ORIGINAL PAPER

Analysing the role of gender and place of residence in acceptability and satisfaction towards e-learning among university students' during COVID-19 pandemic in India

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Abstract

This paper has two broad objectives; the first is to examine the challenges of e-learning faced by the students keeping in view their place of residence and gender in India, particularly during the second-wave of Covid-19. The second objective is to examine the role of place of residence and gender of students in the acceptance and satisfaction towards e-learning. The data has been obtained through an online survey of the students of University of Jamia Millia Islamia, New Delhi, India, in which a total of 490 students participated. Selection of students has been done through stratified sampling technique. Initially the obtained data was analysed and discussed through simple statistical analysis. Later, a chi-square test of independence was applied to find out the dependency of psychological stress, level of acceptance and level of satisfaction towards e-learning on the place of residence and the gender. The major finding of the paper reveals that the gender and the place of residence of the students is significantly associated with their psychological stress, acceptance and satisfaction towards e-learning. Extra money spent on the purchase of online learning resources was greater in case of rural students.

Keywords Covid-19 · Lockdown · Online education · e-learning

Introduction

India declared closing of various educational institutions (including private and government) during the last week of March-2020 due to rising cases of Covid-19 till further orders (Muthuprasad et al. 2021). The lockdown observed a shift from traditional face-to-face and in-person learning to techno-based online mode of learning

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and evaluation (Shakeel et. al. 2021). After June 30th, 2020 unlocking started, but most of the education institutes remained closed even after the lockdown restrictions were removed (Scroll.in 2020). Unfortunately, the 2nd wave of pandemic hit the masses and the lockdown was again imposed from April-2021 till further orders (Kar et al. 2021). From the last week of March-2020 till the writing of this article, the institutes of higher education were delivering education through online mode. Almost one and a half years have passed since the lockdown initiated and it has brought a complete paradigm shift in the pedagogy with all new experiences for the learners and the educators (Li and Lalani 2020). There are several aspects that are related with e-learning such as availability, accessibility, affordability and learning pedagogy which needs to be examined (Dhawan 2020). It is believed that online mode of learning and teaching is easy to access and can reach remote and rural areas as compared to offline teaching (Business Standard 2021). But on ground, the reality is different because availability of online teaching depends upon availability of the digital technologies used in education (India Today 2020a). The accessibility and affordability of online teaching depends upon the socio-economic condition of the student's household (Jain 2020). Thus, in a country like India where digital divide is rampant, majority is rural and a good proportion of the students in the institutes of higher learning come from rural backgrounds, online education is seeming difficult to deal with in contemporary scenarios.

The finding by Esquivel (2020) shows that marginalised and low-income group students were unable to maximise the benefits of online learning due to inaccessibility towards the required resources. In India, 220 million people are currently under poverty (Himanshu et. al. 2013; Planning Commission 2014) and where pandemic induced recession increased the proportion of population with income of 2\$ or less per day from 60 to 134 million in just a year (Mahapatra 2021). Under such conditions, it becomes very tough for the students coming from the rural background to move on with online education. Covid-19 lockdown affected the education of 290 million children due to closure of schools alone in India. Around six million children have been pulled out of schools due to economic insecurity (Chaturvedi 2020a, b, c). With online teaching at home the figures by National Statistical Office (NSO) show that three-fourth of the students in India do not have internet facility followed by 89% of the students who do not have any device including cell phone, tablets laptops and computers during 2017–18 (Hindustan Times 2020). Apart from all these material deficiency, online teaching also leads to lack of face-to-face human connection, supervision of teachers, absence of opportunities of collaborative learning and most important is the lack of hands-on learning especially in scientific subjects (Chari 2020).

Present study has been conducted in Jamia Millia Islamia (JMI) a university, located in north-eastern part of national capital Delhi. The university has been accredited with grade 'A' by National Assessment and Accreditation Council (NAAC) in February 2015 and 'A^{++}' in December 2021 (The Economic Times 2021; The Week 2021). The JMI was ranked at 12th position among Indian institutions by Times Higher Education (THE) World University Rankings (The Wire 2020). JMI was also ranked 6th among the top ten universities by the National Institutional Ranking Framework (NIRF) in 2021 in India overall (The Times of India

2021; PRO-JMI 2021). When the shift was observed from offline to online learning, JMI not just assumed that its teaching faculties would come out well and can teach effectively online. At the same time JMI was quick to take action to combat the effect of lockdown on education through various programmes and workshops for its faculty members enabling them to master online technological platforms for smooth running of academic calendar (The Indian Express 2020). During the first lockdown JMI activated online learning facilitation tools through Google Suit so that teachers can easily open their accounts on Google Hangouts, Google Classroom and Google Meets (Mehra 2020). JMI also organised Online Faculty Development Programmes for making their faculties use online teaching applications followed by more effective use of open education resources (India Today 2020b). JMI in association with UGC-HRDC also organised numerous workshops on MOOC's, e-content development and open educational resources in order to train their faculties in a better way for e-learning/e-teaching (UGC-HRDC-JMI 2019). There are sources available which deal with the viewpoint of the students on e-learning/online education (Mishra et. al. 2020; Patricia 2020a, b; Chakraborty et. al. 2020; Bojovic et. al. 2020 and Sia and Adamu 2021). At the same time very limited studies have focused on the role of gender and place of residence of the students on e-learning. Thus, the paper examines the problem faced by the male and female students and students residing in rural and urban areas during online education.

Literature review

The process of teaching and learning in the institutes of higher education has been significantly affected due to Covid-19 pandemic (Mukherjee 2020). The entire education system around the globe has shifted from face-to-face offline mode to technology based online education (Cuaton 2020; Wang et. al. 2020a, b). This shift in the pedagogy is also referred to as emergency remote learning (ERL). ERL is a temporary shift of education and teaching from an instructional delivery method to an alternate delivery method during a crisis (Hodges et al. 2020). Since time immemorial the process of learning and teaching in higher education was face-to-face and later, dissemination of education also started in a distance mode through radio, television and postal correspondence (Erlam et al. 2020). Recently, due to rapid development in digital information technology many institutes of higher education have also started to deliver education in a parallel online mode (Bearman et al. 2020). During normal times online courses are carefully planned and provide an effective learning environment (Palloff and Pratt 2013), but ERL is an emergency situation creating an obligation for students (Bozkurt and Sharma 2020). In the case of India, ERL created another emergency situation related to diversity of students on the basis of their gender and place of residence. Due to unsuitable study environments at home, poor internet connectivity and pandemic related psychological pressure (Kapasia et al. 2020) it becomes a challenging task for the students to observe sudden shifts towards ERL (Mishra et al. 2020).

Online teaching and learning largely depend on digital technological platforms and such type of teaching and learning is termed as e-learning. There are various

ways for delivering online education; fully online education, blended education, individual online courses and MOOCs (Xie et al. 2020). E-learning has developed as a new approach of learning that is much helpful for developing countries, but all the countries are not equally endowed with resources to tackle e-learning/teaching (Tamrat and Dmatew 2020). Online learning has its own challenges and solutions, but for now it cannot be taken as an option, but it is a necessity (Dhawan 2020). Online education has its own advantages such as flexibility, information accessibility, global reach, equity, innovations and efficiency (Xie et al. 2020). At the same time online education also has its own multi-dimensional challenges; some are on the part of educational institutions such as shortage of trained teachers, e-learning resources and infrastructural support (India Today 2021a). Some challenges are on the part of students such as difficulties in shifting from physical face to face to virtual distant learning (Sanchez-Gordon and Luj´an-Mora 2014), poor digital literacy, lack of familiarity with digital technology, lack of community (Song et. al. 2004), lack of online skills, low access to the devices needed for e-learning (Randy 2011), lack of preparedness regarding the use of online learning environment (Parkes 2015), language barrier and gender inequalities (Chaturvedi 2020a, b, c). Some challenges coexist with online learning such as network issues and technological constraints, lack of sense of belonging and connectedness, presence of distractions, lack of engagement (Xie et al. 2020). The penetration of e-learning among the females in general and rural females in particular is more deplorable. Thus, there is an urgent need for in-depth analysis of these challenges and their key players: the educator, the learners and the institution (Pandit and Agrawal 2021). Other challenges are related to mental health of the students because academic performance of the students will be affected by pandemic related stress. Differences in economic condition and resources availability might also affect the academic performance of the students (Feldman 2020). Digital transformation in education is not a new phenomenon; it coexisted with higher education for some years now (Kopp et al. 2019). The developing nations were shifting towards blended learning at a slow pace, but now the pandemic has accelerated the rate of its adoption. Blended learning is a combination of physical, face to face, interactive classroom learning with virtual online learning (Curran 2004; Garrison and Kanuka 2004).

India being a developing nation is still dominated by rural populations which have a lower rate of literacy than urban areas. Even before lockdown it was believed that online education in rural areas would help fight problems like access to quality education, shortage of teachers, lack of innovative techniques and methods, scarcity of reading resources and high drop-out rate (Chaturvedi 2020a, b, c), but the pandemic lockdown brings out the on-ground reality and challenges which are faced by the rural communities to move on with online digital education. The major challenge which has obstructed the dissemination of online learning is the rampant digital divide in India. There are studies which suggest that the digital divide is on the rise (Attewell 2001; Hargittai 2003; Puckett 2019). Rural communities do not have the required technological infrastructure essential to deliver and sustain a captative, in depth and satisfactory learning experience (Wilbur 2020). The accessibility of students towards digital technologies is not the same for all due to socio-economic factors. This digital divide existed earlier, but the arrival of the pandemic has

exposed the intensity and severity of this digital divide (Jaeger and Blaabaek 2020). Warschauer 1998) in their study claimed that students enrolled in poor schools use computers just for the preparation of presentations and students of the rich schools use computers for research purposes such as editing articles and learning statistical techniques used in research. Another problem which arises out of pandemic is the problem of mental health and students around the world are suffering from psychological stress and anxiety (Islam et. al. 2020; Cao et. al. 2020) and lack of motivation. Besides material challenges, Covid-19 Pandemic has also come up with psychological problems and mental issues as well. There are studies which argue that learning style should match with the students' choice of learning because it will have a positive effect on the individual's motivation (Cuneo & Harnish 2002; Katz 2002; Mitchell 2000; Sankaran and Bui 2001). Studies claim that variation in the learning approach does not impact on students' motivation and satisfaction (Klingner 2003; Terrel and Dringus 1999).

Research gap

Since the onset of Covid-19 extensive studies have been published, but literature concerning the perception of students towards online learning and its adaptation and satisfaction are few and few are studies related to the relationship of Covid-19 with the gender and place of residence (rural/urban) of the students.

Theoretical framework

Covid-19 pandemic and resultant lockdown was a totally new experience for human society which affected every sphere of life specially education. The shifting of teaching from an offline to online mode came up with new challenges for students especially for students belonging to poor social-economic and rural background. In Indian society a male child is more preferred and privileged in terms of provision of resources than a female child thus; online education has created new challenges for female students. Scanty literature is available which has focused on the effect of online learning with respect to the gender and place of residence of the students in India. This study will examine the challenges faced by students on the basis of their gender and place of residence and will provide constructive suggestions for effective online learning.

Hypothesis of the study

1. Whether psychological pressure on the students depends on students' place of residence.
2. Whether the level of acceptance to e-learning/e-teaching is associated with students' students' place of residence.
3. Whether satisfaction from e-learning depends on students' students' place of residence.
4. Whether the psychological pressure on the students is related to gender.

5. Whether the level of acceptance to e-learning has some relation with gender.
6. Whether the level of satisfaction from e-learning has some dependency on gender.
7. Whether the extra money spent in the purchase of e-learning related resources is associated with the place of residence of the students.

Objectives

1. To study the students' perception on e-learning during the second-wave of Covid-19 pandemic.
2. To examine the challenges faced by the students in adapting the e-learning process during Covid-19 pandemic.
3. To examine the rural–urban variation among the students in the availability and accessibility of the resources required for e-learning during Covid-19 pandemic.
4. To analyse the level of acceptance and satisfaction of the students towards e-learning on the basis of the gender and place of their residence.

Database and methods

Research design

The study takes up mixed research methodology using both qualitative (interview) and quantitative (primarily closed ended questionnaire) data collection methods (Creswell and Creswell 2018). Closed ended questions were framed in order to get the information about the socio-economic and demographic data, infrastructural divide in accessibility towards resources which supports e-learning, divide in the use of digital devices in e-learning, divide in the difficulties faced during online classes and household expenditure on digital resources. Additional, close-ended questions were framed to get information on psychological pressure, acceptance and satisfaction towards e-learning. Open-ended questions were framed to get information on their home learning environment, how gender affects learning at home during online classes and other factors related to positive and negative learning experience of the students that has affected their learning. Thus, three research questions governed this research. First, what are the challenges faced by the students on the basis of their gender, second; the challenges faced by the students on the basis of their place of residence and third; does gender and place of residence affect the psychological pressure on the students.

Population and sample

The participants of the present study were under-graduates and postgraduate students of the Jamia Millia Islamia (A Central University) belonging to different courses and faculties. Out of the total 490 participants 216 (44.1%) belong to rural areas and 274 (55.9%) belong to urban areas. Around 152 (31.0%) were aged between 15 and 20 years, 300 (61.2%) aged between 21 and 25 years and 38 (7.8%) aged between

26 and 30 years. More than half of the participants were male 308 (62.9%) and 182 (37.1%) were females. Almost equal number of students participated in the survey with 252 (51.4%) from under-graduate and 238 (48.6%) from post graduate level.

Sampling method

The population for the survey was heterogeneous because the students belonged to various post graduate and graduate programmes and were in different semesters and years. Thus, for categorising this heterogeneous population into homogeneous groups we opted clusters of various courses as strata because a cluster of a specific group is more homogenous in itself. Thus, for present analysis we opted for stratified sampling technique. From each cohort of different courses, we selected 5 to 15 students who had secured first division (more than 60% marks) in previous semester/year and were attentive in the classes when the teaching was going face to face in an offline mode. We also conducted a telephonic communication from the students, selecting 2 to 5 students from each cohort to have a finer and comprehensive understanding of the problems experienced by learners who are currently attending the online classes. The time taken to complete the survey was fifteen days from 16th April to 1st May, 2021. A positive aspect for choosing a Central university was that the researchers received the responses from different regions and states of the country because students from almost all the states, urban, rural and peri-urban areas come for education. The total student's responses incorporated in the study was 490 from over 20 programmes of various faculties such as faculty of Natural Science, Arts, Social Sciences, Commerce, Law, Education, Humanities and Languages etc.

Tools and techniques

A well-structured questionnaire was prepared for the collection of data which was divided in three parts. The first section of the questionnaire was related to their socio-demographic information such as age, education, gender, place of residence of the respondents. The second section of the questionnaire dealt with general information on students' information on severity and intensity of Covid-19 disease. Students' perception about the teachers' preparedness such as, what platform are they using, whether lectures are supported by the provision of study material and other resources such as handouts and online books etc. The third section of the questionnaire carries questions related to the technological, socio-economic and psychological problems experienced by students during e-learning. The question items related to psychological pressure on students, levels of acceptability and satisfaction from e-learning and gender wise psychological pressure were prepared employing five-point Likert's scale. Likert's scale is largely adopted to enquire about the phenomenon like viewpoint, acceptance and satisfaction towards different things where, 1 bears resemblance to strongly disagree, 2 shows disagree, 3 shows neither agree nor disagree (neutral), 4 shows agree and 5 shows strongly agree. Percentage analysis has been performed in order to explain the

results of the survey. Chi-square test has been opted for analysing and comparing the inconsistency between observed results with expected results.

Data collection

For the collection of data an online questionnaire was prepared using Google Forms and the link was circulated among the students through various online platforms such as WhatsApp, Facebook, and e-mails. The participants were informed about the research through questionnaires and informed consent was taken online. It was clearly mentioned in the questionnaire that the data collected will be kept strictly confidential and will be used solely for academic purposes.

Validity and reliability of the tool

We used Cronbach's alpha value to assess the reliability of questionnaire items. Initially, 30 questionnaire items received from the students were analysed and subject to analysis. Considering the reliability of the tool the questions in the questionnaire having low alpha value were eliminated and only those questions were kept which received acceptable alpha value for the preparation of the final questionnaire. Secondly, in order to check the validity of the tool and whether multiple question Likert's survey is dependable and reliable we performed a similar test to measure the internal consistency of the tool.

Data analysis and interpretation

Statistical analysis for the data obtained was performed using Microsoft Excel and SPSS Statistics Version 23.0. Acceptability, satisfaction and acceptance of e-learning was analysed through descriptive statistics. Results were shown in a number of participants (n) and percentage. Interpretative phenomenological analysis (IPA) was adopted to analyse the data. IPA is a method of interpreting qualitative data in research with an aim to provide detailed information about the respondent's experience related to a particular phenomenon or situation (Smith 2011; Smith and Osborn 2015). IPA also involves subjective interview which provides an opportunity for the researchers to analyse the perception of the respondents on a particular event (Smith et al. 2008). IPA is specially used in a condition where the sample of the data collected is small and in-depth analysis of the data is needed (Smith 1996). Moreover, results derived from 5-points Likert's scale items were analysed and presented in diverging stacked bar diagrams.

Results

Role of institution in e-learning/e-teaching

A positive response was observed from the students on how their institution/department is supporting their education at the time of lockdown because 66.1% of the students were of the opinion that they were taught through online video meetings through various online platforms such as Google meet and Zoom as well as study material were also provided in the form of write ups, pdfs, videos, audios through emails and WhatsApp. One/tenth of the students responded that the institution was using all kinds of facilities as given in the questionnaire (Fig. 1). As far as difficulties faced by teachers while taking online classes through different online modes were concerned, 71.8% of the students responded that their teachers felt no problem at all while 13.1% said their teachers hardly felt any problem. This shows that the facilities provided by the institution and the adoption of technology by the teachers since the beginning of the pandemic was appreciable and improved. Moreover, teachers were already using the social media platforms such as Facebook, Twitter, WhatsApp, Instagram which facilitated them to shift easily on online education platforms such as Google Meet, Zoom, and WebEx. Most of the students of central universities and institutions were aware of the various online communication applications thus, when asked about the use of these application other than education purposes 63% of the students responded that they use these applications for communication, 39% use it for professional purpose, 48% use it for enjoyment and during leisure and 32% for other uses. This shows that students were already very much familiar with the online platform which they were using for different purposes. The availability of free educational software on the Google play store and on the Android market such as Google Docs, Google Sheets, Office 365, Google Classroom, Microsoft PowerPoint has also facilitated their online learning. Moreover, as far the study is concerned when students were asked about the difficulties which they face in using those applications which were used by the teachers for delivering online classes and lectures then the students' responses were as follows: not at all—58.4%, rarely—24.1%, sometimes—5.3%, often—7.3% and no response 5.7%.
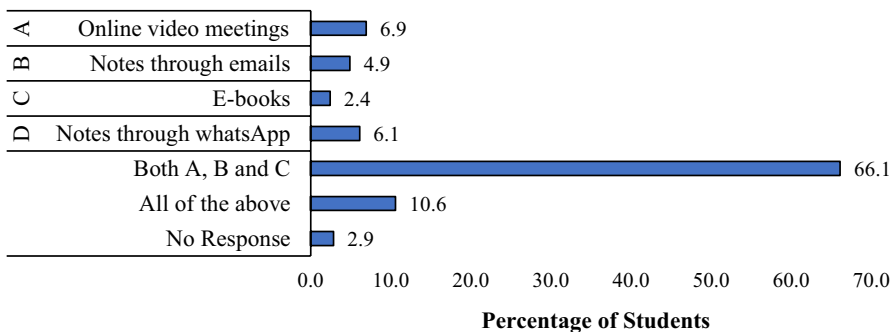

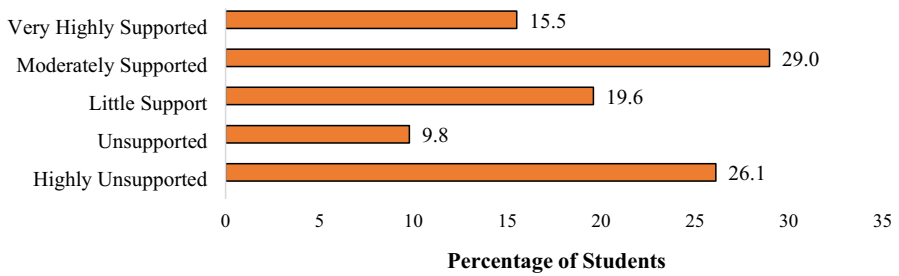**Fig. 1** Use of various online platform by the faculties in e-learning

Very Highly Supported — 15.5
Moderately Supported — 29.0
Little Support — 19.6
Unsupported — 9.8
Highly Unsupported — 26.1

Percentage of Students

Fig. 2 Proportion of students in support and against of e-learning

Highly Satisfied — 6.9
Satisfied — 14.3
Moderately Satisfied — 31.0
Disappointed — 29.0
Highly Disappointed — 18.8

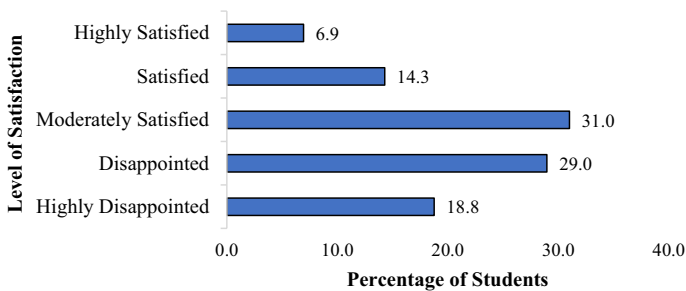**Level of Satisfaction**

Percentage of Students

Fig. 3 Students' satisfaction with e-learning

Students' opinion on e-learning/e-teaching

Student's opinion in assessing the productivity of e-learning is very important because students better analyse the ongoing situation on the part of institutional facilities they are getting in support of their studies and also how the teaching faculty is supporting and helping out the students in learning the subjects in an online mode. Present study took student's opinion on what they themselves feel while e-learning, when asked whether they are in favour or against the online pedagogy, the response of the students was as follows: highly unsupported—26.1%, unsupported—9.8%, little support—19.6%, moderately supported—29.0%, and very highly supported—15.5% (Fig. 2). The students who were not in support of e-learning were of the opinion that online mode of learning requires a lot of resources and technological equipment such as laptops, multimedia mobile phones, desktop computers, internet facilities which most of the rural students belonging to poor socio-economic backgrounds do not possess. We attempted to get an opinion concerning the satisfaction which students had during online teaching on which the data shows that 18.8% and 29.0% were highly disappointed and disappointed respectively. Only 21.2% of the students were satisfied with online mode of learning and teaching and the rest 31.0% were moderately satisfied (Fig. 3).

The study shows that 26.9% of the students who participated in the online survey were facing technological issues during the classes (Fig. 4). During a
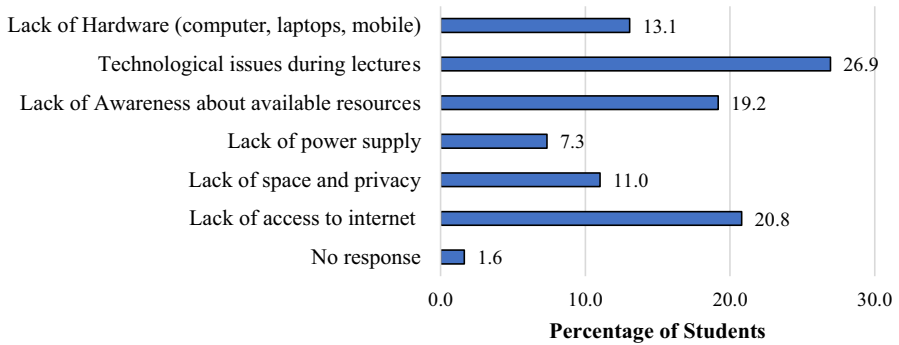
Fig. 4 Major drawbacks experienced by students during e-learning

telephonic interview the students said that to consume more information from the lecture they continuously look on the small mobile screen for hours long which might be detrimental for their health because most of the students did not have laptops, but were attending the classes through cell phones. Their internet data pack gets exhausted within 2 hours of the class because normally they recharge their phone with 1.5 to 2.0 giga byte data per day which is economically reasonable to afford. They faced problems in attending further online classes which normally lasted between 4 and 5 h per day. Most of the students were from the low-income background thus, it was not possible for them to opt for unlimited internet data packs whose monthly recharge was a costly affair for families who are already facing financial constraints. Power-cutting was also a major problem in the rural areas and 7.3% of the students said they continuously face the problem of power-cut in their area. Another drawback which was identified was the lack of hardware (laptop, desktop computer and cell phones) especially to those who belong to poor economic backgrounds and largely from rural areas. 13.1% of the students responded that they face problems related to the unavailability of hardware. Almost one/fifth (20.8%) of the students were having poor internet access and most of the time they were facing connectivity issues and their connection goes-off in between the lecture (Fig. 4). The survey shows that 8.6% of the students informed that for proper connectivity most of the time they prefer to be at an open space or go to the terrace and 11.4% of the students switch-off their video to have proper audio signal. About 19.2% of the students said that they were not aware about the available resources which could have assisted their online learning. Students were not aware about the Swayam's MOOC platform by the Indian government which provides online courses in various subjects. They were also unaware about the e- PG Pathshala by University Grants Commission (UGC), Government of India, which provides high quality study resources both in PDF and PPT format. They were not aware about the online websites which were providing free downloadable e-books and articles. Moreover, 11% of the students were facing the problem of privacy and lack of a conducive environment at home.

Almost, three/fourth (72.2%) of the students responded that they worry thinking that if Covid-19 situation does not normalise then it will affect their career plans.

Problems experienced by the students in e-learning/e-teaching

Students were encountering various kinds of technological and psychological issues at home, which in turn, may reduce the ability of students in e-learning. Majority of the students (75.9%) opined that the major problem related with online classes was face to face interaction with the teachers and their classmates (Fig. 5). During the interview, students were of the view that during online classes it was difficult for them to have an interactive session with the teachers which affected their understanding of the topics being taught in the class and they were also not able to clarify their doubts instantly. Post lecture discussions among the classmates and interaction with the teachers during the offline classes provide a healthier environment for easy understanding of the concept. Reduction in the contact hour for students and lack of counselling from teachers makes understanding and learning a difficult process. Second major hurdle being faced by the students was the preparation and submission of works assigned by the teachers through an online platform. During the offline classes the internal marks of examination was given through sessional tests, but due to lockdown the internal marks are assignments based. Thus, shifting of classes has increased the student's academic workload. Our data reveals that most of the students (62.4%) were attending the classes through cell phones and they do not own laptops and desktop computers thus, they face problems in the preparation of assignments (Fig. 6). During a telephonic interview they said that instead of typing the assignments, they took images of handwritten assignments, converted the images into PDF files and then sent it to the concerned teachers through email and Google classroom. Extra homework and assignments followed by rescheduling of classes was also reported by the students which makes them struggle with online learning. Students were of the opinion that the home assignments also require internet connections because they don't have access to the library and we don't have many
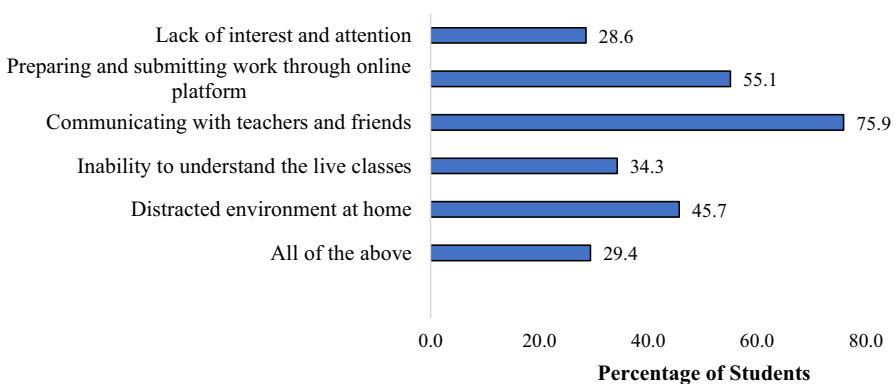
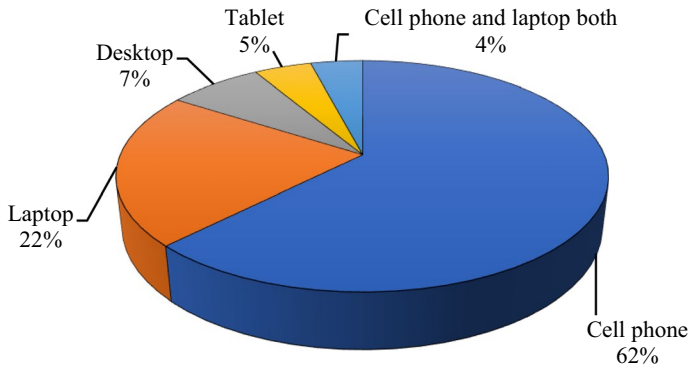**Fig. 5** Types of difficulties faced during the online classes

Fig. 6 Device used by the students for attending the online lectures

books at home. Students also commented on the teacher's teaching speed, they said that the speed of the teacher while teaching remains the same as it was in offline classes, but in online platforms teachers must adjust the speed with the understanding capability of the students which normally decreases during online learning. Around 34.3% of the students felt difficulty in understanding the topics being taught through online platforms because of lack of interest, poor accessibility and intermittent connectivity of the internet followed by lack of proper study environment at home. The data shows that 45.7% of the students said that they are distracted because they do not have quiet/private space and within their home environment, siblings were in too close proximity attending the classes at the same place and time, and sometimes they were also allocated household tasks.

Around 28.6% of the students told of lack of interest and motivation in the online classes because continuously looking at the screens of the mobile and laptops makes them feel mentally lethargic and inattentive leading to headaches. They also opined that they were not habitual of attending the classes through cell phones and laptops. Around 70.6% of the students reported to eye related problems due to e-learning and out of total respondents 23.7%, 13.1% and 3.27% visited the doctor for once, twice and thrice for eye check-up, respectively. The students reported that they were attending on an average 5 periods per day and each period was of fifty minutes and sometimes the periods were in continuity which was unbearable to them. Present study also enquired about the mental pressure on the students regarding the online open book examination rather than regular offline examination. The feedback of the students was as follows, 41.6% of the students were in favour of offline examination when the situation became normal, 26.9% of the students favoured online examination and 31.4% of the students were of the view that online examination is fine, but in a more systematic and organised manner. During the interview the students were of the opinion that during past open-book online examinations they faced a lot of difficulties in uploading the answer sheets on the institution's online portal, they faced internet connectivity issues and some opined that they uploaded the answer sheet, but it was not received by the institution. This is the reason why when asked about the institutional effort for holding the online exam; the response of the students was

as follows: highly disappointing—14.3%, disappointing—21.2%, moderately satisfied—44.1%, satisfied—14.7% and highly satisfied—5.7%.

Socio-economic problems of the households and its impact on online education

Around 44.1% of the students who participated in the online survey belonged to the rural areas and the rest 55.9% were from urban areas. Students under the present study come from different socio-economic backgrounds which creates differences in access to opportunities due to variation in household's income, availability of overall resources, per capita availability of resources with the households, and the educational level of parents. In a country like India where poverty and deprivation are widespread will affect the student's online learning capability especially, those who are coming from marginalised sections of the society. In India, lockdown observed mass migration of the families to their home town because of unemployment, depleting savings, unexpected future and fear of disease. During the lockdown, 50.2% of the students migrated to their native places with their families and 49.8% of the students stayed with their families at the place of their work. Migration further added problems in their online education because the data reveals that 30.2% of the students do not have proper resources and digital tools such as multimedia cell phones, laptops, computers, internet and Wi-Fi due to financial problems. For continuing their studies their parents had to spend extra money on the resources required.

Out of total (490) students, 276 (56.3%) students responded that their family has to spend extra money on the purchase of resources (irrespective of amount) which was necessary for online education such as cell phone, laptops, desktop computers, Wi-Fi modem, etc. Out of 276 students, 128 (26.1%) were from rural areas and the remaining 148 (30.2%) were from urban areas. The data shows that expenditure on online resources was higher in urban areas at aggregate level, but at a disaggregate level, 24.8% of the urban students had to spend less than 10 K Rs as compared to 14.8% of the rural students. From among the total students, 17.1% of the students reported spending between Rs 10 and 20 K out of which 20.4% and 14.6% belonged to rural and urban areas, respectively. Similar conditions were also observed where
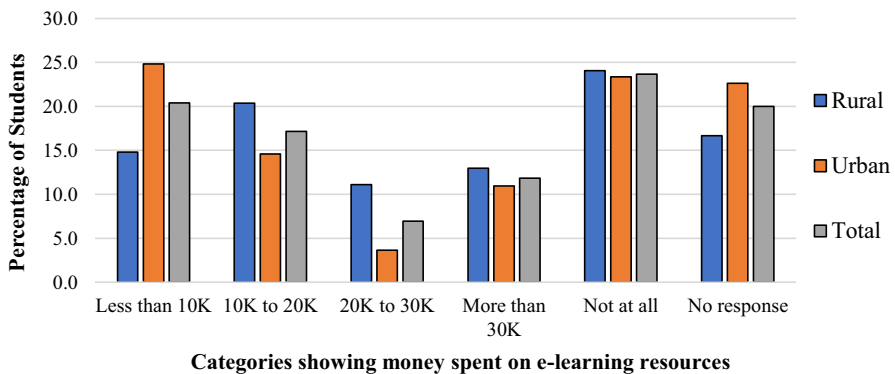

Fig. 7 Household expenditure on the purchase of e-learning resources

the students reported spending between Rs 20 and 30 K because the proportion of rural students (11.1%) was higher than urban students (3.6%) (Fig. 7). Thus, it can be inferred that the majority of the student's family was facing difficulty to move on with e-learning which requires a lot of resources and money. Hampton et. al. in their study in the USA opined that, students who do not have access to laptops and broadband performed poorly compared to those who possess laptops and internet. Among the students who returned with their families back to their native place, around 14.7% responded that their siblings had been taken out from the school because of lack of money paid as school fees and buying equipment for online classes. There were some more issues related to the socio-economic background of the student's such as, most of the students were not interested in switching their camera on because they do not want their teachers and other classmates to see their home environment. They feared that their poor social background would be exposed to others and they might pass judgement on their background.

Effect of place of residence (rural/urban) on e-learning

The effect of Covid-19 on e-learning varies with students' (place of) residence. The effect of Covid-19 on online education of the rural and urban students is an important phenomenon to enquire upon because the infrastructural facilities, socio-economic condition of the households and the availability of resources which contribute to online teaching differ in rural and urban areas. When asked to rank their psychological pressure due to Covid-19 on a scale from 1 (never) to 5 (highly), the response of the rural and urban students was as follows: never—17.6% and 10.2%, hardly—5.6% and 13.9%, sometimes—25.0% and 29.9%, often—17.6% and 21.2, and highly—34.3% and 24.8%, respectively. The reason for high response of rural students in the high category was large because during the interview the students responded that the reason for increased psychological pressure was the depleting income of the family due to lockdown, unemployment of the working members of the family, low availability of medical and healthcare facilities in their rural which generates a sense of fear among them in case they or any other family member get affected. But in other categories the response from urban students was more because the students were of the view that they were continuously receiving news regarding the spread of infection and deaths on a daily basis and the chances of getting infection for them is more in comparison to those who are living in rural and low-density areas. There are studies which show that the level of anxiety among the students is related with social media use (Gao et al. 2020; Kaya 2020). The data shows a mixed response to psychological pressure on students belonging to rural and urban areas both were psychologically disturbed depending upon their own causes.

   As far as the support of e-learning is concerned, the data shows that the proportion of rural students against e-learning was greater. Around 27.8% of rural students were not at all in support of online education as compared to their urban counterparts which accounted for 22.6%. Interestingly we found that the rural background students were in more support of online education. Among the total rural students 19.4% were in high support as compared to their urban counterparts which

accounted for 15.3%. Here the rural students differ in their opinion because those rural students who were not in support of online education were of the view that they face a lot of difficulties in online learning such as problem of downloading the study materials, poor internet connectivity leading to difficulty in account login and problem with video and audio. On the other hand, the rural students who were in favour of online education were of the opinion that attending online lectures provided them a sense of psychological safety because the rate of infection is greater in urban high-density areas where it is tough to maintain the social distance. Moreover, when students were asked to rank their satisfaction level with the e-learning/e-teaching on a scale from 1 (highly dissatisfied) to 5 (highly satisfied), the response of the rural and urban students was as follows: 22.2% and 16.8% (highly dissatisfied). 27.8% and 29.2% (dissatisfied), 28.7% and 32.8% (moderately satisfied), 15.7% and 13.1% (satisfied) and 5.6% and 8.0% (highly satisfied), respectively. Though the survey shows that rural students were in support of online education, but as far as their satisfaction was concerned it was poor. These differences in the opinion of rural and urban students regarding e-learning exist because of digital inequality. Rural students have bare enough internet access and the devices required for online education. Inaccessibility to the digital tools, poor internet connections, unavailability of high-speed internet and Wi-Fi were some of the reasons for lack of interest in online teaching for the rural students.

Role of gender in the adaptation of e-learning during the lockdown

The disparity in the use of technology between males and females is an interesting matter of query (Brown 2016) because there is a stereotypical view in the society that males are more tech-savvy and females have a negative orientation towards the use of technology (Canada and Brusca 1993). Thus it is also important to analyse the role of gender in the adaptation of e-learning because mental capability to adjust during difficult times vary with gender. The Covid-19 and the resultant lockdown have increased the psychological pressure on the students affecting their academic performance. Thus, when asked to rank their psychological pressure due to Covid-19 on a scale from 1 (not at all) to 5 (highly), the response of the male and female students was as follows: never—13.0% and 14.3%, hardly—9.1% and 9.9%, sometimes—25.3% and 34.1%, often—17.5% and 23.1% and highly—35.1% and 18.7%, respectively. The data shows the psychological pressure of Covid-19 was greater on the male students than the female. It may be said that female students apart from study hours were also busier in other household works than the male which were mostly free other than study hours. Regarding the level of support for e-learning/e-education, the study reveals that larger numbers of students were against the online mode of learning and females were more against the online learning as compared to males. The data shows that 46.2% of the female and 44.8% of the male students were not in support of e-learning. Whereas, only 27.5% of the female and 24.7% of the male students were highly supportive of e-learning. The first reason is while being at home and studying it becomes tough for a female student because she is also engaged in various household and domestic works which affects their education.

Table 1 Observed Chi critical value and Chi^2 Value for every hypothesis

Hypothesis (s. no.)	Chi critical value (alpha value)	Chi^2 value (At 5% level of significance)
1	9.487	18.616
2	9.487	7.712
3	9.487	4.25
4	9.487	15.672
5	9.487	15.324
6	9.487	4.343
7	9.487	178.588

Table 2 Observed frequencies of students in various levels of pressure at the place of residence

Levels of disturbance

Category	Never (%)	Hardly (%)	Sometimes (%)	Often (%)	Highly (%)	Total (%)
Rural	38 (57.58)	12 (24.00)	54 (39.71)	38 (39.58)	74 (52.11)	216 (44.08)
urban	28 (42.42)	38 (76.00)	82 (60.29)	58 (60.42)	68 (47.89)	274 (55.92)
Total	66 (100)	50 (100)	136 (100)	96 (100)	142 (100)	490 (100)

Secondly, in Indian context a girl normally does not leave her home without any cause other than education. Thus, the opportunity to go out was ceased due to lockdown and it is also a reason for more female respondents to oppose online mode of learning. Online learning is not supported by the students, as far as their level of satisfaction is concerned the survey shows that 44.0% of the females and 46.8% of the males were unsatisfied with online mode of learning followed by 20.9% of females and 24.0% of male students were satisfied with e-learning.

Statistical analysis

After the preliminary analysis of data, we now examine the data statistically. In order to analyse the reactions and conduct of the learners we consider numerous factors and their place of residence and gender. We applied the Chi-square method for testing the hypothesis. All hypotheses were tested at 5% level of significance with four degrees of freedom. On the basis of the obtained values of χ^2 (chi value) (Table 1), our finding regarding the first hypothesis suggests that place of residence has a significant role in creating psychological pressure on the students. The actual responses of the students on the basis of their place of residence have been shown in Table 2. Table 2 also shows the urban and rural students in each category of psychological pressure it can be inferred that urban students were more psychologically disturbed. The rapidly rising cases and high mortality due to Covid-19 pandemic in urban areas and fear of getting infected were the reasons behind increased psychological pressure on the urban students.

Table 3 Observed frequencies of students in various levels of acceptance at the place of residence

Levels of acceptance

Category	Highly opposed (%)	Opposed (%)	Moderately accepted (%)	Highly accepted (%)	Very Highly accepted (%)	Total (%)
Rural	60 (49.18)	36 (36.73)	62 (45.59)	16 (32.00)	42 (50.00)	216 (44.08)
Urban	62 (50.82)	62 (63.27)	74 (54.41)	34 (68.00)	42 (50.00)	274 (55.92)
Total	122 (100)	98 (100)	136 (100)	50 (100)	84 (100)	490 (100)

The second hypothesis inquires whether acceptability towards e-learning is linked with students' (place of) residence. Our finding indicates that the acceptance of e-learning by the students is independent of their place of residence, that is, place of origin has no role to play in the acceptability towards e-learning. Table 3 shows the level of acceptability of e-learning by the students. Table 3 also depicts the quantity of urban and rural learners in percentage who were in favour and against e-learning. The figure shows that the urban as well as rural students both were not in support of online education because both were facing specific problems at their own end.

The third hypothesis investigates whether the level of satisfaction from e-learning has some dependency on students' (place of) residence. Our finding indicates that the satisfaction level of the students from e-learning is independent of their place of origin, that is*, the satisfaction level of the students is not associated with location of residence*. The data related to various levels of support has been shown in Table 4. The Table 4 also depicts the percentage of rural and urban learners who were satisfied and unsatisfied with e-learning. The figure shows that the place of residence does affect the acceptability, but mental, technological and socio-economic challenges encountered by the students leads to low acceptance.

Fourth hypothesis looks into whether the psychological pressure on the students is related to their gender. The frequencies observed are shown in Table 5 in various levels of pressure. Our findings suggest that the *level of pressure is linked with the gender of students*. The Table 5 shows a comparative level of disturbance and it also shows proportion of males and females in each level of pressure. The figure shows that the proportion of male students is higher in highly, often and sometimes,

Table 4 Observed frequencies of students in various levels of satisfaction at the place of residence

Levels of Satisfaction

Category	Highly unsatisfied (%)	Unsatisfied (%)	Moderately satisfied (%)	Satisfied (%)	Highly satisfied (%)	Total (%)
Rural	48 (51.06)	60 (42.86)	62 (40.79)	34 (48.57)	12 (35.29)	216 (44.08)
urban	46 (48.94)	80 (57.14)	90 (59.21)	36 (51.43)	22 (64.71)	274 (55.92)
Total	94 (100)	140 (100)	152 (100)	70 (100)	34 (100)	490 (100)

Table 5 Gender-wise observed frequencies of students in various levels of disturbance to e-learning

Levels of Disturbance					
Category	Never (%)	Hardly (%)	Sometimes (%)	Often (%)	Highly (%)	Total (%)
Female	26 (39.39)	18 (39.13)	62 (44.29)	42 (43.75)	34 (23.94)	182 (37.14)
Male	40 (60.61)	28 (60.87)	78 (55.71)	54 (56.25)	108 (76.06)	308 (62.86)
Total	66 (100)	46 (100)	140 (100)	96 (100)	142 (100)	490 (100)

categories than female students. Thus, the data shows that female students have less psychological pressure than the male students.

Fifth hypothesis explores whether the level of acceptance to e-learning has some relation with gender. Data related with different levels of acceptance has been shown in the Table 6. Our finding shows that the acceptance towards e-learning by the students is dependent on gender, that is, the *acceptance level is related with gender*. Table 6 shows a comparison of the proportion of male and female students who are in support and against e-learning. The figure shows male students were showing more positivity in accepting e-learning than female students because females have to do household and other domestic work when at home thus, not being able to attend the lecture properly was reason for low acceptance.

Our finding regarding the hypothesis whether the level of satisfaction from e-learning has some dependency on gender suggests that the *satisfaction level of the students is not related to their gender*. The proportion of male and female students who are satisfied and unsatisfied with e-learning is shown in the Table 7. Observed frequencies are shown in Table 7 in various levels of support. The data shows that

Table 6 Gender-wise observed frequencies of students in various levels of acceptance to e-learning

Levels of acceptance					
Category	Highly opposed (%)	Opposed (%)	Moderately accepted (%)	Highly accepted (%)	Very highly accepted (%)	Total (%)
Female	36 (28.57)	48 (50.00)	48 (33.80)	24 (50.00)	26 (33.33)	182 (37.14)
Male	90 (71.43)	48 (50.00)	94 (66.20)	24 (50.00)	52 (66.67)	308 (62.86)
Total	126 (100)	96 (100)	142 (100)	48 (100)	78 (100)	490 (100)

Table 7 Gender-wise observed frequencies of students in various levels of satisfaction to e-learning

Levels of satisfaction					
Category	Highly unsatisfied (%)	Unsatisfied (%)	Moderately satisfied (%)	Satisfied	Highly satisfied (%)	Total (%)
Female	38 (40.43)	42 (32.31)	64 (41.56)	26 37.14(%)	12 (28.57)	182 (37.14)
Male	56 (59.57)	88 (67.69)	90 (58.44)	44 (62.86%)	30 (71.43)	308 (62.86)
Total	94 (100)	130 (100)	154 (100)	70 (100%)	42 (100)	490 (100)

the students living in rural areas have to spend more money on purchase of e-learning related resources in comparison with their urban counterparts. We also inquired about the relationship between the extra money spent on the purchase of online resources and the place of residence of the students.

Shifting of classes from offline to online mode led to increased investment in the purchases of equipment required for online classes such as cell phones, laptops, tablets, internet plans etc. We checked whether the extra money spent in the purchase of e-learning related resources has some dependency on the place of residence of the students. Observed frequencies are shown in Table 8 and we found that the *extra money spent on purchase of e-learning resources is associated with the place of residence.* The proportion of rural and urban student's spending money on e-learning resources in each category is also shown in the Table 8.

Discussion

There are studies which show that emergency pandemic situations may affect the psychological condition of the students in the form of fear, anxiety and depression (Mei et al. 2011). Our findings are similar to the findings of other studies which show that students are facing psychological pressure and anxiety due to effect of pandemic on their studies (Cornine 2020; Essadek and Rabeyron 2020) and their future employment and career plans (Hasan and Bao 2020; Wang et al. 2020a, b). Lack of interest and motivation followed by communication gap with the teachers and fellow classmates was among some causes behind low positive response of students towards e-learning (Patricia 2020a, b) and our data also reveals the similar findings. We found that students belonging to poor socio-economic and rural backgrounds experience more economic and health related issues in adapting online education. Previous studies also indicate that students belonging to less economically advantageous groups face more negative outcomes than the advantageous students (Aucejo 2020; Grishchenko 2020) especially; students from rural areas were at greater loss (Chaturvedi 2020a, b, c; India Today 2021a). Lembani et al. (2020) in their article argues about the existing digital divide which is amplified by the current pandemic situation and insufficient access to communication and information technology by rural students. Our study also observes the similar finding that a digital divide is present between rural and urban areas which affects the adaptability and satisfaction of online education by the students especially those from rural areas. Place of residence also plays an important role in level of acceptance and satisfaction in online learning. Our findings are similar with the study undertaken by Muthuprasad et al. (2021) which shows that flexibility and convenience of online learning is more appealing option, but those who belong to rural areas does not find online learning a suitable option due to problems like poor internet connectivity and other infrastructure related issues such as power cut, lack of space and privacy, lack of hardware etc. (Naik et al. 2021).

Studies dealing with gender differences and their attitude towards use of technology are variable thus drawing any firm conclusion is a difficult task (Cai et al. 2017). There are studies which show that males have a more positive attitude towards technology

Table 8 Area wise household expenditure on the purchase of e-learning resources

Category	Less than 10 K (%)	10 to 20 K (%)	20 to 30 K (%)	More than 30 K (%)	Not at all (%)	No response (%)	Total (%)
Rural	32 (32.00)	44 (52.38)	24 (70.59)	28 (48.28)	52 (44.83)	36 (36.73)	216 (44.08)
Urban	68 (68.00)	40 (47.62)	10 (29.41)	30 (51.72)	64 (55.17)	62 (63.27)	274 (55.92)
Total	100 (100)	84 (100)	34 (100)	58 (100)	116 (100)	98 (100)	490 (100)

(Colley and Chamber 2003; Kay 2009; Hasan 2010). This might be one of the reasons for the technological gender gap leading to variation in acceptance and satisfaction level. Richardson and Woodley (2003) opines that learning outcomes in case of female students may be higher because they are more determined and devoted than males. Alghamdi et al. 2020 opined that stronger self-regulation in females than males makes the learning outcome more significant in females, but as far as level of acceptance and satisfaction towards e-learning is concerned studies suggest that gender has no role to play in acceptance (Cuadrado-García et al. 2010; Hung et al. 2010) and satisfaction towards online learning (Harvey et al. 2017). In the present study we found that the level of acceptance for online education is greater in males as compared to females and level of satisfaction is not associated with gender. The level of acceptance among males is higher because male students are not engaged in household work. Female students during online classes remain at home and at the same time they have to perform household and other domestic work thus, acceptance among female students observed was low (India Today 2021b).

Implications of the study

Present article has identified several challenges experienced by the students on the basis of gender and place of residence. These challenges could be analysed and a work plan can be framed for hassle free execution of online learning at the receivers end (students). Rural areas and their students face problems related to availability and accessibility towards resources required for online learning. Though the government has initiated various programmes to boost e-learning such as DIKSHA, SWAYAM-MOOCs, e-PG Pathshala, National Digital Library etc., but the inability to avail and access these services at household level still remains a challenge. The students are facing problems related to the availability of hardware (laptops, mobiles and tablets) and internet related issues. Thus affordable technical assistance must be provided to those who are in need and increased investment is required to improve the poor rural infrastructure. Once the new normal is achieved and students adapt accordingly to the pandemic situation it will become easy to move on with online learning. Students have reported that the syllabus which they were earlier following in an offline mode is lengthy and tough for online mode learning. Lengthy online lectures and problems related to course delivery leads to stress, lack of interest, attention and inability to understand the concepts taught in the classes. Thus, curriculum load should be reduced and made easier. This will provide more time to students to meet the deadlines for the submission of home assignments especially to the rural students and female students. The developed nations of the world find it easier to tackle the emergency remote learning, but for a country like India where digital divide is rampant between rural and urban, economic divide between *rich and poor* must be addressed seriously for proper adaptation of online learning.

Conclusions and suggestions

Proper functioning of online mode of learning largely depends upon two factors. First is the adaptability and usage of online teaching platforms by the teachers and faculties at the delivering end; secondly; the availability and accessibility of technical resources by the students and learners at the receiving end. For the delivering end the study concludes that the availability, usage and adaptability of various kinds of online teaching platform by the teachers of the institute were appreciable. The study finds that the problem with e-learning was not from the delivering end, but it was on the receiving end. It was the students who were facing different kinds of infrastructural, technological, social, economic and mental health problems. Students were not in favour of online education and their satisfaction level was also low. The study reveals that gender has a significant role in psychological pressure due to pandemics. The adaptability of online education was also found to be significant with gender, but the satisfaction level was having an insignificant relationship with gender. Study concludes that place of residence has a significant role in the psychological pressure on the students. The rural students were under more mental pressure first due to fear of Covid-19 pandemic and its effect on their education.

Moreover, study shows that place of residence has no significant relationship with the adaptability and satisfaction towards online education. This reveals that rural and urban students both were facing problems related to online education with different causes. Problems like digital divide between *rural and urban*, *rich and poor*, *have and have not* been required to be addressed seriously because the poor and vulnerable learners of the society were badly affected by the pandemic. The greatest threat faced by the students was the digital divide and even if the government and institutes of higher learning come up with different faculty development programmes for teachers and improved e-syllabus for the students, until the digital divide narrows down one cannot provide better e-learning content and environment to the student. If the authorities remain sluggish in providing online supportive measures, then the current digital disparity would widen the educational inequalities. Since the major hurdle in rural-online education is the unavailability of internet and other related infrastructure and inaccessibility of the hardware and software resources by the students due to economic problems thus, it will take time for the students to get well equipped with the needed resources. Before all, the rural areas must be provided with regular power supply because daily power cuts for indefinite time is the prime hindrance in the dissemination of e-learning. Next emphasis should be on dissemination of the internet because internet penetration in India (45.0% in January, 2021) is much lower than the world average (59.5%). The students must be provided with laptops by the governmental bodies. The associated institution must look out for the proper infrastructure development related to the internet in the rural areas. The availability of low-cost and high-speed internet should be made available by the government through community participation focusing more on the provision of Wi-Fi hotspots rather than individual internet connection. Moreover, at the earliest,

the government should come up with a student's mobile recharge plan in which students will get internet connection and data on a highly subsidised rate and in some cases for free. Students reported that continuous periods and constant gazing on screens for 5 days a week was unbearable. Thus, the institution must bring some changes in their curriculum with respect to the continuity of the periods as well as the topics taught.

Data availability All data generated or analysed during this study are included in this article.

Declarations

Conflict of interest The authors of the present manuscript declare that there is no conflict of interest.

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