



Students' perception and preference for online education in India during COVID -19 pandemic

T. Muthuprasad ^{a,*}, S. Aiswarya ^b, K.S. Aditya ^a, Girish K. Jha ^a

^a Division of Agricultural Economics, ICAR- Indian Agricultural Research Institute, New Delhi, 11001, India

^b Division of Agricultural Extension, ICAR- Indian Agricultural Research Institute, New Delhi, 11001, India

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ABSTRACT

Educational institutes across the world have closed due to the COVID-19 pandemic jeopardizing the academic calendars. Most educational institutes have shifted to online learning platforms to keep the academic activities going. However, the questions about the preparedness, designing and effectiveness of e-learning is still not clearly understood, particularly for a developing country like India, where the technical constraints like suitability of devices and bandwidth availability poses a serious challenge. In this study, we focus on understanding Agricultural Student's perception and preference towards the online learning through an online survey of 307 students. We also explored the student's preferences for various attributes of online classes, which will be helpful to design effective online learning environment. The results indicated that majority of the respondents (70%) are ready to opt for online classes to manage the curriculum during this pandemic. Majority of the students preferred to use smart phone for online learning. Using content analysis, we found that students prefer recorded classes with quiz at the end of each class to improve the effectiveness of learning. The students opined that flexibility and convenience of online classes makes it attractive option, whereas broadband connectivity issues in rural areas makes it a challenge for students to make use of online learning initiatives. However, in agricultural education system where many courses are practical oriented, shifting completely to online mode may not be possible and need to device a hybrid mode, the insights from this article can be helpful in designing the curriculum for the new normal.

1. Introduction

With the COVID-19 -a novel corona virus disease spreading across the globe, many countries have ordered closure of all educational institutes. Educational institutions have come to a functional standstill since they had to protect their students from viral exposures, which are likely in a highly socializing student community. In the beginning of February 2020, schools only in China and a few other affected countries were closed due to the proliferating contamination. However, by mid-March, nearly 75 countries have implemented or announced closure of educational institutions. As on 10th March, school and university closures globally due to the COVID-19 has left one in five students out of school. According to UNESCO, by the end of April 2020, 186 countries have implemented nationwide closures, affecting about 73.8% of the total enrolled learners (UNESCO, 2020). Even though the lockdown and social distancing are the only ways to slowdown the spread of the COVID-19 by

breaking the chain of transmission, closure of educational institutions has affected large number of students.

As the schools and colleges are shut for an indefinite period, both educational institutions and students are experimenting with ways to complete their prescribed syllabi in the stipulated time frame in line with the academic calendar. These measures have certainly caused a degree of inconvenience, but they have also prompted new examples of educational innovation using digital interventions. This is a silver lining on a dark cloud considering the sluggish pace of reforms in academic institutions, which continues with millennia-old lecture-based approaches in teaching, ingrained institutional biases and obsolete classrooms. Nevertheless, COVID-19 has been a trigger for educational institutions worldwide to pursue creative approaches in a relatively short notice. During this time, most of the universities have shifted to online mode using Blackboard, Microsoft Teams, Zoom, or other online platforms.

The educational institutions in affected areas are seeking stop-gap

Abbreviations: TC, Total Count.

* Corresponding author.

E-mail addresses: muthuprasad1994@gmail.com (T. Muthuprasad), aishuambady@gmail.com (S. Aiswarya), adityaag68@gmail.com (K.S. Aditya), girish.stat@gmail.com (G.K. Jha).

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solutions to continue teaching, but it is important to note that the learning quality depends on the level of digital access and efficiency. The online learning environment varies profoundly from the traditional classroom situation when it comes to learner's motivation, satisfaction and interaction (Bignoux & Sund, 2018). The Community of Inquiry (COI) framework offers a convenient baseline for intervening in online teaching and learning (Garrison et al., 2001). According to COI framework, success of web-based instruction is determined by creating a learners' group. In this group (analogous to the traditional classroom situation), learning happens through three interdependent elements: (1) social presence, (2) cognitive presence, and (3) teaching presence. Study by Adam et al. (2012) argued that there was no significant difference between online learning and face to face class with regard to their satisfaction and also, they supported the fact that online class will be as effective as traditional class if it is designed appropriately. These facts clearly show us that online learning is a perfect substitute for the traditional classroom learning if they are designed suitably.

Educational institutions in India have also made a transition to online teaching environment soon after Union Government's decision to impose nation-wide lock-down for 21 days from 25th March, 2020 which was later extended for 19 more days. However, the major concern is about the quality of learning which is closely related with how well the content is designed and executed. Effectiveness of learning also depends on how the content is curated to online environment and also in understanding and addressing the constraints faced by students. The study is even more relevant considering that in India the system of online education has never been tried at this scale and this is like a massive social experiment. Further, in agriculture education sector, the curriculum of agriculture gives a lot of importance to practical aspects and adopting it to online platform can decide the effectiveness. In this line, we have examined Indian agricultural students' perception regarding online education and various attributes which could make the online learning more effective and successful.

The results of the study are important for educational institutes in Agriculture for two main reasons. Firstly, the shift to online mode has been an abrupt one due to unprecedented lockdown imposed to manage the COVID-19, and the institutes did not had time to design and adopt the course contents for online mode. In this context, experience of students and the learnings can be incorporated to make online learning easy, efficient and productive. Second, even after lockdown is revoked, life after the COVID-19 pandemic will not be like before and online learning is here to stay, though in combination with regular offline classes. There is uncertainty about the length of the pandemic and chances of re-infections, the social distancing can become a new normal. So, all the educational institutes need to be prepared to shift majority of the course content to e-learning platforms and modify the course structure and curriculum suitably. The results of our study can be important input in deciding on the learning environment in online platform to promote effective learning. In the next section, we provide a brief review of literature followed by data and methods section where we describe the methodology used in the study. Then, we discuss the results and the implications followed by concluding remarks of the study.

2. Review of literature

The current technological advancements allow us to employ several ways to design the online content. It is very important to consider the preferences and perception of learners while designing the online courses to make the learning effective and productive. Preference of the learner is related to the readiness or willingness of the learner to participate in collaborative learning and the factors influencing the readiness for online learning. In the section to follow, we summarise the learnings from the review of related literature.

Warner et al. (1998) proposed the concept of readiness for online learning in the Australian vocational education and training sector. They described readiness for online learning mainly in terms of three

aspects: (1) the preference of student's for the way of delivery opposed to face-to-face classroom instruction; (2) student's confidence in the utilising the electronic communication for learning which includes competence and trust in the use of the Internet and computer-based communication; and (3) capability to engage in autonomous learning. The concept was further refined by several researchers like McVay (2000, 2001) who developed a 13-item instrument which measured student behaviour and attitude as predictors. Subsequently, Smith et al. (2003) conducted an exploratory study to validate the McVay's, (2000) questionnaire for online readiness and came up with a two-factor structure, "Comfort with e-learning" and "Self-management of learning". Later, several studies were taken up for operationalising the concept of readiness for online learning (Evans (2000); Smith (2005)). The factors that influenced the readiness for online learning as put forth by researchers were self-directed learning (Guglielmino (1977); Garrison (1997); Lin and Hsieh (2001); McVay (2000, 2001)), motivation for learning (Deci and Ryan (1985); Ryan and Deci (2000); Fairchild et al. (2005), learner control (Hannafin (1984); Shyu and Brown (1992); Reeves (1993)), computer and internet self-efficacy ((Bandura (1977, 1986 1997); Compeau and Higgins (1995); Eastin and LaRose (2000); Tsai and Tsai (2003); Tsai and Lin (2004); Hung et al. (2010)), online communication self-efficacy (Palloff and Pratt (1999); McVay (2000); Roper (2007)).

Any efforts to strengthen the effectiveness of online learning needs to understand the perception of the users. Studies have documented both favourable and unfavourable perceptions by students on online learning. Several studies indicate that the instructor's interaction with students has considerable impact on the student's perceptions of online learning. Consistency in course design (Swan et al. 2000), the capability of the interaction with course instructors to promote critical thinking ability and information processing (Duffy et al. (1998, pp. 51–78); Picciano (2002); Hay et al. (2004)) rate of interactivity in the online setting (Arbaugh (2000); Hay et al. (2004)), the extent of instructional emphasis on learning through interaction, the flexibility of online learning (Chizmar and Walbert (1999); McCall (2002); National Centre for Vocational Education Research (2002); Petrides (2002); Schrum (2002); Klingner (2003); Kim et al. (2005)), chances of engaging with teachers and peers in online learning settings (Soo and Bonk (1998); Wise et al. (2004); Kim et al. (2005)), social presence (Barab and Duffy (2000); Kim et al. (2005); Jonassen (2002)), academic self-concept (Trautwein et al. (2006); Lim et al. (2007)), competencies required to use the technology (Wagner et al. (2000) were identified as the perceived strengths of online learning. Hence an effective online class depends upon well-structured course content (Sun and Chen (2016)), well-prepared instructors (Sun and Chen (2016)), advanced technologies (Sun and Chen (2016)), and feedback and clear instructions (Gilbert, 2015).

However, several weaknesses related to online learning were also described in the literature. Delay in responses (Hara and Kling (1999); Petrides (2002); Vonderwell (2003), scepticism of their peers' supposed expertise (Petrides (2002)); lack of a sense of community and/or feelings of isolation (Woods', (2002); Vonderwell (2003); Lin & Zane, (2005));, problems in collaborating with the co-learners, technical problems (Piccoli et al. (2001); Song et al. (2004)), issues related to instructor (Mullenburg & Berge, 2005) higher student attrition rates (Frankola (2001); Ryan (2001); Laine (2003)), the need for greater discipline, writing skills, and self-motivation; and the need for online users to make a time commitment to learning (Golladay et al. (2000); Serwatka (2003) are considered to be barriers or weakness of online learning.

Several researchers compared the efficacy of online or web-based tutorials with conventional teaching in classrooms. The types of possible encounters that might occur online as compared to conventional classrooms differ substantially, and the impact of communicating within one setting or another can have a direct effect on attitudes of the students and faculty. The studies explored perceptions of online learning experiences vs. conventional classroom experiences by students and faculty and reported mixed findings that demand further studies. Some of those areas include analysing the nature and amount of interactions that is available

online (Moore and Kearsley (1995)), flexibility and accessibility of web-based instructions (Navarro and Shoemaker (2000)), the skills, motivations, time and perception of learner and instructor (Yong and Wang (1996); Shih, Ingebritsen, Pleasants, Flickinger, & Brown, 1998; McIsaac et al. (1999); White (2004) and whether some or all of these aspects are linked to academic achievement (Brewer and Erikson (1997)). It was also found that there was no significant difference between online learning and face to face class with regard to their satisfaction and also in terms of their academic performance (Hara and Kling, 1999). Studies also supported the fact that online class will be as effective as traditional class if it is designed appropriately (Nguyen, 2015).

The literature has highlighted different models which provides the basic framework to understand the students perception regarding online education. Papers have also highlighted potential bottlenecks for success of the online learning. However, not many papers have attempted to understand the students perception and preference in Indian context. It is understandable that only limited number of distance education platforms were using online mode of education before the Covid-19 pandemic. Further, to the best of our knowledge, study on these lines has not been attempted in the field of agricultural education, where online learning initiatives are even lesser probably because of higher share of practical learning aspects in curriculum. We try to fill this gap with our study, drawing insights from the literature in conceptualizing the problem, exclusively focusing our attention on online learning in agricultural education.

3. Data and methods

3.1. Participants

Agricultural graduates were chosen as the respondents for this study as agriculture is the most diverse subject that includes subjects ranging from life sciences to social sciences where students work from lab to land. The participants were 307 agricultural graduates from different universities of National Agricultural Research System (NARS). It included 136 Under Graduates, 84 Postgraduates and 87 students pursuing their Ph.D. Among them 172 were female and 135 were male.

3.2. Procedure

A structured and unstructured preliminary questionnaire was designed with the help of literature survey and informal discussions with the students who are currently attending the online classes. Pre-testing was done with 12 respondents and their feedbacks were considered for designing the final questionnaire.

3.3. Domain of the study

First of all, we identified key-informants among different agricultural universities for online survey. The link for Google form was sent to the key-informants through the WhatsApp. After submitting their responses, they circulated the questionnaire among other university students like snowball sampling. We have disabled the link after 10 days of circulating the Google forms. In this way, responses from a total of 307 students were obtained from different universities of the NARS.

3.4. Data analysis

Data were collected on demographic features, followed by learners' preferences, perception, advantages, constraints and suggestions. The statements were prepared based on extensive review of literature and discussion with experts to minimize researchers bias. To analyze and summarize the perception, statements were rated on a five-point continuum scale (five being most effective and 1 being the least effective). Frequency and percentage were calculated for most of the questions to summarize the data. Apart from calculating the percentage table for the

perceptions, we used a measure of consensus for each of the statements. The consensus was calculated by the formula suggested by Tastle and Wierman (2007).

$$cons(X) = 1 + \sum_{i=1}^n p_i \log_2 \{1 - (|X_i - \mu_X| / d_X)\}$$

p_i = probability or frequency associated with each Likert attribute X_i ;
 i ranges from 1 to 5
 d_X = width of X
 μ_X = mean of X.

Further, each statement regarding perception of respondents based on effectiveness of online learning in comparison to classroom teaching was ranked based on mean rank obtained by Friedman's test. Formula used for calculating mean rank in Friedman's test is as follows

$$\text{Mean rank} = \frac{12}{n_r k(k+1)} \sum R_i^2 - 3n_r(k+1)$$

Where, k = number of columns (treatments); n_r = number of rows (blocks); R_i = Sum of the ranks.

To identify the most important benefits and constraints of online learning, Garret ranking technique was used. For this, 5 benefits and 8 constraints were given to the respondents and they were asked to rank it based on their opinion. As a first step these ranks were converted into percent positions based on the following formula

$$\text{Percent position} = 100(R_{ij} - 0.5) / N_j$$

Where.

R_{ij} = Rank given for the i th Benefit/constraint by j th respondents
 N_j = Number of Benefits/constraints ranked by j th respondents

As a second step these percent position of each rank was converted into scores using the table given by Garrett and Woodworth (1969). And then for each factor, scores of individuals were added and divided by the total number of respondents to get the mean score of each factor. The Benefit and Constraint with the highest mean score was considered as the most important.

The perception study detailed above has a limitation that the responses are dependent on how the questions are framed. Insights can be drawn only on statements for which answers are recorded. In this context, to broaden the perception of students regarding the online course and factors determining the success, we have used content analysis. To analyze the open-ended questions conventional content analysis was done. Content analysis is defined as a generic name for a variety of textual analyses that typically involves comparing, contrasting, and categorizing a set of data (Schwandt, 1997). We tried to perform content analysis to identify the trends in learners' perspective regarding online classes. As a foremost step, two authors after looking into all the responses of the open-ended questions, created the themes and sub-themes which was checked for inter-rater reliability using Kappa Co-efficient with the help of the other two authors. The estimated Kappa co-efficient was found to be 0.72 which denotes substantial agreement between the two raters.

4. Results

Findings from the analysis of qualitative and quantitative data gathered from the present study are presented below.

4.1. Demographic details of respondents

The demographic variables included age, sex, degree, and place of

Table 1
Demographic details of the respondents.

		N = 307
Demographic variables		Percentage
Degree	UG	44.29
	PG	27.36
	Ph.D.	28.33
Sex	Female	56.03
	Male	43.97
Place of Residence	Peri-urban	14.98
	Rural	45.60
	Urban	39.41

residence. The mean age of the respondents was 23 years. There were more female respondents 172(56.03%) than male respondents 135 (43.97%). Majority of the respondents were belonging to rural background 140 (45.60%) whereas 121 (39.41%) were from urban areas and only 46(14.98%) were from peri urban areas (see [Table 1](#)).

4.2. Basic information regarding online classes ([Table 2](#))

Among the respondents, only 145 (47.23%) were having prior experience of online classes and 162 (52.2%) did not attend online classes before. And 82% of the respondents said that online classes have already started by the universities where they have enrolled. When a question was asked how to cope up with curriculum during this COVID-19 pandemic, majority of the respondents (67.1%) indicated that online classes can be used as substitute for class room teaching to cover the syllabus, whereas 29.97% of the students wanted the curriculum to be suspended and very few (2.93%) wanted teachers to provide only assignments and reading material. The reasons behind the response of those 30% respondents who were not in favour of online classes can be traced to inability to focus on curriculum due to the fear of the pandemic or technological constraints they face for online learning. In the later part of the paper we will examine the constraint faced by students for online learning.

5. Learner's preference for online classes

5.1. Technical availability

Various devices preferred by the respondents for attending online classes were Smartphone (57.98%), laptop (35.83%), tablet (4.89%) and desktop(0.65%)which clearly suggests that if any organization which wants to develop an application for the online learning, it has to ensure that the platform is compatible with smartphone. Mobile data pack was the source of internet for 82% of the respondents. Majority of the respondents (62%) said that WhatsApp was the best way to communicate class updates (see [Table 3a](#)).

5.2. Structure of online classes

Recorded classes uploaded at the university website/YouTube/any other application was the most preferred (54.4%) class format by whereas 27.04% of the respondents preferred live classes that can be recorded, 17.92% opined in favour of live classes and 0.65% preferred only reading materials.

Majority of the respondents preferring recorded classes and live classes that can be recorded since it gives them a flexibility in learning. Regarding the nature of reading materials majority of the respondents (84%) preferred video content supplemented with reading materials. More than half (53%) of the respondents preferred the instructor to teach using PowerPoint presentations (see [Table 3b](#)).

Table 2
Basic information regarding online classes.

		N = 307
Questions	Response	Percentage
Did you attend any online course earlier?	No	52.77
	Yes	47.23
Whether your college has begun online classes in the wake of corona?	No	17.92
	Yes	82.08
As the COVID-19 continues to spread, educational institutions around the globe has been shut, disrupting the educational system. What will you suggest to meet the current situation?	Assignments and reading materials can be provided	2.93
	Curriculum schedule can be suspended	29.97
	Managing with online classes	67.1

Table 3a
Technical requirements for online classes.

		N = 307
Attributes		Percentage
Communication means to class updates	Any two mode	1.63
	Posting in university website	5.86
	Text message	8.47
	e-mail	21.50
Preferred device for an online course	WhatsApp	62.54
	Both smartphone and laptop	0.65
	Desktop	0.65
	Laptop	35.83
Source of internet	Smart phone	57.98
	Tablet	4.89
	LAN	2.93
	Mobile data pack	85.67
	Wi-Fi	11.40

Table 3b
Structure of online classes.

		N = 307
Attributes		Percentage
Online class format	Live online Classes	17.92
	Live classes that can be recorded	27.04
	Recorded classes that is uploaded at University website/YouTube/any other application	54.40
	Sending reading material	0.65
Nature of Course material	Reading material is sufficient	11.40
	Video Content supplemented with reading material	84.36
Nature of Video content	Video content is sufficient	4.23
	As per the convenience and requirement	2.93
	Both PowerPoint and whiteboard	2.28
	Course Instructor should teach using whiteboard	34.53
	Course instructor should use PowerPoint	52.77
	Lecture only	7.49

5.3. Frequency and duration of online classes

Around 58% of the learners wanted online classes for twice in a week with 46% respondents preferring 45 min duration for each class. Around 48% of the respondents desired to spend only two to 4 h in a day for online class and wanted a break of 15 min in between the two classes (See [Table 3c](#)).

5.4. Addressing the queries

Various methods preferred for clarifying the queries were a platform with option for posting queries (48.21%), through live chat (35.5%), email to the course instructor (14.33%) and WhatsApp (0.98%). Interestingly, 40% of the respondents expect the instructor to clarify their

Table 3c
Frequency and duration of online classes.

		N = 307
Attributes		Percentage
How often do you expect the course instructor to conduct the classes?	Alternate days	0.65
	As per the schedule to complete the syllabus	4.56
	Daily	1.30
	Fortnight	4.56
	Weekly once	29.97
Suitable duration for online classes (per class)	weekly twice	58.96
	30 min	29.97
	45 min	45.93
	more than hour	0.65
	1 h	23.45
How much time would you like to spend in a day for online classes	2–4 h	48.86
	4–6 h	14.33
	6–8 h	0.65
	Less than 2 h	36.16
How much time you need as break between two online classes	10 min	22.15
	15 min	47.88
	Less than 10 min	5.21
	More than 15 min	24.76

doubts within a day (See Table 3d).

5.5. Plans and criteria for evaluation

Majority of the students preferred quiz (75.9%) and assignments (56.3%) at the end of every class for effective learning. Around 47 %of the respondents felt that one-week time should be given for submitting their assignments.

Surprisingly,60% of the respondents wished to attend online exams and around 70% of the respondents preferred objective mode of examination rather than descriptive examination (See Table 3e).

6. Respondent's perception towards online learning

The frequency and percentage were calculated for each of the seven statements rated on a scale of five-point continuum as shown in Table 4a.

Results suggested that, there was not much differences in the perception of Graduate and Post Graduate students towards online learning. Around 50% of the respondents agree with the statement online leaning improves their technical skills as compared to face-face classes. It also evident that around 60% of respondents are agree with the statement that online classes are less effective when it comes to communication with the instructor as compared to face-face classes. On an average 20–30% of the respondents perceive that online and face-face classes are equally good when it comes to the above criterions.

It should also be noted that the consensus varied from 0.40 to 0.56

Table 3d
Addressing the queries.

		N = 307
Attributes		Percentage
Way for clarifying queries	All three can be made available	0.33
	Both live chat and email	0.65
	Live chat	35.5
	Platform for posting queries	48.21
	email to the course instructor	14.33
	WhatsApp	0.97
	Within Next class.	0.33
Expected time for clarifying the queries by instructor	Within 2–3 days	17.59
	Within a day	40.39
	Within a week	12.05
	Within few hours	29.64

Table 3e
Plans and criteria for evaluation.

		N = 307
Attributes		Percentage
Do you feel quiz of 5–10 min during each class is necessary to achieve better?	No	24.10
	Yes	75.9
Do you feel assignments at end of every class are necessary to achieve effective learning?	No	43.97
	Yes	56.03
Deadline for submitting assignments	1 day	2.93
	1 week	46.58
	2–3 days	14.98
	before the next scheduled class	35.5
Do you like to attend online exams	No	39.74
	Yes	60.26
Nature of online exam	Both	26.06
	Objective	70.03
	Subjective	3.91

Table 4a
Respondents' perception towards online learning.

						N = 307
Statements	1(%)	2(%)	3(%)	4(%)	5(%)	Consensus
S1–I prefer my online courses as they are very structured with set due dates similar to face-to-face courses	21.00	23.45	28.34	17.26	9.45	0.52
S2- Online classes help me comprehend the course materials compared to Classroom learning	26.38	25.73	21.50	19.22	7.17	0.50
S3- Online environment makes it easier for me to communicate with my instructor than classroom environment	31.60	31.27	14.33	14.33	8.47	0.49
S4 – I am more comfortable responding to questions by email than orally	26.38	15.96	19.22	21.50	16.94	0.41
S5- My technical skills (email/internet apps) has increased since attending online classes	12.38	14.66	23.45	31.60	19.30	0.51
S6– I spend more time on my homework in comparison with regular classroom learning	15.64	20.85	25.73	22.48	15.31	0.51
S7- Instructor understands the online environment and makes it easy to learn whereas continuums	14.98	20.85	30.62	21.82	11.73	0.55

Where,1- online is or might be less effective
2- online is or might be somewhat less effective
3- online is or might be equally effective
4- online is or might be somewhat more effective
5- online is or might be much more effective.

implying that there was neither perfect disagreement nor perfect agreement between the respondents regarding the effectiveness of online learning. Difference in perception among the respondents could be

attributed to lack of equity in internet availability, poor teaching skills or poor learning environment.

Further, to test for the presence of pattern in the data, we employed Friedman test. The ranking provided by the respondents might as well be random without any pattern and simply comparing them based on mean rank can be erroneous. So, mean ranks can be compared only after making sure that there is a pattern in the ratings provided by the users. The analysis revealed that there is a pattern in the data as the test statistics turned out to be significant. Mean value for each statement was used to rank the statements related to the perceived effectiveness of online classes in comparison with classroom teaching. The results revealed that enhancement in technical skills; instructors' ability to understand the virtual environment and making the platform easier to learn and spending more time on assignments in comparison to classroom environment were ranked first, second and third respectively (see Table 4b). The test statistic is presented in the Table 4c and its level of significance indicated that the differences were highly significant.

7. Benefits of online learning

Results of the study indicate that flexible schedule and convenience was ranked as the major benefits of the online learnings. Online education offers students the opportunity to study at their own pace and time of their convenience. Hence, flexibility and convenience are major drivers behind the demand for online education.

More comfortable environment, enhancing the technical skills, more interaction and greater ability to concentrate and self-discipline and responsibility were ranked two, three, four and five respectively (see Table 5).

8. Bottlenecks for online learning

Table 6 indicates that lack of connectivity was the ranked as the major hindrance in online learning. The situation is even worse for those from remote areas. The findings highlight the India's digital divide and lack of equity in access to uninterrupted internet proving to be a hassle to many students.

The second and third constraints were data limit and data speed which were again the limitations of internet infrastructure. These give us an insight that if any country wants to move towards online education then as a pre-requisite it should focus on its internet facilities. Lack of traditional way of direct interactions in classrooms is also a major concern along with those mentioned above in conducting online classes.

9. Factors affecting success of online classes

Qualitative analysis of the open-ended questions indicate that the majority of the participants recognized the following components for conducting online classes successfully such as nature of content, infrastructure, competency of the instructor, student readiness and follow up and various subcomponents were also discussed.

Majority of the respondents opined that nature of content and infrastructure were the major determinants for smooth conduct of online classes (see Table 7a and 7b) The course instructor should spend quality

Table 4b
Friedman rank test.

Ranks	
Statement	Mean Rank
S1	3.90
S2	3.59
S3	3.24
S4	4.03
S5	4.76
S6	4.23
S7	4.24

Table 4c
Test Statistics for Friedman Rank test.

Test Statistics	
N	307
Chi-Square	129.88
df	6
Asymp. Sig.	.00

Table 5
Benefits of online learning.

Benefits of online learning	Total Score	Number of Respondents	Average Score	Rank
Flexible schedule and convenience	17730	307	57.75	1
More comfortable environment	15470	307	50.39	2
Improves your technical skills	15310	307	49.87	3
More interaction and greater ability to concentrate	14175	307	46.17	4
Self-discipline and responsibility	14065	307	45.81	5

Table 6
Bottlenecks in online learning.

Constraint of online learning	Total Score	Number of Respondents	Average Score	Rank
Lack of connectivity	17659	307	57.52	1
Data limit	17178	307	55.95	2
Data speed	17037	307	55.50	3
Little/no face to face interaction	16448	307	53.58	4
Intense requirement for self-discipline	15710	307	51.17	5
Lack of device	14143	307	46.07	6
Poor learning environment	13868	307	45.17	7
Technophobia	11064	307	36.04	8

time to design the content which should be well structured, concise, interactive and relevant. The students should be able to record the classes such that content can be accessed at any time based on their convenience. Recording will also come in handy for those students who have internet connectivity issues to live stream the classes.

The online classes will succeed only if all the students have access to internet. Minimum technical requirements such as internet connectivity, devices and software requirements should be fulfilled for optimal learning experience.

10. Factors that could lead to failure of online classes

Many participants in this research study reported that technological constraint, distractions, instructor's incompetency, learner's inefficacy and health issues were challenges in their online learning experience.

The biggest challenge reported by participants was technological constraints. The concern over technological constraints was also reflected across all the responses (see Table 8a and 8b). Lack of access to internet will exclude some of the learners from the online classes. Slow connections can also make accessing course platforms and materials frustrating. Online classes will be successful only if internet facility is provided to all by making it equitable and affordable.

The concern over a lack of community was also expressed by the respondents. It is challenging to build a comfortable environment for learning or a sense of community in the online environment. It will be important to think about ways that students and teachers can get to know

Table 7a

Factors affecting success of online classes.

S.No	THEMES	SUBTHEMES	Criteria	Examples
1.	Nature of content	Structure	Comprehensive and efficient course design incorporating course goals and learning objectives	"Staffs should spend quality time in preparing the content, rather than just copying from other material and making PowerPoint Presentations and reading it to students"
		Accessible	"universal design for learning" as it considers all possible learners	"good reachability for all learners"
		Interactive	Ensuring active participation of learner along with interactive videos making them to assimilate the concept	"Platform should facilitate face to face interaction and should use animated videos to enhance interactivity"
		Comprehensive	Content should be easy to understand	"classes should be crisp, concise and precise"
2.	Infrastructure	Flexibility	Study anywhere at anytime	"timetable should be fixed according to the convenience of learner"
		Relevancy	Appropriateness of the content to the curriculum as perceived by the learner	"lecture should be productive with practical experience"
		Connectivity	Learners can access the internet without interruption	"elimination of network issues"
		Data pack	Availability of sufficient data pack to enjoy the internet facility	"free data pack for attending the online classes"
3.	Competency	Data speed	Quick flow of information without interruption	"high speed internet without interruptions"
		Devices	Possession of suitable devices to attend the classes	"we should be able to attend the classes using mobile phones"
		Video/audio quality	Fidelity of video/audio output during the classes	"clarity in audio/video"
		User friendly	Software/hardware that is use to learn	"using student friendly interface"
4.	Readiness	Technical skills	Basic knowledge of computer and Internet skills required by instructor	"Our instructor should be the one with good technical knowledge"
		Communication skills	The ability of the instructor to convey the concepts effectively	"Creation of classroom like environment by the instructor using his communication skills"
		Motivation	Goal directed behaviour of the learner	"students should possess self-learning interest"
		Discipline	Staying organized and responsible	"Students should be more disciplined"
5.	Follow up	Focus	Ability of the student to avoid distraction and stay focussed on the curriculum	"ability of the students to remain focussed decides the success of online classes"
		Query	Question answer session that will help in clearing the doubts	"Recorded videos and good study materials with platform to ask queries will be more effective"
		Evaluation	Monitoring the learners during the class time to ensure their presence and taking the feedbacks about the previous classes, providing the assignments and conducting the online tests for evaluation	"Classes with regular online tests"

each other and stay connected.

Incompetency of the instructor was also reflected from the survey. Efforts should be made by the instructor to make classes interesting and effective so as to sustain the interest of the learner. It is also important to feel comfortable using a computer and navigating the Internet.

In addition to discussing specific challenges and useful components, interviewees provided several suggestions for conducting online classes smoothly during COVID-19 pandemic. The major themes identified were general, content, connectivity, interactivity, flexibility, skills and follow-up (see Table 9a and 9b).

Majority of the participants opined that online classes are effective provided that the classes are well structured and interactive with flexible

curriculum supported with uninterrupted internet connectivity and competent instructor.

11. Discussion

The primary purpose of this study was to examine the preference and perception of students regarding the online classes.

Majority of the respondents preferred online classes to cope up with the curriculum due to lockdown in the wake of COVID-19 pandemic, whereas 30% of the respondents suggested suspending the classes or providing reading materials till the lockdown is lifted. In order to probe into this matter, analysis of perception of the respondents regarding online classes was required.

We also identified the learners' perceptions of successful components and hindrances in online learning environment. Early work has provided some fundamental insights into the prospects of online learning (Cereijo et al., (1999); Hartley and Bendixen (2001); Hill (2002)). The components identified by the participants were in line with previous research. One of the primary factors listed for determining the success of online classes was structure of online classes. This finding is reinforced by the studies of Dempsey and Van Eck (2002); Song et al.(2004); Allen (2011). In order to enhance the productivity of the learners' long duration classes should be avoided and sufficient break should be given between two consecutive classes. It will not only avoid cognitive load but also takes care of the physical strain caused due to prolonged use of electronic gadgets. It was supported by Thompson's (2014) formula of work for 52 min and break for 17.

Technical proficiency of teachers and learners related to usage of computer and internet is a major factor determining the effectiveness of online classes. It was in line with the findings of Tsai and Lin (2004); Peng, et al. (2006); Convenience and flexibility were identified as the strength of online classes. Petrides (2002) claimed that respondents indicated that it was convenient to work in an online course in collaborative groups without rearranging the schedule for everyone as one

Table 7b

Frequency of themes identified for success of online classes.

Q	THEMES	SUBTHEMES	Count(n = 292)
1.	Nature of content TC = 150	1.1 Structure	43
		1.2 Accessible	9
		1.3 Interactive	42
		1.4 Comprehensive	24
		1.5 Flexibility	28
		1.6 Relevancy	4
2.	Infrastructure TC = 142	2.1 Connectivity	41
		2.2 Data pack	9
		2.3 Data speed	23
		2.4 Devices	4
		2.5 Video/audio quality	58
		2.6 User friendly	7
3.	Competency TC = 48	3.1 Technical	7
		3.2 Communication	41
4.	Readiness TC = 33	4.1 Motivation	16
		4.2 Discipline	11
		4.3 Focus	6
5.	Follow up TC = 37	5.1 Query	11
		5.2s Evaluation	26

Where TC-Total Count.

Table 8a

Factors affecting failure of online classes.

S.No	THEMES	SUBTHEMES	Criteria	Example
1.	Technological constraint	Digital divide	Gap between the learners who have ready access to internet and computers and those who don't	"not all rural students have the privilege of internet and laptop"
		Data limit	Insufficient data pack to access the material/to attend the class	"online classes consume large amount of data which is difficult to afford"
		Poor connectivity	Interrupted internet supply that makes the learners difficult to learn	"dragging of classes due to network problem"
		Issues with the device	Lack of device or device incompatibility to the applications used for online classes	"Unavailability of gadgets with some of the students"
		Non recordable videos	Online classes that cannot be downloaded or recorded for future learning	"videos that cannot be recorded or watched later pose difficulty in learning"
		Technical issues	Low quality audio or video; low bandwidth	"lack of voice clarity and poor signal strength"
		Virtual presence only	No face to face interaction between the learners and teachers	"only one-way communication and no scope for interaction"
2.	Distractions	Poor learning environment	Lack of congenial learning environment	"home environment is not suitable for learning as it leads to lot of disturbances from children and relatives"
		Noise	Distractions that deviate learner from learning	"two-way communication is loathsome as the voices from all the sides are raising"
3.	Instructor's incompetency	Technophobia	Instructors fear of handling ICT's	"Lack of technical expertise of the teacher"
		Poor teaching skills	Inability of instructor to render the subject matter	"prolonged monotonous lectures with improper explanations"
		Unstructured content	Curriculum which is designed improperly lacking a clarity in course objective	"poorly designed content where classes are held for name sake"
		No follow up	Instructor doesn't take the feedback/online exams nor addresses their queries	"doubts cannot be cleared effectively compared to classroom environment"
4.	Learner's inefficacy	Indiscipline	Irresponsible and unorganised behaviour of learner	"lack of discipline as no one is there to control the students"
		Student attritions	Reduction in the number of learner's attending the classes	"Poor attendance and students miss the classes without any reason"
		Unmotivated	Learner does not possess interest or enthusiasm in learning	"Lack of interest and laziness among the students to learn during vacations"
5.	Health issues	Strain	Difficulty in concentration due to the harmful radiations from device used for online classes	"prolonged usage of mobile phone for classes causes headaches due to harmful rays"
		Worsening of existing health issues	Deteriorating the already existing health issues due to prolonged online classes	"continuous classes lead to worsening of migraine and backache"

would do in traditional classroom learning. [Poole \(2000\)](#) found that learners often accessed resources for the course from their home computers, the most convenient location for them. Hence care should be taken to fix the online classes based on the learner's convenience and it will be better if recorded videos are uploaded in the university website so that the learner can access the videos as per the convenience.

Agriculture education system gives a lot of emphasis on imparting practical skills to the learners. But conducting the practical classes online is a difficult task. In the wake of adapting to the changed times,

innovative solutions like 3D virtual labs are being devised. A teacher's competency in communication as well his ability to use the multimedia contents for effective presentation are very important in this juncture. The results of the study clearly highlight that the lack of teachers' competencies could be a major reason for failure of online classes and also calls for further exploration on the potential of the recent initiatives in online practical classes to further develop suitable models/applications to cater the real needs.

Interactivity was found to be one of the major driving forces for success of online classes. For example, the findings by [Johnson et al. \(2008\)](#) indicates that developing and sustaining a collaborative learning space within an e-learning environment is essential for maximizing the satisfaction of the participants. In addition to this [Gunawardena and Zittle \(1997\)](#) found a strong correlation between learners' social presence and their overall satisfaction in the medium.

Online classes must engage participants through frequent, meaningful activities that helps to keep them focussed. The importance of frequency of interaction in making online classes was also explained by [Huggett \(2014\)](#). It was also found that lack of immediacy in getting answers to their queries was also found to be a challenge in online learning. It was also reported by [Hara and Kling's \(1999\)](#); [Petrides' \(2002\)](#); [Vonderwell's \(2003\)](#). Hence care should be taken by the instructor to answer the queries of the learners' immediately.

Suggestions were also taken from the participants to enhance the effectiveness of online learning. It was found that appropriate content, connectivity, recorded videos along with proper follow up makes online classes on par with the traditional classroom situation. Majority of the participants reiterated the point several times. Therefore, Online learning thus allows institutions and/or teachers to reach learners virtually, enhances convenience and strengthens educational opportunities ([Bourne et al. \(1997\)](#); [Owston \(1997\)](#); [Hara and Kling \(1999\)](#), (2001); [Schrum \(2000\)](#); [Rourke \(2001\)](#); [Hill \(2002\)](#); [Hofmann \(2002\)](#)).

Even in countries with little digital divide, unlike India, and has better

Table 8b

Frequency of themes identified for failure of online classes.

S.No.	THEMES	SUBTHEMES	COUNT(n = 300)
1.	Technological constraint TC = 266	1.1 Digital divide b/w rural and urban	15
		1.2 Data limit	44
		1.3 Poor connectivity	130
		1.4 Issues with the device	17
		1.5 Non recordable videos	6
		1.6 Technical issues	23
		1.7 Virtual presence only	31
2.	Distractions TC = 41	2.1 Poor learning environment	28
		2.2 Noise	13
		2.3 technophobia	15
3.	Instructor's incompetency TC = 93	3.2 Poor teaching skills	38
		3.3 Unstructured content	27
		3.4 No follow up	13
		4.1 Indiscipline	21
4.	Learner's inefficacy TC = 53	4.2 Student attritions	6
		4.3 Unmotivated	26
		5.1 Strain	8
5.	Health issues TC = 12	5.2 Worsening of existing health issues	4

Where TC-Total Count.

Table 9a

Themes identified for suggestions for online classes.

S.No	Themes	Criteria	Examples
	General	Refers to overall comment about online classes without referring to a specific context or content	"Online classes are innovative way, and is supplementing classroom teaching"
	Content	Presentations or videos or audios used by the instructor	"Add more images/videos/GIFs/comic etc., appropriate to the course content would make it more interesting and feel good for listeners thereby magnetise the concentration of the listeners."
	Connectivity	Access to internet	"Attendance should not be considered for some students as they have not responded due to poor network"
	Interactivity	Active participation of instructor and learners' during the class	"Online classes are not lively. Instructor should ensure active participation of students"
	Flexibility	Convenience of teacher and learner	"Convenience of the student should be considered and give sufficient time to learn themselves"
	Skills	Expertise of instructor in imparting knowledge and digital literacy of instructor	"Instructor should explain in an effective way such that students can remember for longer time"
	Evaluation	Assessing the learning by queries raised by learner, online tests and assignments and taking their feedback	"Make it mandatory so that students ask doubts and that will be marked"

Table 9b

Frequency of themes identified for suggestions.

S.No.	Theme	TC (n = 78)
	General	63
	Content	23
	Connectivity	15
	Interactivity	10
	Flexibility	4
	Skills	12
	Evaluation	12

Where- TC-Total Count.

internet connectivity has never shifted to complete online mode before this pandemic. Reasons could be varied including the advantage of face to face interactivity, immediate feedback and sense of community amongst many other. One reason could also be related to difficulty in teaching skills, as in practical classes. In Agricultural Education, where the weightage to practical aspects of learning is more, shifting completely online mode may not be possible. In the immediate future, the universities may resort to a hybrid mode where the classes are conducted online and practical's are conducted in small batches with social distancing. The findings of the study can be very useful in designing the content as well as structure for the online classes.

12. Limitations

Due to time constraint the study was restricted only to Agricultural students from India. Further we have limited our analysis to understand the perception of learners and excluded the instructors for the sake of brevity and time constraint.

13. Conclusion

With efforts to prevent the spread of the novel coronavirus, the contours of education system are changing with online education becoming the primary means of instruction. Universities and institutions are shifting to online platforms to catch up with the curriculum. It may be too early to say how students and teachers will cope with online learning as they figure out the constraints, reorient to address them but the perception and readiness of teachers and students is an important consideration which we have tried to document.

The findings of this study indicated that majority of the students evinced a positive attitude towards online classes in the wake of corona. The online learning was found to be advantageous as it provided flexibility and convenience for the learners. Students preferred well-structured content with recorded videos uploaded in university websites. They also indicated the need for interactive sessions with quizzes and assignments at the end of each class to optimise the learning experience. However, most students also reported that online classes could be

more challenging than traditional classroom because of the technological constraints, delayed feedback and inability of the instructor to handle effectively the Information and Communication Technologies. Therefore, all these factors should be considered while developing an online course to make it more effective and productive for the learner. It's possible that once the COVID-19 pandemic settles down, we may see a continued increase in education systems using online platforms for study aids, albeit in a hybrid mode in combination with regular classes. Hence this study will prove useful for reimagining and redesigning the higher education with components involving online mode.

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CRediT authorship contribution statement

T. Muthuprasad: Conceptualization, Formal analysis, Project administration, Writing - original draft, Validation, Investigation. **S. Aiswarya:** Conceptualization, Writing - review & editing, Formal analysis, Validation, Investigation, Visualization. **K.S. Aditya:** Conceptualization, Methodology, Writing - review & editing, Validation, Resources. **Girish K. Jha:** Conceptualization, Methodology, Writing - review & editing, Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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