AGRICULTURAL EXTENSION JOURNAL
ISSN 2582- 564X

Available Online at www.aextj.com
Agricultural Extension Journal 2024; 8(4):221-229

RESEARCH ARTICLE

Suggesting a Prescriptive Model for Online Agricultural Education

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Received: 15-10-2024; Revised: 22-11-2024; Accepted: 08-12-2024

ABSTRACT

Online education became mandatory for all institutions throughout the country during the pandemic situation. Higher Educational Institutes adopted this for the completion of degree programs. Agriculture is one of the most professional degrees which require more practical exposure. It is not known whether the online education provided by the State Agricultural Universities (SAUs) in the COVID-19 pandemic was effective or not from the student and teacher perspectives. Previous studies investigated student perception, acceptability and challenges of online education. So far, the prescriptive model has not been suggested in the agriculture stream, considering both students and teachers. At this point, it is need of the hour to prescribe the effective model for online education from both student and teacher perspectives. This model will rectify the errors and correct it in future. A prescriptive model has been suggested for promoting online agricultural education by SAUs in future. This model includes suggestions to government/policy makers, suggestions to institution and suggestions to students.

Key words: COVID-19, online education, suggestions, etc

INTRODUCTION

The World Health Organization (WHO) declared COVID-19 as a pandemic on March 11, 2020. This global health crisis has affected over 768 million individuals worldwide (WH{WHO, 2023 #1}O, 2023). The impact of COVID-19 has been particularly felt in the field of education, with approximately 1.2 billion students' worldwide experiencing disruptions due to the closure of schools and universities.[1] Almost 87% of the total student population worldwide has been affected by the outbreak of COVID-19 (UNESCO, 2020). The COVID-19 pandemic had a significant impact on education in India, affecting a total of 320 million learners. In response to the situation, the country swiftly transitioned to the online system of education.[2] India implemented a full lockdown with minimal advance notice to the public, leading to the temporary closure of all educational institutions in March 2020 (UNICEF, 2021).[3]

Online Education During the COVID-19 Pandemic – Global Scenario

The global reach of the COVID-19 pandemic has disrupted education for an extensive number of students, impacting approximately 1.6 billion individuals across more than 150 countries.[4] To cope with this unprecedented challenge, many nations adopted online learning as a viable solution to continue educational activities during these difficult times (Munoz-Najar *et al*., 2022).[5] Kuiper (2020) found that the COVID-19 pandemic had a profound impact on the education sector in 165 nations, affecting 63 million teachers and resulting

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in 1.3 billion students worldwide being unable to attend college.[6]

Marinoni *et al*., (2020) highlighted that in response to the pandemic, 185 nations shifted from traditional on-campus education to online learning methods, affecting an overwhelming 89.40% of all enrolled students globally.[7] The transition to online learning was an essential measure taken by many countries to continue education during these challenging times.[8] Higher education relief package was a proactive response by the Australian government to support the educational needs of its citizens during the unprecedented times of the pandemic (Australian Government, 2020).[9]

Online Education During the COVID-19 Pandemic – Indian Scenario

In response to the lockdown imposed on 25 March, 2020, which led to the closure of educational institutions across India, the government and educational authorities swiftly adapted to the situation by transitioning to online education.[10] One of the significant steps taken by the University Grants Commission (UGC) was to encourage higher educational institutes to adopt a blended learning approach. Under the blended learning model, 25.00% of the syllabus for each course was to be delivered through online mode, while the remaining 75.00% was intended to be covered through offline teaching methods (UGC, 2020).[11]

The UGC issued guidelines for universities regarding the completion of terminal semester/final examinations during the COVID-19 pandemic. According to the UGC's instructions, universities were allowed to conduct these examinations using offline, online, or blended modes, provided that strict adherence to COVID-19 standard operating procedures was followed to ensure the safety of students and staff.[12]

This study suggests a prescriptive model that can be best suited for offering online agricultural education. This model will give valuable insights to policy makers and universities for the betterment of online education. This model could be applicable in future pandemic scenario to promote effective online education by SAUs in India.[13]

Suggestions Made for Effective Online Education

Mukhtar *et al*., (2020) conducted a study among medical students and faculty in Pakistan. Teachers and students suggested continuous faculty development. They recommended a reduction in cognitive load and increased interactivities during online teaching. Nartiningrum and Nugroho (2020) in a study among students in Indonesia and they mainly suggested the use of video conferencing applications such as zoom or Google meet, though some students chose assignments over those applications. The students also mentioned that they basically needed grammar-related materials within the online classes.[14]

Zboun and Farrah (2021) revealed that students in Indonesia recommend training classes for both instructors and students to know how to deal with applications and programs such as Zoom and Google meet because most of them find difficulty in using these applications. Adedoyin and Soykan (2023) revealed that crisis-response migration due to the pandemic should not be equated with effective online education or digital transformation of universities but rather be seen from the perspective emergency remote teaching platforms in a review study of challenges and opportunities in online learning.[15]

Aguilera-Hermida (2020) conducted a study about acceptance of online learning among college students in United States. The results insisted that emergency online learning requires a certain degree of self-regulation skills where students have to manage their learning process and be reminded that they are capable of being successful (self-efficacy).

Ariesta *et al*., (2021) in a study on evaluation of higher education in South Kalimantan, Indonesia, suggested that universities need to monitor and evaluate the online learning during the COVID-19 pandemic. Teacher–student interaction needs to be improved, especially through online video conferencing applications with many participants to be improved.[16]

Ozturk (2021) conducted a study on asynchronous online experience among English language students in Turkey. Students suggested that live broadcasting activities take place at regular intervals, opening the comments section under the videos, conducting

discussion board activities, establishing fast support systems, using alternative evaluation methods such as online testing and online presentations during the asynchronous online learning process. Curelaru *et al*., (2022) in a study about perception of college students toward online learning in Romania found that most suggestions were directed toward improving the learning process. Some of these suggestions concerned administrative or organizational aspects of online teaching such as reducing the number of students per group.[17]

Senol *et al*., (2021) conducted a study on evaluation of online education among universities in Turkey. The results suggested the government can provide free internet to all students, improve internet infrastructure, reduce the custom of computers and laptops, and test all teachers and students free for online learning. Purwanto (2020) in a study of university students' online learning system in Indonesia suggested that improvement include increasing network instability, activating interaction through increasing one-sided interaction, and conducting face-to-face classes for practice.[18]

These studies suggested that government and institutions can provide subsidy for teachers and students undergoing online classes. Training can be provided to participating teachers and students for effective learning. Their work load can be reduced and interaction could be improved. Self-efficacy of students needs to be improved by motivating them.

MATERIALS AND METHODS

Tamil Nadu Agricultural University was deliberately chosen and an ex-post facto research design was employed for this study. A sample size of 275 students and 180 teachers was fixed for this study. Open-ended questions have been asked from both students and teachers regarding the suggestions to overcome the constraints in online education. The response has been pooled and a prescriptive model has been framed best suiting for offering online education.

FINDINGS AND DISCUSSION

A prescriptive model formed by pooling the responses obtained from open-ended questions from students and teachers for betterment of online education. This model is best suited for pandemic scenarios in the future.

Suggestions to Government/Policy Makers for Effective Online Education

Suggestions to the government/policymakers for improving the effectiveness of online education include free internet connectivity for students, subsidized in digital devices for students, and regulations for conducting online classes, which are discussed below in detail.

Free internet connectivity to students

Poor internet connectivity was the major constraint faced by the students in the online system of education. Providing free internet connectivity to students will help them participate in the online system of education. Sub-Saharan African countries tied up with service providers like Vodafone and orange to provide free internet access to the students. The Sri Lankan government provided free internet services for undergraduate students from state universities through the Telecommunications Regulatory Commission of Sri Lanka. The Indonesian government, through the Ministry of Education and Culture, made a policy of subsidizing internet quota for all teachers, students, and lecturers for 4 months.

Keeping all this in mind, the Ministry of Education, Government of India, need to tie up with internet service providers to provide free internet to students. The government needs to provide free internet to all students to improve internet infrastructure, reduce the custom of computers and laptops, and make all teachers and students free for online learning.

Subsidy in digital device for students

Students felt that device incompatibility was a major concern while attending online classes. This leads to the device hanging during online classes. An improved digital device provides a better configuration for online learning platforms. Hence, when the government provides subsidies for students to access digital devices, it will improve the effectiveness of online education.

Before carrying out online learning, the government must ensure that all students have good equipment and network conditions through equipment donations and financial aid so that all students can begin their learning at the same level. The government of India needs to focus on device accessibility by providing subsidies on smart phones for marginalized communities and coming up with affordable smart phones for educational purposes.

Collaboration with educational technology (EdTech) companies

Students felt that there was lack of infrastructural facilities on campus to provide a better online learning environment. This was one of the constraints confronted by students who participated in the online system of education. Collaboration between government institutes and EdTech companies will be able to solve this constraint.

EdTech is the practice of introducing Information and Communication Technology (ICT) tools into the classroom to create more engaging, inclusive, and individualized learning experiences. Personalized learning solutions claim to offer radically new and context-adaptive ways to improve students' academic performance and grasp of concepts. EdTech companies in India have boomed after the COVID-19 pandemic due to the shift from traditional classroom learning to online learning. Some of these companies were BYJU'S, Unacademy, UpGrad, Vedantu, etc. Millions of users started using app-based learning during the COVID-19 era. Online learning offered through Edtech platforms has had prolonged effects on young students mental and physical health.

EdTech platforms may provide augmented reality, virtual reality, and extended reality in the future to students. This will enhance the effectiveness of online learning. The government's allowing the collaboration of EdTech companies with institutions will enhance the effectiveness of online education.

Suggestions to Institutions for Improving the Effectiveness of Online Education

Suggestions to institutions for improving the effectiveness of online education include providing appropriate training for students and teachers, developing digital infrastructure, and reducing cognitive overload for students, which are discussed below in detail.

Training for students and teachers

Students felt that there was a lack of training for attending online classes. Students also reported that there was a lack of technical proficiency among teachers. Providing training to students and teachers will help overcome this constraint. Training improves the confidence level of students and teachers in online education.

The provision of setting up workshops to enhance the skill gaps of teachers will help enhance the academic performance of students learning online. More importantly, a series of professional development workshops and practical training courses are needed to prepare for the continuation of online learning and teaching success.

Institutions need to provide proper training for students and teachers before participating in the online system of education. This helps them understand, learn, and act accordingly in the online classes. This improves technical proficiency among students and teachers to enhance the effectiveness of online education.

Developing digital infrastructure

Students and teachers felt moderate ease in handling the online learning platform and the online examination platform. Developing digital infrastructure facilities in terms of better online learning platforms and better online examination platforms will help to overcome this constraint.

Digital infrastructure for education can be defined as the tools and technologies that an institution would require to set itself up in the digital space of the internet. Digital infrastructure in higher education helps enhance student experiences. Universities can attract more prospective students and fulfill the needs of current students with digital support, such as websites, mobile apps, portals, course registration platforms, intranet, and micro sites. Institutions have to choose a better online learning platform that is end-to-end encrypted. A personalized and customized learning platform needs to be accessed to provide a better learning environment for students and teachers. This will improve the quality of education offered online.

Institutions have to choose a better online examination platform that is user-friendly. Students faced many hurdles in writing examinations online, and submitting through online was also difficult. Teachers found it difficult to proctor the students for hours. A better online examination platform needs to be chosen by the institution. This helps in the systematic evaluation of students and will reduce malpractice in examinations.

Reducing cognitive overload for students

Students felt an excessive workload when they took online classes. They spent 8 h a day attending online classes. They were not able to follow-up with the teachers. This constraint can be overcome by reducing cognitive overload for students.

The American Psychological Association defined cognitive overload as a situation where the student has been given too much information at once or too many simultaneous tasks, resulting in not being able to perform or process the information. It is a situation in which the demands placed on a person by mental work (the cognitive load) are greater than the person's mental abilities can cope with.

Students were barraged with many ideas and concepts from teachers in online classes. Therefore, students had difficulties coping with the lessons taught. Online learning involves activities such as accessing an online learning platform, using digital resources to study, and solving technical and internet connection problems, which result in an increased extraneous cognitive load.

Institutions can take steps to reduce the cognitive overload of students by altering the timetable or schedule according to online classes. Students felt tired after seeing the screen for a long time. Reducing the number of working hours per day will improve students' concentration in online learning.

Suggestions to Teachers for Improving the Effectiveness of Online Education

Suggestions to teachers for improving the effectiveness of online education include teaching preparation, monitoring and evaluation, creating an interactive environment, and providing counseling to students, which are discussed below in detail.

Teaching preparation

The results of this study revealed that the teaching preparation factor contributed in a positive and significant way to the effectiveness of online education. Teaching preparation includes time spent by teachers on preparation, lesson plan preparation, teaching style, and teaching method. These are all the efforts made by teachers to improve the effectiveness of education.

Teachers need to spend more time preparing quality content for online classes. Teachers need to prepare lesson plans, which will act as a road map for classroom activities and help teachers with time management. Teachers need to have a facilitator-type teaching style that encourages self-learning in the classroom through peer-teacher learning. Teachers need to utilize advanced teaching methods with the help of ICT tools to enhance the attention of students in online classes.

Teachers need to improve their efforts in terms of time spent for preparation, lesson plan preparation, teaching style, and teaching method to improve the effectiveness of online education.

Monitoring and evaluation

The results of this study revealed that monitoring and evaluation factor contributed in a positive and significant way to the effectiveness of online education. Monitoring and evaluation factor include ease of use of the online teaching platform, monitoring in online classes, evaluation through the online examination platform, and ways of clarifying queries.

Teachers need to monitor the students' progress through regular class works/assignments. They need to track the students' difficulty in understanding the subject. Teachers need to promote the self-efficacy of the students in carrying out class works/assignments in their own creative way.

A better evaluation through an online examination platform will help us know the progress of students. Teachers need to clarify the queries of students in an efficient manner to improve the quality of online learning. Monitoring and evaluation are profoundly important to observe if there are significant issues encountered by the teachers and the students related to the implementation of an online learning system.

Creating an interactive environment

The results of this study reported that teacher–student interaction was at a medium level. To enhance teacher–student interaction, teachers need to create an interactive environment in the online system of education.

Students were just merely present in online classes; hence, the teacher has to interact with students, and he/she wants to make sure that the students are following the class. Involving students in classroom discussions will improve the effectiveness of online learning. Time needs to be allotted at the end of each class to have interaction with students.

Online interactions and discussions among students and teachers are a significant part of online classes because interaction, collaboration, communication, and discussions are the key elements for making online learning successful. This offers the opportunity for students to participate actively, and it helps them to think and compose their thoughts before sharing them.

It helps students and teachers keep a close track of the lecture without getting diverted. To minimize students' reluctance to interact, teachers need to pay attention to several factors, such as selecting interesting materials and considering the difficulty level and relevance of the course material to students' learning needs. Teachers need to provide an environment where students can share their views and opinions about the concerned topic.

Providing counseling to students

Students have been psychologically affected due to the COVID-19 pandemic, and they felt exhausted because of continuous classes of 8 h/day without any breaks. Online learning resulted in long-term social isolation and limited interaction with fellow students. This situation may lead to an increased level of loneliness. Students spending more time on social media also experience depression and psychological distress. Students felt a lack of motivation to learn online. The depressive symptoms among students lead to suicidal thoughts too.

Teachers need to be concerned about the mental health of their students. Teachers need to provide emotional and cognitive support to the students. Ward counseling, which was provided by teachers in offline classes, needs to be carried out for online classes too. This will comfort the students and motivate them to learn online with more enthusiasm.

Suggestions to Students for Improving the Effectiveness of Online Education

Suggestions to students for improving the effectiveness of online education are the e-learning status of students, students' responses toward e-learning, students' readiness toward e-learning, and self-regulation in e-learning, which are discussed below in detail.

E-learning status of students

The results of this study reported that the e-learning status of students is an important factor that contributes in a positive and significant way to the effectiveness of online education. This factor includes the resources opted for study, the syllabus covered for the examination, and the time spent on study.

Students need to choose digital resources like soft copies as their resources for study in the online system of education because it is easy to access the material anywhere. It is cost-efficient and easy to store larger amounts of data on a pen drive.

Students need to cover a major portion of the syllabus while they are preparing for an online examination. This will improve the academic performance of students in the online system of education. Students need to spend more time studying other than the regular class timing to follow-up on the lectures and improve their self-efficacy in learning.

Students' response toward E-learning

The results of this study reported that students' response toward e-learning is an important factor which contributed in a positive and significant way toward the effectiveness of online education. This factor includes self-directed learning, level of learner control, and motivation for learning.

Students need to take self-initiative in the learning process while learning online. This improves their confidence and self-efficacy in learning online. Students need to have a degree of control over the instructions they receive while learning online. Students need to self-motivate themselves in online

education for their psychological well-being. Students need to feel comfortable learning online. They need to take a break and reward themselves while they are studying online.

Students' readiness toward e-learning

Students' response to e-learning is an important factor, which includes frequency of participation, level of understanding, preferred mode of study in the future, and way of addressing queries.

Students need to improve their degree of participation in online classes to enhance the effectiveness of online learning. Participation tends to increase the academic performance of students, and it shows their interest in studying online. Participation does not merely mean being present in the class. Students need to be actively involved in classroom discussions.

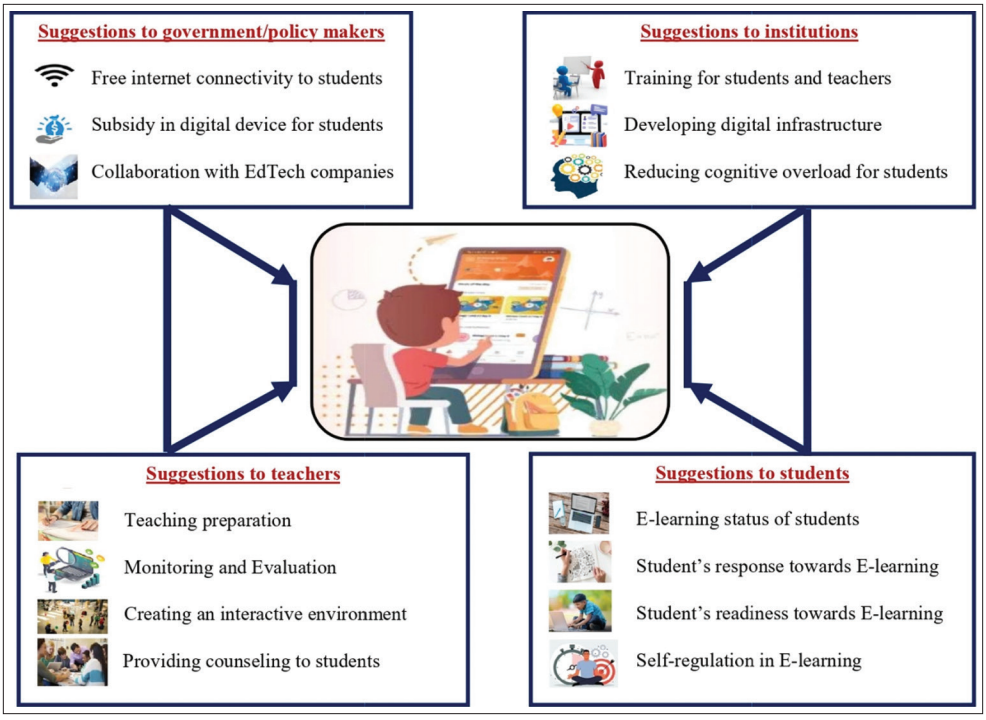
Students felt that there was a lack of concentration while they took online classes. This was the learning constraint confronted by the students in the online system of education. To overcome this constraint, students need to have self-interest in the class and feel free to ask questions of the teacher. Addressing questions to teachers will improve students' comprehension. E-learning has led to the need in assessing the mental and physical preparation of students before using the E-learning environment. This makes sure that students are capable of using the online system of education in the best way possible.

Self-regulation in e-learning

Students felt socio-emotional constraints such as a lack of self-confidence and a lack of satisfaction with the online system of education. This constraint can be overcome by encouraging students to adopt self-regulated learning. Self-regulated learning is the result of the self-determined efforts made by the students to enhance their learning and improve their academic performance.

Students need to adopt self-regulated learning, which includes goal setting, the use of their own strategies, self-monitoring, and self-adjustment. Students can use this to strengthen their learning achievements and enhance their motivation for learning in online mode. Students who show higher self-regulation may learn the material more effectively since they are less affected by irrelevant events. Students have to be self-disciplined to maintain decorum in the classroom environment and to avoid malpractice in online examinations.

Students need to have self-control to avoid social media distractions and environmental distractions. Students who frequently use digital devices for texting and accessing social media during online classes significantly reduce their academic performance.



Prescriptive model for effective online education

CONCLUSION

Majority of students from rural areas participating in online education emphasize the need for strategies to bridge the digital divide between rural and urban students. Initiatives should address accessibility issues and provide necessary resources to ensure quality education for all. Student perceptions of online learning platform usability highlight the need for user-friendly interfaces and platforms. Institutions should consider continuous improvements to ensure that technology enhances rather than hinders the learning process.

The diversity of student opinion toward online education suggests that institutions should engage with student feedback to continuously refine and improve online learning experiences. The significant influence of digital device and internet access on the outcomes of online education from student perspective underscores the critical importance of technological infrastructure. The significant impact of students' learning status on online education from student perspective outcomes suggests that individual student preparedness and engagement play a pivotal role in successful online learning.

Institutions should actively seek feedback from students and adapt online teaching methods based on their preferences and needs. The lack of training reported by a majority of students emphasizes the need for educational institutions to provide comprehensive training on online learning platforms and digital tools to both students and teachers to ensure smooth online class experience.

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