

RESEARCH ARTICLE

Students' Perceptions on the Effect of COVID 19 on Agricultural Higher Education in India

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ABSTRACT

The study analysed the temporal changes in the perceptions of students of agricultural higher education due to disruption of the COVID 19 pandemic and recommends strategies to deal with it. An online survey was conducted involving students of agricultural higher education at two intervals to capture their perceptions on the academic, physical, and psychological disruptions due to the COVID 19 pandemic. Among these three aspects, changes in behavioural aspects are significant over time, which is reflected in terms of viz., attitude, frustration, anxiety, depression, uncertainty, desire for cocooning and boredom. Students showed a positive response towards continuing educational activities through online and e-learning modes. Adapting to new normal necessitated extensive use of digital technologies in education that challenged the face to face instructions, approaches to learning and assessment. Counselling and mentoring of students are found mandatory in pandemics. The development of a sustainable digital ecosystem of learning with equal weightage on students' physical and psychological well-being is needed. New approaches of learning are to evolve due to the COVID19 pandemic.

Key words: Agricultural education; Pandemic-led disruptions; COVID19; Temporal changes; Students' perceptions.

The COVID19 pandemic caused unprecedented disruptions in all sectors concerning human life across the globe compelling a change towards adapting to the new normal. COVID19 affected over 632 million of the world's population and has surged quickly with reported deaths of over 6.59 million (*World Health Organization, 2022*). The epidemic carried not only unbearable psychological stress to individuals but also the risk of death from the viral infection in the outside world (*Xiao 2020, Duan and Zhu 2020*). Some of the reports showed that the psychological impact of the epidemic on the general public, patients, medical staff, children, and older adults (*Chen et al. 2020; Yang et al. 2020*). Strict isolation measures and delays in starting schools, colleges, and universities across the country because of the continuous spread of the epidemic and expected to be influencing the mental health of college students. *Shin and Hickey (2020)* stated that the COVID19

pandemic forced an abrupt and temporary shift to remote online learning due to crisis circumstances and it was described as emergency remote teaching (ERT). While many sectors have started resuming activities gradually, the education sector has been the most affected with educational institutes across the world remaining closed all through and students are subjected to stress connected with uncertainty on the courses, remaining in confinement, lack of social interactions, anxiety due to inadequacy of support from teachers under lockdown conditions, etc. The impact of the COVID19 is varying across countries but the effect of the novel coronavirus in India is significantly different from how it has impacted other countries across the globe. India made an early move to cover the spread of COVID-19 across the country through lockdown in 1st wave during 2020 and in the second wave, the lockdown is staggered across the states during the year 2021.

Continuity of teaching and learning in universities

and colleges was a major issue during COVID-19. The current scenario has highlighted the gaps in an education system built over time, where the contact time between student and teacher plays a significant role in effective learning, which was severely constrained following the pandemic and lockdown restrictions. The academic activities across different levels viz., from schooling to higher education were affected across the world (UNESCO, 2020) and India was no exception.

The academic activities in India, particularly that of higher education, were affected differentially based on the magnitude of the spread in the respective region, and periodic guidelines issued by the University Grants Commission (UGC, 2020), the apex body governing higher education in India under the Ministry of Education and also by the Department of Agricultural Education and Research (DARE), Indian Council of Agricultural Research (ICAR), under the Ministry of Agriculture and Farmers' Welfare with the mandate to govern agricultural higher education. The academic, physical, and psychological well-being of students are the major drivers of achieving quality education, as envisaged in Sustainable Development Goals, which is of paramount importance. The pandemic-led disruptions had a significant impact on these wellbeing indicators of students and the current study was commissioned to map the same by taking the agricultural higher education, as a case study. The present study profiles the temporal changes in the perceptions of students of agricultural higher education and recommends strategies to deal with the disruption of COVID-19.

METHODOLOGY

A structured survey schedule was developed to quantify the effect of COVID19 on different aspects (academic, physical, and psychological) of the students. The schedule comprised of questions on respondents' profiles (gender, course (graduate or post-graduate), year of study) and perceptions on the extent of access to online education in their subjects from sources other than their University; dealing mainly with access to online educational resources; quality of learning materials and impacts on studies due to lack of access to laboratory/experiential learning. The students' perception about education, physical and psychological aspects captured through 5-9 sub-questions for each aspect on a 5-point Likert scale. The survey schedule tested with a pilot sample of size of 60

respondents and its reliability in measuring the effect of COVID19 on different aspects was tested through Cronbach's alpha coefficient, before the actual study.

The survey was carried out online using Google Forms among the students of higher agricultural education institutes (HAEI) in India (74 Agricultural Universities). The first survey was conducted immediately after imposing the first lockdown to which 1477 responses were received from the students representing 56 universities. Among them, data from 1075 (73%) respondents only were complete in all aspects and therefore used for the study. The survey was repeated later after six months in which 173 responses were received. Among them, 143 (81%) responses were found to be complete and used for comparative analysis. Both online surveys were conducted with a response window lasting a fortnight and the response pattern is depicted in Fig.1.

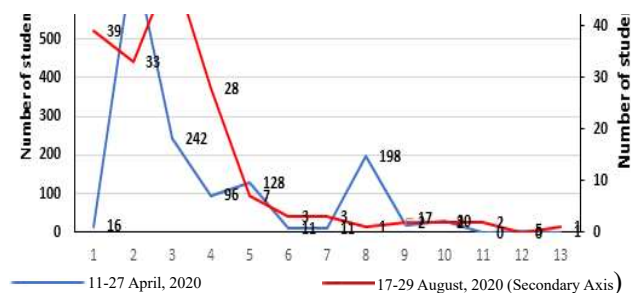


Fig. 1. Temporal response pattern during the two survey rounds

While all the complete responses (1075) remained used for the statistical analysis related to the general pattern, only the responses from 143 students (13.3 % responses), who participated in both surveys were considered for performing comparative analyses on education, physical and psychological aspects. The respondent students included those studying in various years of the graduate program of four years and postgraduate (masters and doctoral) students belonging to diverse disciplines.

The collected data were subjected to statistical analysis using descriptive statistics. The Wilcoxon-Mann-Whitney U test was used to test the changing trends in students' perceptions between two time periods.

RESULTS AND DISCUSSION

Reliability of the study instrument : The test items were considered reliable when the Cronbach alpha value was more than 0.6. The values of Cronbach alpha for the pilot data were close to 1 (Table 1), suggesting

that the questionnaire used is reliable and consistent. The Cronbach's alpha values for the study data also followed a similar pattern (Table 1).

Table 1. Cronbach alpha values for the study instrument

Aspect	Pilot data	Study data
Educational	0.82	0.90
Physical	0.79	0.80
Psychological	0.92	0.92

Respondents profile vis-à-vis response trend : The first sample (1075 respondents) comprised 49.4 per cent of male students and the majority (81.6%) belonged to the graduate programme. The second sample (140 respondents) comprised 51.5 per cent male students, representing 32 Agricultural Universities, and the majority were in their graduate program (n=100; 71.5%). The postgraduates accounted for 28.5 per cent of the respondents comprising those in masters (17.1%) and doctoral (11.4%) programs.

Temporal Disruptions due to COVID : In this section, the temporal changes in the students' perceptions of three important dimensions, viz., academic, physical, and psychological were analysed and discussed. Overall, a highly significant change in perception (at 1% of probability) was observed among physical and psychological aspects (Table 2) based on the Wilcoxon-Mann-Whitney U test. Both physical and psychological aspects are prominent ones, which have often not drawn enough importance. The differences in perception about academic aspects, as such were not statistically significant during 5 months.

Table 2. Results of Wilcoxon-Mann-Whitney U test for comparing temporal changes

Variable/ aspects	Mean and SD		U statistic	p- value
	Phase 1	Phase 2		
Academic	26.3 ± 8.2	27.1 ± 7.6	2950.5	0.535
Physical	14.1 ± 4.9	15.3 ± 4.9	2765.5***	0.008
Psychological	26.0 ± 10.7	30.2 ± 9.6	1289.5***	<0.001

Academic aspects : In an attempt to comprise the spread of the virus, several countries enforced lockdown in which schools and or colleges/universities were closed for several months. Academic time vanished in all educational institutions across the globe. The loss of active academic learning time in higher agricultural education was estimated to be 210 to 270 hours per student till the first week of May 2020 (*Thammi-Raju et al. 2020*). However synchronous online learning

has taken place to some extent. The agricultural HEIs compensated for the loss of academic learning time through digital interventions which have their limitations viz. the preparedness of the University for a shift in teaching methodologies, availability of resources for virtual teaching, network connectivity, and faculty competencies in online teaching. Almost all countries including India used a variety of resources to support students' learning while they were unable to come to school/college, including instructional parcels (textbooks, worksheets, and printouts), radio education, educational telecast, and online instructional resources. Virtual learning tools extended from educational content in which each individual could explore at their preference and imposing learning programmes conducted at their own pace to real-time classes delivered by their teachers using virtual meeting platforms. The result is in line with other studies like *Khiat (2017)* who stated that teaching depending on learners' ability to learn. However, *Madhuri and Sharma (2022)* revealed that majority of the students perceived online classes as very structured but are not more effective for basic courses when compared to applied courses and not easy to communicate with instructor, But almost all the respondents (99.2%) had high overall perception towards online education.

The Wilcoxon-Mann-Whitney U test analysed students' academic perception in the two phases, spreading over 5 months on aspects, viz., social learning, learning outcomes, knowledge gain, skills up-gradation, career development opportunities, placement activities, guidance/mentoring/counselling, and prospects of education (Table 3). Among all these parameters, the 'U Statistic' for social learning was significant (at a 1% level of significance) which portrays that the COVID19 impacted social learning over two reference periods (Table 3). The mean value for social learning increased from 2.89 to 3.2 suggesting that there is an increase in the number of students perceiving that social learning is highly affected. The hands-on experience, field visits, experiential learning modules, etc., are some of the core means of imparting agricultural education which contributes more to social learning. Due to lockdown, the students remained indoors, and online teaching could not help to improve their social learning. The sudden and forced shift to online teaching because of social distancing amid the COVID-19 pandemic is a

Table 3. Results of Wilcoxon-Mann-Whitney U-test for comparing temporal changes in academic aspects

Variable	Mean and SD		U-statistic	p-value
	Phase 1	Phase 2		
Social learning	2.89 ± 1.25	3.20 ± 1.25	1203.0***	0.003
Learning outcomes	3.31 ± 1.13	3.26 ± 1.11	1397.0	0.265
Knowledge gain	3.15 ± 1.30	3.01 ± 1.20	2081.5	0.819
Skills upgradation	3.34 ± 1.26	3.27 ± 1.21	1751.5	0.879
Career development opportunities	3.50 ± 1.36	3.39 ± 1.36	1804.5	0.315
Placement activities	3.59 ± 1.37	3.56 ± 1.45	1274.5	0.416
Guidance / mentoring / counselling	2.99 ± 1.45	3.02 ± 1.45	1827.0	0.367
Prospects of education	3.17 ± 1.20	3.23 ± 1.37	1837.5	0.385

paradigm-changing process. The anxiety and lack of expertise in the use of technology by faculty is also an important factor for either resistance or avoidance of change, creating barriers to online teaching (Johnson 2012). Institutional support, including appropriate training, is essential for faculty members to comfortably engage in online teaching (Stickney, 2019). A sudden shift to online teaching is also an important factor concerning their adaptability, convenience, expertise in using the technology. However, the other parameters, viz., learning outcomes, knowledge gain, skills up-gradation, career development opportunities, placement activities, guidance/mentoring/counselling, prospects of education, etc., were not impacted significantly over five months' period. Cao (2020) indicated that from correlation analysis that economic effects, and effects on daily life, as well as delays in academic activities, were positively associated with anxiety symptoms ($P < .001$).

Shift in perception in Academic Aspects: The Social Learning Theory (Bandura, 2019) postulates that learning is not purely behavioural; rather, it is a cognitive process that takes place in a social context and can occur by observing a behaviour and also the consequences of the behaviour. The shift in the perception among the students over two time periods was also analysed by calculating per cent change.

Among all the parameters representing academic aspects, about 15.1 per cent of 'not at all affected' slowly transgressed into 7.7 per cent moderately affected and 7.4 per cent severely affected over the same period. This temporal shift can be attributed to a lack of formal instruction and connected activities

that facilitate social learning, viz., collaborative/group activities, field visits and hands-on experiences, etc. Even though other parameters are not statistically differing significantly, they are worth considering to understand the shifting patterns in the overall context of academic aspects. The negative change of the class 'Not all affected' distributed into either moderately or significantly affected classes to the extent of 13.9 to 15.1 per cent. A sudden shift in teaching modality to online due to the COVID-19 pandemic has led to the new arena of 'emergency remote teaching' (Hodges et al. 2020). Purnima et al., (2022) concluded from their study that academicians to redesign the distance courses to a hybrid mode complementing theory and practicals without shifting completely to online education as more number are interested to enroll for online classes rather than contact classes.

A maximum shift to 'severely affected' class is observed in 'career development opportunities' (7.8%), followed by 'skill up-gradation' (7.7%), 'prospects of higher education'(7.3%), 'placement activities and mentoring and counselling' (each 7.2%), 'knowledge gain' (7.1%) and 'learning outcomes' (6.9%). The maximum shift to 'moderately affected' class is observed in 'learning outcomes' (8.1%), followed by 'placement activities' (7.6%), 'prospects of higher education' (7.5%), 'skill up-gradation (7.1%), 'mentoring and counselling' (6.9%), 'knowledge gain' (6.8%), 'career development opportunities' (6.5%). So, the career development opportunities, skill up-gradation, knowledge gain, and mentoring and counselling are important parameters as the per cent change towards 'severely affected' class is more than the 'moderately affected' class.

Physical well-being : Often, very few students of SAUs consider the importance of physical wellbeing for the overall development of personality. Similarly, the extra-curricular activities are also undermined. The present study focussed on the extent of change in some important physical parameters, viz., body weight, blood pressure, physical activity, nutrition and diet, and rest and sleep. The perception about blood pressure and rest and sleep was found to be significantly different (at 10% and 1% level of significance, respectively) among the students over the period (Table 4). Over time, more students felt that the blood pressure and rest & sleep are affected. The perceived change in blood pressure, which is significant at a 10 per cent level of significance, is to

Table 4. Results of the Wilcoxon-Mann-Whitney U test for comparing temporal changes in physical well-being

Variable	Mean and SD		U-statistic	p-value
	Phase-I	Phase-II		
Body weight	2.61 ± 1.33	2.90 ± 1.40	1456.0	0.136
Blood pressure	1.86 ± 1.18	2.22 ± 1.34	856.0*	0.072
Physical activity	3.18 ± 1.38	3.49 ± 1.38	1492.5	0.100
Nutrition & diet	3.05 ± 1.43	3.34 ± 1.42	1628.5	0.374
Rest and sleep	3.31 ± 1.56	3.66 ± 1.43	1077.0***	0.003

be understood in the light of changes that happened in psychological aspects.

Initially, the students were comfortable due to lockdown because of low/nil academic activities. But later, the perceptions changed over time due to the stress created by COVID 19 mainly due to phenomenon like Fear of Missing Out (FoMO), delay in academic activities, uncertainty over the completion of the degree (for final year students), higher education, career progression, *etc.* The rest and sleep patterns were also affected over this period as the daily routine was also disturbed, which is coupled with uncertainty over the reopening of educational institutions.

The shift in perception in Physical well-being: The shift in the case of physical aspects ranged between -8.6 to -8.9 per cent at the end of phase 2. The maximum shift was noticed in perception about bodyweight followed by blood pressure, nutrition and diet, rest and sleep, and physical activity. However, the magnitude of shift was only towards the 'moderately affected' class from the 'not at all affected' class, in the range of 7.4 to 8.3 per cent. The marginal shift of respondents from 'not all affected' class to severely affected class was noticed to the extent of 1.1 to 1.3 per cent only. There is a need to create an environment in which students enjoy learning in a socially interactive environment.

Psychological aspects: The perception of agricultural students was also obtained on identified psychological aspects, *i.e.*, confidence, attitude, frustration, anxiety, depression, uncertainty, desire for cocooning, boredom, collective behaviour/group behaviour, *etc.* Among all these parameters, except for 'collective behaviour/group behaviour', perceptions about all other variables were found to be significantly different over some time based on the Wilcoxon-Mann-Whitney U test (Table 5). The perceptions about psychological aspects, *viz.*, attitude, frustration, anxiety, depression, uncertainty, desire for cocooning and boredom were

Table 5. Results of the Wilcoxon-Mann-Whitney U test for comparing temporal changes in psychological aspects

Variable	Mean and SD		U-statistic	p-value
	Phase-I	Phase-II		
Confidence	2.80 ± 1.50	3.01 ± 1.41	1847.5*	0.054
Attitude	2.65 ± 1.52	2.89 ± 1.44	1098.5***	0.001
Frustration	2.92 ± 1.57	3.52 ± 1.53	561.0***	<0.001
Anxiety	2.84 ± 1.57	3.51 ± 1.46	893.5***	<0.001
Depression	2.80 ± 1.62	3.43 ± 1.57	833.5***	<0.001
Uncertainty	2.81 ± 1.57	3.28 ± 1.57	924.5***	<0.001
Desire for cocooning	2.74 ± 1.49	3.08 ± 1.55	804.5***	0.001
Boredom	3.31 ± 1.58	3.81 ± 1.45	544.0***	<0.001
Collective/behavior	3.34 ± 1.52	3.57 ± 1.40	1656.5	0.271

found to be significantly differing at 1 per cent level of significance and the aspect 'confidence' at 10 per cent level of significance. Accordingly, it was found that the perception changed towards highly affected behaviour by these aspects.

The imposed lockdown due to COVID 19 disrupted different activities majorly the placement activities, and the prospects for higher education in India and abroad. The uncertainty about national level entrance examinations for admission to higher degrees, risk/ threat associated with travelling abroad, visa processing, *etc.*, created a lot of confusion among the students' community. In some college campuses, placement activities are completed, pending the issue of recruitment orders. All these factors have created an impact on the confidence levels of students.

The lockdown due to COVID 19 impacted the attitude of students also. Attitudinal changes occur anytime, and it is highly significant during this period, *Hager et al. (2019)* found that the attitude of most respondents (68.9%) towards instituted preventive measures was satisfactory with an average attitude score of 6.9±1.2. The majority of the respondents (96%) practised self-isolation and social distancing but only 36 per cent follow all health recommendations. But *Ramya et al., (2021)* revealed that more than three-fourth of the UG students had medium (79.44%) favourable attitude, followed by low (16.11%) and high (4.44%) favourable attitude. Less than three-fourth of the PG students had medium (73.33%) favourable attitude and 13.33 per cent each had high and low favourable attitude towards online learning.

The students also perceived a significant change in anxiety levels. The anxiety due to COVID 19 was mainly due to the fear of infection of novel Coronavirus and subsequent effects viz. nervousness, sadness, fear of losing relatives, impending anxiety and lack of specific treatment/protection protocols, etc. *Akdeniz et al.* (2020) also stated that anxiety status and consumption of information from the media about COVID-19 are directly correlated. The nervousness of the respondents might outcome in changing over to a virtual mode of teaching education, functioning from home as much as possible in professional life, dropping working hours, social distancing, and accepting other social measures advised across the country. Current investigation has specified that the emergence of anxiety symptoms was related to an interval in academic activities among university students in Turkey (*Akdeniz 2020*). *Cornine (2020)* demonstrated that college students' anxiety about COVID-19 might have been related to the effect of coronavirus disease on their performance in studies. *Akdeniz et al.* (2020) found a linear movement in the perception of widespread distribution associated with a significant reduction in the level of shielding behaviour and nervousness status in respondents compared to the first survey days. It is reported that the gradually increasing distances between people may have been caused by students' anxiety due to quarantine. This is known as anxiety disorder and it's more likely to occur and get worse in the absence of societal communication (*Xiao, 2020*). *Cao et al. (2020)* reported that 24.9 per cent of college students were distressed with anxiety because of the COVID-19 outbreak in China. Of these students, 0.9 per cent of the respondents were experiencing severe anxiety, 2.7 per cent moderate anxiety, and 21.3 per cent mild anxiety. Correlation analysis results indicated that anxiety symptoms are due to change in everyday's life, intervals in academic activities etc. However, community support was negatively associated with the level of anxiety. It is suggested that the mental well-being of college students should be examined during epidemics.

The COVID 19 pandemic also resulted in a significant difference in depression levels over time. The students are in the active age group of 18-27 years and sudden transition to the new situation and adaptation to new normal tenets due to COVID 19 manifested as feelings of sadness, loss, or anger that

interfere with a person's everyday activities. In a similar online survey during the COVID-19 pandemic in China, *Wang et al. (2020)* reported that a total of 53.8 per cent of respondents ranked the psychological impact of the outbreak as moderate or severe; 16.5 per cent reported moderate to severe depressive symptoms; 28.8 per cent reported moderate to severe anxiety symptoms, and 8.1 per cent reported moderate to severe stress levels. *Roy et al. (2020)* reported that sleep difficulties, paranoia about acquiring COVID-19 infection, and social media related distress accounted for 12.5 per cent, 37.8 per cent, and 36.4 per cent of participants, respectively in India. The alleged mental healthcare requirement was perceived in more than 80 per cent of applicants. There is a need to strengthen the awareness and mental health problems of people during this COVID-19 pandemic.

The students are caught unaware of the effects of COVID 19 either on their academic and/or non-academic aspects, apart from physical and psychological aspects. Even the uncertainty has prevailed among organizations/governments over the sequel of COVID 19. The respondents worried about their future, studies, employment, and career development apart from the health effects of themselves and their family members. The psychology of uncertainty causes anxiety and leads to haywire stress responses. Psychological stress is deleterious to the overall development and performance.

The desire for cocooning is a typical behaviour exhibited by waiting inside one's home to get isolated from observed danger, instead of going out. The perceived threat and panic created by COVID 19 and its after-effects curtailed the students' activities and made them confined to their houses. The psychological stressors also created the desire for cocooning resulting in dull and docile nature. Depression or feeling loneliness also culminates into cocooning behaviour. In a way, it is self-nurturing, which may look different with each person and changes frequently. The significant change to cocooning behaviour is attributed to different factors, viz., depression, fear/tension created by the pandemic, lack of activities, etc. The mean value has risen from 2.74 to 3.08 indicating that the desire for cocooning is increasing over time.

Most of the students are active and stay together in hostels during the academic calendar years to pursue their studies, apart from being fun and

frolic. COVID 19 imposed lockdown reduced the regular face to face communication and collective and cooperative behaviour. Boredom is caused generally when energy is not channelled into an outlet that provides meaningful fulfilment. A few key components that cause boredom are mental arousal, difficulty in concentrating on a single task, and lack of control over one's surroundings.

Agricultural education ensures active engagement through collective and cooperative behaviour; often through practical classes, hands-on experiences, field experiments, experiential learning modules, *etc.* Due to the pandemic, collective behaviour is significantly affected.

The shift in perception in psychological aspects: The time lag between the first phase and second phase resulted in a perceptual change from 16.6 to 18.7 per cent among the students in psychological aspects. A significant change of perception noticed on 'frustration' (-18.7%), followed by confidence and attitude (-18.2% each), uncertainty (-17.7%), anxiety and collective behaviour (-17.4% each), depression (-17.1) and boredom (-16.6%).

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The students in the 'not at all affected' class shifted either to moderately affected or to severely affected class. The maximum shift to moderately

affected class was observed in 'uncertainty' (15.4%), followed by 'frustration' (15.1%), and the lowest in the case of 'boredom' (13.6%). However, the maximum shift of 3.6 per cent to 'severely affected' class was seen in frustration and collective behaviour, followed by about 3.5 per cent in confidence, attitude, desire for cocooning, and the least in case of 'anxiety' (2.7%). Therefore, the distribution pattern delineates that the psychological attributes of students significantly changed (Table 6) but more so among 'uncertainty' 'frustration', and 'collective behaviour'. These psychological parameters are of topmost priority for minimising the effect of COVID 19 imposed lockdown and its ramification. Although recent evidence has suggested high vulnerability of the student population to declining psychological wellbeing during this particular period (Cao *et al.* 2020), there is still a lack of evidence to consider and establish the conflict between academic and family/personal lives as a potential risk factor to declining psychological wellbeing among the student population (Khadijah, *et.al.*, 2021).

Behavioural Responses : The students' perceptions of social and societal aspects were also studied during the 2nd phase. However, the data revealed that the extent of the change was rated either minimal or was significantly represented by equal proportions of students on aspects, viz., emotional aspects, responsiveness to social problems, social relationships, cultural values, lifestyle (food, clothing), societal norms (self-isolation), responsibility in society, perceived risks, awareness about covid19, and myths and misconceptions. Egan, *et.al.* (2021) stated that to specifically investigate the relationship between attitudinal and personality constructs that are associated with wellbeing and to explore their association with student academic outcomes. The extent of change was perceived to be 23 to 24 per cent. About 13.9 to 14.8 per cent perceived 'no change' in all the above-mentioned parameters while about 20 per cent of students indicated 'average change' and 17 per cent indicated moderate change. Therefore, the COVID 19 impacted the students' social aspects significantly, with minimal and moderate changes.

Activities performed through access to resources: However COVID-19, the worldwide pandemic pretended an incomparable provocation and stuck all the academic institutions ignorant, Agricultural Universities across India found ingenious ways for

sustained nurturing of the teaching-learning practices. The responses from the survey indicated that 'spending time with family members' remained the number one activity performed by the students. 45.7 per cent of students gave the first rank to 'spending time with family members and 17.9 per cent gave 2nd rank for the same; which was later diminished to 38.6 per cent and 16.4 per cent respectively during phase 2. But there are major significant changes from phase 1 to phase 2 in the perception of continuing education activities and pursuing some online courses. High self-esteem encourages students' desire to involve themselves in academic activity to improve their skills and abilities (Gebka, 2014). The survey indicated that, after phase 2, students are showing positive responses for adapting to the new form of online learning, and the majority of students gave the highest ranking for continuing education activities through e-Learning. While 23.6 per cent gave 3rd rank to 'entertainment' in phase 1, later it got reduced to 14.3 per cent. Moreover, the other findings highlighted that the students are more variable towards the new learning and their experiences relating to the quality of learning, academic interest, and performance seemed to vary significantly depending on respective course instructors (Shin and Hickey, 2020 and Chatterjee and Correia 2020). Adoption of some methods which made classroom more interesting during Covid-19 were photographs, recordings, slides, ICT tools, demonstration method, explaining through AV Aids, virtual availability and encouragement for discussion. Thus, it becomes very important for teachers to identify the methods by which students can interact in class effectively and they can feel more opportunistic after getting interesting productive material which is available online (Gautam et al. 2022).

Shift in preferences: The shift in students' ranking of activities during the period between phase 1 and phase 2 was considerably positive towards continuing educational activities and entertainment. However, a negative change was noticed among pursuing online courses, reading books, social networking, and spending time with family during the phases.

Leanings for higher education due to COVID 19 : Transformation is expected and that has been enforced upon peoples of the society due to COVID-19. The opportunities created by the pandemic are indeed desired to be availed for a better tomorrow. New technologies, no doubt, will certainly pose challenges

to the traditional patterns such as classroom lectures, methods of learning, and modes of valuation. Nevertheless, the fresh trend should prompt the teaching sector to prospect innovative ways of teaching-learning and digital ecosystem and as such some concerns and favourable tendencies are pointed below:

Psychological Wellbeing: The perceived changes in psychological aspects are of great concern for HEIs. Steps are required to tide over the psychological abrasions through the establishment of psychological counselling by Universities/Faculties integrating the ICTs. Even though the challenges recognized, the psychologists defined the knowledge with the use of ICTs as optimistic, meeting clients' observance, and yielding confident results. Psychologists with the utmost years of specialized experience continued their services the most, and those with normal experience indeed showed the most favourable attitudes in the direction of the use of tools and web-based interventions (Dores et al, 2020).

May boost personalised knowledge : Knowledge may not be restricted to classes or any specific boundaries. Students may become virtual learners with one educator coaching dozens of students at a time in the new age.

Learning with social distancing may continue : Necessity to maintain social distancing and avoiding warm handshake, hug, personal greeting, and intimacy for a long time is becoming a new normal situation. Institutionalizing social (physical) distancing through innovations in schoolroom assembly, course delivery, and teaching, training and learning methodologies, suiting to local circumstances is required. Eventuality plans and standard operating procedures (SOPs) need to be prepared and adhered to for ensuring safety from the pandemic in the institute campuses, and among staff and students and for building confidence among the students and parents (Thammi-Raju et al. 2020).

Digital teaching and learning : Most of the learners will hang on to technological and digital solutions for teaching-learning, entertainment, and connecting with the outside world. Students will use the internet and technologies to interconnect virtually with their teachers and fellow students through E-mail, WhatsApp, video conferencing, instant messages, webinars, or any other tool. The academic reforms incentivising enhanced online engagement, either through synchronous or asynchronous mode, are

essential.

Learning assessment methodologies : Artificial Intelligence (AI) might help trainers to deal with the assessment, valuation, making mark-sheets, and observing the performance of each student simply and accurately. AI may use numerous digital platforms extensively to reduce the load of the examiner in supervision inspection and evaluation systems. If these happenings are made simpler, the academicians would be able to concentrate more on course development, qualitative teaching-learning, and ability improvement in tune with the National Educational Policy of India (2020).

Build-back-better education systems : The post-COVID 19 phases will offer many other opportunities to “build back better”. But other reforms may require more lead-time than in normal situations that can and should support the move to a stronger post-COVID 19 education system.

Agricultural research system: The risks and challenges in students’ research activities that arose due to COVID 19 are to be mitigated and tackled for fetching results of high standards.

CONCLUSION

The study concludes that the present world pandemic has prompted the education sector to look inward and the outcome of the result shows that the students are ready for e-learning. Organisations are now acceptance to e-teaching-learning which functions as an alternative to face-to-face contact learning, thereby helping the institutions cover the course gaps in the institutions’ stipulated academic calendars due to enforced lockdown during the pandemic. The adoption of e-learning during the COVID-19 pandemic is beset with a lot of lapses and gaps which are to be addressed in the educational system. The challenges in e-learning range from the irregular power supply, high internet subscription costs, poor internet access especially in remote and outreach areas, amongst many factors. The students who are at a disadvantage due to the above-mentioned factors will suffer due to the current choice of digital platforms compared to those who are well-placed. Indeed, universities and governments are persistently trying to overcome the problems through several proactive measures in the digital ecosystem and extended networking avenues. The priority should be to promote and build capacity for efficient use of digital

technology to empower millions of young students in deeper learning. The physical and psychological wellbeing of students is also of paramount importance in the overall personality development of students, recovery from the stresses and increase proficiency in learning through intelligent tutoring systems. Overall, teaching and learning proficiencies are to be improved substantially by re-imagining the agriculture-related education systems for excellence under Higher Agricultural Education in India in the face of challenges from COVID-19 and the post-pandemic era and implementing the strategies for adapting to the new normal, effectively.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES

- Akdeniz,G.; Kavakci,M.; Gozugok, S.; Yalcinkaya , A.; Kucukay,; and Sahutogullari B. (2020). A survey of attitudes, anxiety status, and protective behaviors of the university students during the COVID-19 outbreak in Turkey. *Frontiers in Psychiatry*,**11**(4): 695.
- Bandura, A. (2019). *Social Learning Theory*. Prentice-Hall, 2019, pp 247.
- Cao, W.; F Ziwei H.; Guoqiang H.; Mei X.; Xinrong D.; Jiaxin.; and Jianzhong Z. (2020). The psychological impact of the COVID-19 epidemic on college students in China, *Psychiatry Res.*, **287**:112934.
- Chatterjee, R.; and Correia. A.P.(2020). Online students’ attitudes toward collaborative learning and sense of community. *American J. Distance Edu.*, **34** (1): 53–68. doi:10.1080/08923647.2020.1703479.
- Chen,Q.; Liang,M.; Li Y.; Guo, J.; Fei, D.; Wang, L.; He, L.; Sheng, C.; Cai, Y.; Li X.; Wang, J.; Zhang Z. (2020). Mental health care for medical staff in China during the COVID-19 outbreak. *Lancet Psychiatry*. **7**(4):e15-e16. doi: 10.1016/S2215-0366(20)30078-X.
- Cornine A.(2020). Reducing Nursing Student Anxiety in the Clinical Setting: An integrative review. *Nursing Edu. Perspectives*, **41**(4): 229-234.
- Dores, A.R.; Andreia, G.; Irene, P.C.; and Fernando, B. (2020). The use of new digital information and communication technologies in psychological counselling during the COVID-19 Pandemic. *Intl. J. Envir. Res. and Public Health.*, **17**: 7663.
- Duan L.; and Zhu G.; (2020). Psychological interventions for people affected by the COVID-19 epidemic. *The Lancet Psychiatry*, **7**(4): P300-302.
- Egan,H.; Hara, M.O.; Cook, A.; and Mantzios, M. (2021). Mindfulness, self-compassion, resiliency and wellbeing in higher education: a recipe to increase

- academic performance, *J. Further and Higher Edu.* **46**(3): 301-311, DOI: 10.1080/0309877X.2021
- Gautam, M.; Agarwal, N. and Sharma, A. (2022). College students' perspective on online teaching and learning methods during Covid-19 pandemic: A Study. *Indian Res. J. Ext. Edu.*, **22** (4), : 118-123.
- Gebka, B. (2014). Psychological determinants of university students' academic performance: An empirical study, *J. Further and Higher Edu.*, **38**:6,
- Hager, E.; Odetokun, I.A.; Bolarinwa, O.; Zainab, A.; Okechukwu, O., and Al-Mustapha, AI. (2020). Knowledge, attitude, and perceptions towards the 2019 Coronavirus Pandemic: A bi-national survey in Africa. *PLoS ONE* **15**(7): e0236918.
- Hodges, C.; Moore, S.; Locke, B.; Trust, T.; and Bond, A. (2020). The difference between emergency remote teaching and online teaching. *Educause Review*, Available at <https://er.educause.edu/articles/2020/3/>
- ICAR. Agricultural Education Portal. (2020). Indian council of Agricultural Research, New Delhi, Available at <http://education.icar.gov.in/>. (Date accessed 16-11-2022).
- Johnson, T.; Wisniewski, M.A.; Kuhlemeyer, G.; Issacs, G.; and Krzykowski, J. (2012). Technology adoption in higher education: Overcoming anxiety through faculty bootcamp. *J. Asynchronous Learning Networks*, **16** (2) : 3-72
- Khadijah, S.; Badri, Z.; Azam, W.M.; and Yunus, W.M. (2021). The relationship between academic vs. family/personal role conflict and Malaysian students' psychological wellbeing during COVID-19 lockdown, *J. Further and Higher Edu.*, **46**(1): 76-88.
- Khiat, H. (2017). Academic performance and the practice of self-directed learning: The adult student perspective. *J. Further and Higher Edu.*, **41**(1): 44-59.
- Madhuri, R.; and Sharma, G.R.K. (2022). Veterinary students' perception towards online education in Andhra Pradesh. *Indian Res. J. Ext. Edu.*, **22** (4): 73-76
- National Education Policy. (2020). Ministry of Human Resource development Development, Government of India, New Delhi. Available at <https://www.education.gov.in>.
- Purnima, K.S.; Lalitha.; and Venkataramulu. M. (2022). Perception and preferences of online learners of certificate courses in agriculture. *Indian Res. J. Ext. Edu.*, **22** (4) : 124-127.
- Ramya, CH.; Jyothi, V.; Vijayabhinandana, B. and Prasad, P.V.N. (2021). Students attitude towards online learning in Acharya N.G. Ranga Agricultural University. *Indian Res. J. Ext. Edu.*, **21** (4) : 10-13.
- Roy, D.; Tripathy, S.; Kar, S.K.; Sharma, N.; Verma, S.K.; and Kaushal, V. (2020). Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian J Psychiatry*, **51**:102083.
- Shin, M.; and Hickey, K. (2020). Needs a little TLC: examining college students' emergency remote teaching and learning experiences during COVID-19. *J. Further and Higher Edu.*, **45** (7): 973-986. _
- Stickney, L.T.; Bento, R.F.; Aggarwal, A.; and Adlakha, V. (2019). Online higher education: Faculty satisfaction and its antecedents. *J. Mngt. Edu.*, **43** (5): 509-542.
- Thammi-Raju, D.; Ramesh, P.; Krishnan, P.; Soam, S K.; Ch. Srinivasarao, and Agrawal, R C. (2020). Re-imagining higher agricultural education in India on the face of challenge from COVID-19 pandemic - Strategies for adapting to the new normal. ICAR Policy Paper. 2020. ICAR, New Delhi 14 pp.
- UGC-Guidelines-for-Re-opening-of-Universities-and-Colleges. <https://www.ugc.ac.in/pdfnews/1360511>
- UNESCO, (2020). COVID-19 Educational Disruption and Response. Retrieved on August 28, 2020.
- Wang, C.; Riyu, P.; Xiaoyang, W.; Yilin, T.; Linkang, X.; Cyrus, S.H.; and Roger, C.H. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Intl. J. Envir. Res. and Public Health*, **17**: 1729-54.
- World Health Organization (WHO). Coronavirus disease (COVID-19) dashboard. Available at <https://covid19.who.int/> (Date accessed 16-11-2022).
- Xiao, C. A. (2020). Novel approach of consultation on 2019 novel coronavirus (COVID-19)-Related psychological and mental problems: Structured letter therapy. *Psychiatry Investigation*, **17**(2): 175-176.
- Yang, Y.; Zhang, W.Li.Q.; Zhang, L.; Cheung, T.; and Xiang, Y.T. (2020). Mental health services for older adults in China during the COVID-19 outbreak. *The Lancet Psychiatry*, **7**(4): E19.

