers' acceptability of online classes as the future media of Education	14.44	22.22	30.56	25	7.78

Table 4. Different responses of pre-service trainee teachers towards online classes during COVID-19 outbreak.

### Teacher-student interaction in the online classroom

The investigators developed three Likert items about 'Teacher-Student Interaction'- an essential component of teaching. Table 5 shows the results where the responses are taken in percentages and the statistical analysis follows the table.

It is clear from the above table that the percentage of responses in favor of satisfaction (ranks 4 and 5) exceeded the percentage of responses in favor of dissatisfaction (ranks 1 and 2). Around 30 % of responses in each Likert item are marked for the neutral option (rank 3) wherein the student preferred not to comment on their satisfaction or dissatisfaction. The responses from Likert items were significant different within each other ( $F_{4,10} = 41.82$ ,  $p < 0.001$ ; One-way ANOVA;  $F_{critical} = 3.48$ ).

For paired t-test, we have grouped the responses into three categories (as discussed in the methodologies): Negative extremities (ranks: 1/2); Neutral option (rank: 3); Positive extremities (ranks: 4/5). The null hypothesis for the paired T-test is  $H_0$ : The two samples (here, extremities) are taken from populations (here, responses) with equal means. The results of the paired t-test are grouped in Table 5 and we conclude that the observed t-value (9.9702) exceeds the critical t-value (2.7764) at  $p = 0.05$  (Also,  $p_{observed} < 0.05$ ).

We reject the null hypothesis and accept the alternate hypothesis  $H_1$ : The two samples are taken from populations with unequal means. In other words, there is a significant relationship between the positive and negative extremities in the given Likert rating scale.

Items in the Likert scale	Ranks				
	1 (Extremely dissatisfied)	2 (Dissatisfied)	3 (Neutral)	4 (Satisfied)	5 (Extremely satisfied)
Responses are in percentages					
1) Interaction with teachers during online classes.	3.9	14.4	32.8	38.9	10
2) Interaction with teachers after the class hours (doubt clearing).	3.3	11.7	26.7	37.2	21.1
3) Teachers' ability to engage in the lectures.	1.7	6.7	35.6	36.7	19.4

Table 5. Pre-service trainee teachers' rating on teacher-student Interaction in online classes during COVID-19 outbreak through Likert scale.

Extremities (Samples) (A)	No. of responses (B)	% of responses (C)	Mean of C (D)	Variance	95 % Confidence level	t-value	p- value
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Positive extremities	294	163.3	54.3	24.173	(42.22, 66.647)	9.9702	0.00056
Negative extremities	75	41.6	13.9	25.41	(1.378, 26.422)		

Note: Significant at  $\alpha < 0.05$

Table 6. Paired t-test of the responses of pre-service trainee teachers retrieved from the Likert rating scale

### **Semi-qualitative assessment of challenges, benefits, and limitations of online classes: Pre-service trainee teachers' suggestions to improve online classes**

The three open-ended questions were meant to decipher the challenges, benefits, and limitations of online classes. From the open-ended questions, we concluded the major possible reasons depending on the repetition of the responses. The results of the present study revealed that the maximum number of respondents found access to a good internet connection (86.7 %) and the absence of laboratory experiments/activities (80.6 %) challenging (Figure 3). It was followed by 55 % of respondents preferring that lack of peer interaction is challenging in the course of online classes. 42.8 % of respondents felt that online classes are vulnerable to easy distractions and interferences due to the lack of a classroom environment. Lack of access to library books (19.8 %) and inability to write proper notes (25.4 %) received minimum responses as challenges in online classes (Figure 3). These challenges are vital for consideration to improve the online classroom platforms, considering these are the perceptions of future teachers.

About three-fifth of pre-service trainee teachers (59.4 %) considered that online classes save time that was otherwise being devoted to walking from hostels to classrooms (Figure 4). On a similar scale, 60.6 % of respondents believed the use of power-point presentations, as a part of online classrooms, is beneficial to their learning process. The use of audio/video clips (48.3 %) and a relaxing home environment (34.4 %) during the online classes are some of the perks as opined by the pre-service trainee teachers (Figure 4).

The last open-ended question was intended to receive suggestions from the pre-service trainee teachers, precisely the future teachers. The majority of suggestions stated by the respondents that they would like to experience the online classes. Maximum respondents felt the need to have a proper class timetable/schedule (81.2 %) which they find absent in the online classes. 76.7 % of respondents realized the need to have regular assessment systems as an improvement to the present online classes. This suggestion is followed by 73.4 % of pre-service trainee teachers reporting the need to provide a proper course syllabus (content structure) to them so that they can be prepared for the classes. A good recommendation that came from the respondents was to record the class videos and share the same with them after the class is over (65.1 %). Not all the instructors were sharing the recorded videos- creating a room for the given suggestion. In a similar notion, 67.9 % of pre-service trainee teachers believed sharing the PPTs after the class will be beneficial for making notes (Figure 5). The findings of the present study can be used to accrue a successful online classroom interaction - also, the suggestions are coming from the prospective teachers' perspectives and therefore, serves to be a worthwhile implementation for the future online classes.

## **DISCUSSION**

This study intended to decipher the perception of the undergraduate students, engaged in pre-teaching courses, towards the advent of online classes- a teaching-learning platform which is extremely new in the context of Indian Education. Salmon (2000) has reported the need to understand the behaviour of students towards the teaching practise as an important step towards effective learning- this study is an effort in the similar pursuit. According to the findings of Ogunnowo (2016), students' acceptance to the online learning is directly related to the access to technological aspects of online learning platform(s) since that increases acceptance while allowing self-paced learning environment. Similar observation was recorded in the present study wherein 86.7 % respondents considered lack of internet connection (like Wi-Fi) a major challenge in the online classes. In a study by Peytcheva-Forsyth *et al.* (2018), it was found that the bachelor students own a positive attitude towards the technologies they are well informed of. The investigators of the present study observed that 60.6 % respondents considered PPTs as a benefit to online classrooms- we can expect this response is owing to the awareness of the PPT mode of teaching

interaction. According to Liaw & Huang (2003) and Liaw & Huang (2011), the experience and expertise of the students with respect to specific web technicalities and applications in the educational context influences their attitude towards the online learning. These observations consociate with the present study-Indian education was never practiced through the online learning and the sudden transition from conventional method did not allow the teachers and students to gain any prerequisite skills, therefore, the respondents have vented out so many challenges-audio/video technicalities (38.9 %), inability to make notes (25.4 %), and easy distraction (42.8 %). Though the investigators did not observe intense enthusiasm among the future teachers for considering online classes as a future of teaching-learning transaction, there were 32.8 % responses in favour of embracing online classes. There were 30.6 % responses that accounted for the option of 'Don't Know' in this Likert item. We believe this finding is in line with the observations reported by Hardy (2011) where he has mentioned the need to develop online courses in better depth as there seem to be a strong proclivity among the prospective students to pursue the online classes. Our study found that a section of respondents preferred the traditional learning process as was reflected in the open questionnaire- 55 % respondents realised the lack of peer interaction in online classes while 38.3 % respondents felt the absence of chalk-board mode of teaching as an impediment to online classes. This statement also supports findings from the research of Ogunnowo (2016) and Salawudeen (2008) where it was revealed that a high proportion of students voted in favour of traditional classes. In addition to that, the intrinsic nature of the students is to be "social learners"- preferring to learn and interact in groups (Weaver, 2002). The study was conducted in an Indian institution where students- pre-service trainee teachers- from diverse socio-economic classes are enrolled for the degree. Seamless execution of online classes is subjected to internet connectivity and a high bandwidth Wi-Fi at home is a luxury which many parents cannot afford for their children- this can be an impediment for the pre-service trainee teachers (lack of proper internet connection: 86.7 %) to attend the classes as is also reported by Kruse (2006). As an advantage of online classes, 59.4 % respondents stated that online classes save time of travel from their hostels to classrooms- Gunasekaran et al. (2002) described the same advantage where e-learning saves expense and journey time of travelling from homes to the institutions. Relaxing home environment and classroom class schedules- 34.4 and 15.3 % respondents respectively labelled these two facets as advantages of online classes. This finding resonates with the study by Featherstone (2006) where he considered students' ability to control their learning environment as a primary benefit to pursue E-learning courses- this is also supported by the Adult learning theory. Jaggars (2014) concluded that many students find it difficult to adopt the online classes due to their inability to balance home-family-study demands. In a similar observation from our study, 56.11 % respondents have found themselves to be highly engaged in household chores. We observed that majority of the pre-service trainee teachers have positively affirmed to teachers' ability to engage them in the online classes (Likert scale)- Irwin & Berge (2006) have also referred teachers can break the obstacles of online classes by a healthy teacher-student interaction. It is reported that there is a relationship between use and access to online classes and students' satisfaction level (Qazi *et al.*, 2020)- such can be a plausible explanation for many of the pre-service trainee teachers realizing that online learning is not an acceptable future teaching-learning platform.

## CONCLUSION, LIMITATIONS AND FUTURE RESEARCH

The competence of online classrooms to allow interaction in an independent spatio-temporal platform is a feature of great worth in the present social situation. The COVID-19 pandemic has left everyone baffled as to when a 'good time' will arrive but it has opened the premise of online classrooms as a new educational paradigm for the future. Teachers, though willing to accept the new technologies, have vented the need to train their professional skills through seminars and workshops (Lowrie, 2007). The given study fits with the present social situation when the students are restricted in their homes and the major findings reflect the perspectives of pre-service trainee teachers regarding the online classes through the lens of Indian educational practises- more than half of the respondents displayed doubt and discontentment in the assessment patterns of the online classes; more than half of the respondents were in a state of incertitude and clear reluctance to accept online classes as a future medium of learning; teacher-student interaction was well appreciated by the respondents in the synchronous online classes; absence of laboratory experiments/activities, internet connectivity, lack of interaction among peers were the top three challenges in the online classes as per the respondents; among the advantages of online classes, use of PowerPoint presentations, saving travelling time from hostels to classrooms and sharing the recorded clips of classes topped the responses of the survey; the respondents felt need for proper class time tables and a better/regular

assessment system for facilitating the online classes. They suggested developing a proper structure of the content(s) to be delivered and that should be shared with them subject-wise before the class commences for that day.

The Indian education system is still in its infancy regarding the online classes and the teachers and students are very new to the new practice. For an efficacious teaching-learning environment, we must be open to suggestions and constructive criticisms- this study can be used to improve the shortcomings of the online classes to create an ambiance where the students are active learners. One way this study can affect the design or use of educational computer systems is to employ techniques of the flipped classroom while delivering content- in that way, one of the suggestions (prior intimation of content) of the pre-service trainee teachers is also considered.

The generality of this study lies with the entire community of teachers, educators, pedagogy experts, and policymakers to ease the execution of online classes. The majority of the studies done with respect to online classrooms have compared the students' performance in e-learning and blended learning practices but this study is unique in its way to explore the pre-service trainee teachers' perception of the online classes, with its applicability across the larger swath of developing nations of the globe. One of the limitations of this study is that due to the absence of participants physically, the data is collected through google forms which they are previously inexperienced with. This may lead to some confusion concerning answering the questions or submitting the responses, though full attention was paid by the investigators to such a situation. Another limitation is that the study was restricted to the level of pre-service trainee teachers which could have been more robust if the faculties were involved in the study.

The future implications of this study can be to report the perceptions of the teachers and the obstacles they face in light of online classes. Moreover, the surveyors took the responses from pre-service trainee teachers of science disciplines; hence, the study can be implied further to the student teachers from humanities and commerce backgrounds- this will provide a more comprehensive understanding. Even a similar study can be repeated with the same sample population after addressing their concerns through a gap of time in the academic year- this will provide their level of contentment with the amendments in the online classes, thereby justifying the amendments.

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