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Teachers' perception of online teaching of B. Tech. (Dairy technology) course during the Covid-19 pandemic with reference to dairy science colleges in India

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Abstract

The Indian Dairy sector has a vital role in India's Economy. Dairying sector contributes around 28% to the Agriculture GDP and 4.5% to National GDP. The formal education in the subject of dairy science started in year 1923 with establishment of the "Imperial Institute of Animal Husbandry and Dairying" at Bangalore. At present there are around 20 Dairy Science colleges associated with the Indian Council of Agricultural Research / State Agricultural Universities in India. Due to COVID-19 pandemic there has been an increasing movement towards teaching online because of lockdown and subsequent shutting down of schools, colleges and universities for an indefinite time. Though, it is an accepted assumption that no pedagogical approach can replace the peak position of formal education. But, as a result of COVID-19 crisis, online education became a pedagogical shift from traditional method to the modern ICT based approach of teaching-learning from classroom to virtual classroom. This research study focuses on the perception of Teachers of Dairy Science Colleges of India towards the online Teaching of B.Tech. (Dairy Technology) course during the COVID-19 Pandemic and the challenges faced by them. The relevant information for the study was collected from respondents in the form of Questionnaire. The major findings was effectiveness of theory classes it was found that the respondents disagreed with online teaching for theory is as effective as offline theory teaching.

Keywords: perception of online teaching, online teaching-learning, online education, Covid-19, online dairy education, online teaching effectiveness

Introduction

The Indian Dairy sector has a vital role in India's Economy. Dairying sector contributes around 28% to the Agriculture GDP and 4.5% to National GDP. The milk production of the country has increased from 17 million tonnes in the year 1951 to a mammoth 198.40 million tonnes in the year 2019-20 and the per capita availability of milk in the country has also increased to 406 grams /day.

The formal education in the subject of dairy science started in year 1923 with establishment of the "Imperial Institute of Animal Husbandry and Dairying" at Bangalore.

Sheth M.C. College of Dairy Science is the oldest college started by the then Anand Agriculture University in 196. Subsequently, several State Agricultural Universities established their constituent "Dairy Science" faculties having the responsibility of imparting Dairy Science education. At present there are around 20 Dairy Science colleges associated with the Indian Council of Agricultural Research / State Agricultural Universities in India. These colleges offer courses ranging from Graduation, Post-graduation and Doctorate and it is estimated that in a year they turn out around 754 dairy graduate, 154 Dairy Post graduate and around 21 PhDs.

Due to COVID-19 pandemic there has been an increasing movement towards teaching online because of lockdown and subsequent shutting down of schools, colleges and universities for an indefinite time.

Though, it is an accepted assumption that no pedagogical approach can replace the peak position of formal education. But, as a result of COVID-19 crisis, online education became a pedagogical shift from traditional method to the modern ICT based approach of teaching-learning from classroom to virtual classroom. Previously, e-learning, distance education and correspondence courses were commonly considered as the part of non-formal education,

but now, they may slowly replace the formal education system if the situation persists over the time.

Further, the lockdown has created an unprecedented situation and new challenges for agricultural education being offered in various agricultural universities across the country. The ICAR took several immediate actions to make sure the continuity in teaching- learning process. As a part of these initiatives, based on UGC Guidelines for the Universities in view of COVID-19 pandemic and in consultation with academic experts and administrators of agricultural universities, the ICAR has articulated the advisories for the betterment of academic ambience in the agricultural universities. The current situation necessitates the dependence on online learning mode. Hence, necessary steps need to be taken by the universities to create such learning resources and encourage the students to avail such online courses. All Agricultural Universities (AUs) has taken necessary steps to connect each student through various online tools for their classes, assignments and other related activities, so that there is no time lag in the schedule of academic session. Further, the Universities has availed the available online options such as Google Classroom, Google Meet, Google Hangout, MOOCs, Cisco WebEx Meeting, YouTube Streaming, OERs, SWAYAM Platform and SWAYAMPBHA.

The Government of India is also emphasizing on ICT and use of online education as the part of compulsory teaching-learning process at tertiary level. Furthermore, it is reflected on preparing draft New Education Policy 2019 (NEP-2019) that has been regarded as a proactive and extremely techno-efficient step in the time of this pandemic. Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM) is a programme or Massive Open Online Courses (MOOC) platform introduced by the government of India presented online courses in four different quadrants.

Objectives

- To study the perception of Teachers of Dairy Science Colleges of India towards the online Teaching of B.Tech. (Dairy Technology) course during the COVID-19 Pandemic
- To study the challenges faced by the Teachers during the online teaching-learning

- To give suitable suggestions to increase effectiveness of online teaching-learning

Methodology

The present study covers all the Dairy Science Colleges in India. At present there are 20 Dairy Science colleges in India which offer various courses ranging from Graduation, Post-graduation and Doctorate. The relevant information for the study was collected from respondents in the form of Questionnaire. Total 92 Teaching Faculty members from different Dairy Science Colleges around the country gave their responses in the online questionnaire. The data so collected was analysed in light of the objectives and appropriate inferences were made and finally suitable suggestions were also made. The study was carried out during February 2021 to October – 2021.

Data Analysis

Table 1: State wise distribution of Respondents (n=92)

Sr. No	State of Respondent	No.	%
1	Gujarat	51	55%
2	Haryana	5	5%
3	Karnataka	4	4%
4	Kerala	7	8%
5	Maharashtra	11	12%
6	Punjab	2	2%
7	Rajasthan	2	2%
8	Tamil Nadu	4	4%
9	Telangana	1	1%
10	Uttar Pradesh	3	3%
11	West Bengal	2	2%
12	Total	92	100%

At present the Dairy Science colleges are located in various states across the country. The above table shows that majority of the respondents in the study were from Gujarat (55%) followed by Maharashtra (12%) and Rajasthan (2%), Hence around 70% respondents were from the western region (Gujarat, Maharashtra and Rajasthan). This is also because the number of Dairy Science colleges is relatively more in these states.

Table 2: College wise distribution of respondents (n=92)

Sr. no	College of the Respondent	No.	%
1	College of Dairy and Food Science Technology, MPUAT, Udaipur, Rajasthan	2	2%
2	College of Dairy Science and Technology, GADVASU, Ludhiana, Punjab	2	2%
3	College of Dairy Science and Technology, Mannuthy, Thrissur, Kerala	5	5%
4	College of Dairy Science and Technology, Trivandrum, Kerala	2	2%
5	College of Dairy Science, Kamdhenu University, Amreli, Gujarat	9	10%
6	College of Dairy Technology, MAFSU, Udgir, Maharashtra	4	4%
7	College of Dairy Technology, MAFSU, Warud (Pusad), Maharashtra	7	8%
8	College of Dairy Technology, PVNR TVU, Kamareddy, Telangana	1	1%
9	College of Food and Dairy Technology, Koduvalli, Tamil Nadu	4	4%
10	Dairy Science College, Humanabad Road, Kalaburagi, Karnataka	2	2%
11	Dairy Science College, KVAFSU, Hebbal, Bengaluru, Karnataka	2	2%
12	Faculty of Dairy Technology, W.B. Uni. of Animal & Fishery Science, Krishiviswavidyalaya, West Bengal	2	2%
13	Mansinhbhai institute of Dairy & Food Technology, Kamdhenu University, Mehsana, Gujarat	8	9%
14	National Dairy Research Institute, Karnal, Haryana	5	5%
15	Shri G.N. Patel Dairy Science & Food Technology College, Dantiwada, Gujarat	5	5%
16	SMC College of Dairy Science, Anand, Gujarat	29	32%
17	Warner College of Dairy Technology, Shuats, Naini, Uttar Pradesh	3	3%
18	Total	92	100%

From the above table it can be seen that the out of 20 dairy science colleges in the country in the present study the respondents were from 17 dairy science colleges. Majority of the respondents were from SMC College of Dairy Science (32%) followed by DSC, Amreli, MIDFT and NDRI.

Table 3: Designation of the Respondent (n=92)

Sr. no.	Designation of the Respondent	No.	%
1	Principal	3	3%
2	Professor & Head	1	1%
3	Professor and equivalent	6	7%
4	Associate Professor and equivalent	5	5%
5	Assistant Professor and equivalent	76	83%
6	Senior Research Assistant	1	1%
7	Total	92	100%

The above table shows that majority (83%) of the respondents were Assistant Professors and equivalent, around 11% were Professor and equivalent (Including 3 Principals) and only 5% were Associate Professors.

Table 4: Department of the respondent (n=92)

Sr. no.	Department of the Respondent	No.	%
1	Dairy Business Management / Dairy Economics	13	14%
2	Dairy Chemistry	17	18%
3	Dairy Engineering	20	22%
4	Dairy Microbiology	8	9%
5	Dairy Technology	30	33%
6	Department of Statistics and Computer Science	1	1%
7	DVK	1	1%
8	Food Process Engineering/Technology	2	2%
9	Total	92	100%

From the above table it can be seen that Majority (33%) of the respondents were from Dairy Technology department, followed by Dairy Engineering (22%), Dairy Chemistry (18%), Dairy Business Management (14%) and Dairy Microbiology (9%). Hence, it can be said that sufficient respondents were from all the Major Departments of Dairy Science College.

Table 5: Nature of Appointment (n=92)

Sr. no.	Nature of Appointment of the Respondent	No.	%
1	Permanent	84	91%
2	Deputation	1	1%
3	Contractual	7	8%
4	Total	92	100%

The above table shows that almost 91% of the respondents were holding Permanent posts in their colleges.

Table 6: Total Teaching Experience (n=92)

Sr. no.	Total Teaching Experience (in Years)	No.	%
1	0-5	22	24%
2	6 to 10	37	40%
3	11 to 15	23	25%
4	16 to 20	2	2%
5	21 to 25	1	1%
6	26 to 30	3	3%
7	31 to 36	4	4%
8	Total	92	100%

The above table shows that around 24% of the respondents had less than 5 years of Teaching experience, 40% had around 6 to 10 years, 25% had 11 to 15 years and 10% had more than 15 years of teaching experience.

Table 7: Age wise distribution of respondents (n=92)

Sr. no.	Age of the Respondent	No.	%
1	20 to 30	9	10%
2	31 to 40	52	57%
3	41 to 50	21	23%
4	51 to 60	9	10%
5	61 to 65	1	1%
6	Total	92	100%

From the above table it can be seen that Majority of the respondents were in the age group of 31 to 40 years (57%), followed by 41 to 50 years (23%), 20 to 30 years (10%) and 51 to 60 years (10%).

Table 8: Gender wise distribution of respondents (n=92)

Sr. no.	Gender of the Respondent	No.	%
1	Male	66	72%
2	Female	26	28%
3	Total	92	100%

The above table indicates that 72% of the respondents were Males and 28% were females.

Table 9: Actual number of hours spent in UG online teaching / Week (n=92)

Sr. no.	Actual number of hours spent in UG online teaching / Week by the Respondent*	No.	%
1	1 to 5	33	36%
2	6 to 10	28	30%
3	11 to 15	15	16%
4	More than 16%	9	17%
5	Total	92	100%

*(Does not include lecture preparation or any other time)

Regarding the Actual number of hours spent in UG online teaching / Week, it can be seen from the above table that 36% respondents used to spend upto 5 hours per week for UG online Teaching, another 30% used to spend 6 to 10 hours, other 16% spent 11 to 15 hours/week, and around 17% used to spend more than 16 hours per week.

Table 10: IT skills of the respondents (n=92)

Sr. no.	IT skills of the Respondent	No.	%
1	Poor	0	0%
2	Weak	0	0%
3	Good	32	35%
4	Very good	46	50%
5	Excellent.	14	15%
6	Total	92	100%

Regarding IT skills 50 per cent of the respondents have very good IT skill, 35 per cent have good IT skill and 15 per cent respondents have excellent IT skill.

Table 11: Previous experience of virtual classroom teaching before the pandemic (n=92)

Sr. no.	Previous Experience of the Respondent regarding virtual classroom teaching (i.e before pandemic)	No.	%
1	Yes	18	20%
2	No	74	80%
3	Total	92	100%

The above table shows that a majority (80%) of the Respondent regarding virtual classroom teaching (i.e before pandemic) did not have any Previous Experience of the pandemic).

Table 12: Gadget do you generally use for online teaching (n=92)

Sr. no.	Gadget generally used by the respondent for online teaching	No.	%
1	I pad	1	1%
2	Laptop	43	47%
3	PC	46	50%
4	Smartphone	2	2%
5	Total	92	100%

From the above table it can be said that Majority of the the purpose of online Teaching. respondents used a PC (50%) followed by Laptop (47%) for

Table 13: Platform used for online teaching (n=92)

Sr. no.	Platform generally used by the respondent for online teaching	No.	%
1	Google Classroom	51	55%
2	Google Meet	68	74%
3	Zoom	40	43%
4	WhatsApp	24	26%
5	Impartus	8	9%
6	Cisco WebEx	11	12%
7	LMS	2	2%
8	Microsoft Team	13	14%

From the above table it can be said that majority of the WhatsApp, Zoom and Cisco WebEx, and very few respondents preferred Google Meet and Google classroom respondents used platforms such as Microsoft Team and Impartus. platform for online teaching. Some respondents also used

Table 14: The Software version used by respondents for Online Teaching (n=92)

Sr. no.	Type of software version used by the respondent for online teaching	No.	%
1	Free	78	85%
2	Paid	14	15%
3	Total	92	100%

The above table indicates that Majority (85%) of the platform for the purpose of Online Teaching. respondents used 'Free' version of the software/online

Table 15: Technical aspects of Online Teaching (n=92)

Sr. no.	Particulars	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
1	Connection process to join the online lecture is easy.	0	6	9	50	27	92
		0%	7%	10%	54%	29%	100%
2	Internet speed is good at my place.	1	6	18	48	19	92
		1%	7%	20%	52%	21%	100%
3	Generally there is no audio problem during online lecture	2	14	28	36	12	92
		2%	15%	30%	39%	13%	100%
4	My device's processing speed is appropriate for online teaching	0	3	16	51	22	92
		0%	3%	17%	55%	24%	100%
5	My devices' screen size is appropriate for online teaching	0	3	4	55	30	92
		0%	3%	4%	60%	33%	100%
6	I have sufficient data package / internet facility for online teaching	0	6	17	37	32	92
		0%	7%	18%	40%	35%	100%

- Majority (83 per cent) of the respondents agreed with the Connection process to join the online lecture is easy.
- Majority (73 per cent) of the respondents agreed with the Internet speed is good at my place.
- More than half (52 per cent) of the respondents agreed that there is no audio problem during online lecture.
- Most of (79 per cent) of the respondents agreed with the devices processing speed is appropriate for online teaching.
- Overwhelmed majority (93 per cent) of the respondents

agreed with the devices' screen size is appropriate for online teaching.

have sufficient data package / internet facility for online teaching.

- Most of (75 per cent) of the respondents agreed that they

Table 16: Interaction & Material Sharing during Online teaching (n=92)

Sr. no.	Particulars	Never	Rarely	Sometimes	Often	Always	Total
1	I always share my camera / video during online lecture	2	12	27	18	33	92
		2%	13%	29%	20%	36%	100%
2	I permit the students to share their audio during online lecture	0	7	25	31	29	92
		0%	8%	27%	34%	32%	100%
3	I provide e-Tutorial / Video lectures during online teaching	4	10	20	33	25	92
		4%	11%	22%	36%	27%	100%
4	I provide e-Content / Materials using PDF, PPT, Word File, etc. during online class	0	1	10	19	62	92
		0%	1%	11%	21%	67%	100%
5	I conduct sufficient number of Online Assessments / quizzes in my course	0	11	18	35	28	92
		0%	12%	20%	38%	30%	100%
6	I provide sufficient Online Discussion of the lecture topic by students and teacher via Audio / Video	4	2	10	36	40	92
		4%	2%	11%	39%	43%	100%
7	I provide sufficient Online Discussion of the lecture topic by students and teacher via Chat Box / Discussion Forum	0	10	20	33	29	92
		0%	11%	22%	36%	32%	100%
8	I clarify students' questions / queries during the online teaching	0	1	10	15	66	92
		0%	1%	11%	16%	72%	100%
9	I provide my lectures / practical on social media like YouTube, WhatsApp, Facebook, etc.	32	14	20	17	9	92
		35%	15%	22%	18%	10%	100%
10	I use and share e-courses developed by ICAR	4	13	20	24	31	92
		4%	14%	22%	26%	34%	100%

Regarding Interaction & Material Sharing during Online teaching we got the following response:

Majority (72 per cent) of the respondents said that they always clarify students' questions / queries during the online teaching, 67 per cent of the respondents said that they provide

e-Content / Materials using PDF, PPT, Word File, etc. during online class. While 35 per cent of the respondents said that they never provide their lectures / practical on social media like YouTube, WhatsApp, Facebook, etc.

Table 17: Teaching Effectiveness (Theory) (n=92)

Sr. no.	Particulars	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
1	Online teaching for theory is as effective as offline theory teaching	16	33	15	27	1	92
		17%	36%	16%	29%	1%	100%
2	I am satisfied with the level of student participation and interaction in theory online teaching	8	34	27	21	2	92
		9%	37%	29%	23%	2%	100%
3	It is not possible to verify the physical attendance of student throughout the online theory class	2	6	17	41	26	92
		2%	7%	18%	45%	28%	100%
4	I feel online theory teaching is not effective since I can not see students face and reactions	0	13	19	38	22	92
		0%	14%	21%	41%	24%	100%
5	I use digital pad / digital board for theory teaching	13	34	25	19	1	92
		14%	37%	27%	21%	1%	100%

Regarding Teaching Effectiveness (Theory) during Online teaching we got the following response:

More than half (53 per cent) of the respondents disagreed with Online teaching for theory is as effective as offline theory teaching during the online teaching and 51 per cent also

mentioned that they are not using digital pad / digital board for theory teaching. While, 73 per cent of respondents agreed that it is not possible to verify the physical attendance of student throughout the online theory class

Table 18: Preparation for Practical Classes (n=92)

Sr. no.	Particulars	Never	Rarely	Sometimes	Often	Always	Total
1	I personally perform (real time) and demonstrate the given practical during practical classes	11	19	33	21	8	92
		12%	21%	36%	23%	9%	100%
2	I upload the video of myself performing the practical so that students can understand	20	24	22	18	8	92
		22%	26%	24%	20%	9%	100%
3	I upload the videos of given practical from YouTube, Vimeo, etc.	9	17	24	31	11	92
		10%	18%	26%	34%	12%	100%

Regarding Preparation for Practical Classes during Online teaching we got the following response:

34 per cent of the respondents often upload the videos of given practical from YouTube, Vimeo, etc. 36 per cent respondents sometimes personally perform (real time) and

demonstrate the given practical during practical classes. While 26 per cent respondents rarely upload the video of myself performing the practical so that students can understand.

Table 19: Teaching Effectiveness (Practical) (n=92)

Sr. No.	Particulars	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
1	Online teaching for practical is as effective as offline practical teaching	34	40	9	6	3	92
		37%	43%	10%	7%	3%	100%
2	I am satisfied with the level of student participation and interaction in practical online teaching	18	42	25	6	1	92
		20%	46%	27%	7%	1%	100%
3	It is not possible to verify the physical attendance of student throughout the online practical class	4	11	23	31	23	92
		4%	12%	25%	34%	25%	100%
4	I feel online practical teaching is not effective since I can not see students face and reactions	3	8	15	35	31	92
		3%	9%	16%	38%	34%	100%
5	Because of online practical, it is unable to feel the organoleptic (taste, smell, etc.) and other sensory attributes (body, texture, colour, appearance, etc.) which are very important in dairy processes	1	3	6	20	62	92
		1%	3%	7%	22%	67%	100%
6	I use digital pad / digital board for practical teaching	17	29	28	17	1	92
		18%	32%	30%	18%	1%	100%
7	I use computer simulator to conduct practical	22	27	27	14	2	92
		24%	29%	29%	15%	2%	100%

Regarding Teaching Effectiveness (Practical) during Online teaching we got the following response:

Most of (89 per cent) of the respondents stated that because of online practical, it is unable to feel the organoleptic (taste, smell, etc.) and other sensory attributes (body, texture, colour, appearance, etc.) which are very important in dairy processes and 72 per cent also mentioned that they feel online practical teaching is not effective since they cannot see students face and reactions. While, 80 per cent of respondents disagreed that online teaching for practical is as effective as offline practical teaching.

Table 20: Type of evaluation implemented by college during COVID 19 pandemic (n=92)

Sr. No.	Type of Evaluation	Number	%
1	Online	91	99%
2	Offline	1	1%
3	Total	92	100%

Regarding type of evaluation implemented by your college during COVID 19 pandemic almost 99 per cent of the respondents mentioned that the college have conducted the online evaluation system.

Table 22: Type of questions used by you for conducting online exam (n=92)

Sr. no.	Type of questions used by respondents for conducting online exam	No.	%
1	Both Objective and Subjective	60	65%
2	online viva	1	1%
3	Only Objective questions	31	34%
4	Total	92	100%

Regarding type of questions used by respondents for conducting online exam, majority of (65 per cent) of the

Table 21: Platform / Software used by you for online evaluation (n=92)

Sr. no.	Platform / Software used by respondents for online evaluation	No.	%
1	CodeTantra	1	1%
2	email	1	1%
3	Google Form	79	86%
4	Google Meet	1	1%
5	Google Classroom	1	1%
6	Microsoft Forms	2	2%
7	Online exam by sending question paper to students.	1	1%
8	Online viva and presentations	1	1%
9	PDF form through email	1	1%
10	Quiz, class assessment etc.	1	1%
11	Speedexam.net	2	2%
12	Teaching audit	1	1%
13	Total	92	100%

Regarding platform / software used for the online evaluation, most of (86 per cent) of the respondents were used Google Form for conducting the online examination for students.

Table 23: Evaluation Effectiveness (Theory) (n=92)

Sr. no.	Particulars	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
1	In online evaluation supervision is not effective	0	4	9	33	46	92
		0%	4%	10%	36%	50%	100%
2	I feel online evaluation / exam is unable to distinguish between high performing and poor performing students	3	3	9	36	41	92
		3%	3%	10%	39%	45%	100%
3	In online evaluation the result generation and preparation is easier than offline	1	6	14	27	44	92
		1%	7%	15%	29%	48%	100%
4	Online theory examinations are not suitable when teacher wants to take the test the student's memory / recall power (definition, formula, etc.)	2	3	16	36	35	92
		2%	3%	17%	39%	38%	100%

Regarding Evaluation Effectiveness (Theory) during Online teaching we got the following response:
Most of (86 per cent) of the respondents stated that in online evaluation supervision is not effective and it was followed by

84 per cent feel online evaluation / exam is unable to distinguish between high performing and poor performing students.

Table 24: Evaluation Effectiveness (Practical) (n=92)

Sr. no.	Particulars	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
1	In online evaluation there is limited scope to conduct practical test	0	0	4	41	47	92
		0%	0%	4%	45%	51%	100%
2	Conducting practical viva is satisfactory	2	17	15	50	8	92
		2%	18%	16%	54%	9%	100%
3	Using MCQ / Objective questions is not very effective in testing the practical knowledge gained by the students	1	5	9	38	39	92
		1%	5%	10%	41%	42%	100%

Regarding Evaluation Effectiveness (Practical) during Online teaching we got the following response:
All most of (96 per cent) of the respondents stated that in online evaluation there is limited scope to conduct practical

test and it was followed by 83 percent stated that using MCQ / Objective questions is not very effective in testing the practical knowledge gained by the students.

Table 25: Challenges of Online Teaching-Learning (n=92)

Sr. no.	Particulars	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
1	I feel there is lack of scope for meaningful interaction and oral discussion	0	5	16	50	21	92
		0%	5%	17%	54%	23%	100%
2	I feel it is difficult to implement innovative teaching method	2	25	26	32	7	92
		2%	27%	28%	35%	8%	100%
3	It is difficult to explain topics involving numerical and calculations	1	10	15	42	24	92
		1%	11%	16%	46%	26%	100%
4	I feel that online examination / evaluation is not very effective in separating good performing student and poor performing student	1	1	14	46	30	92
		1%	1%	15%	50%	33%	100%
5	I feel extra tiring of eyes during online teaching	1	4	15	47	25	92
		1%	4%	16%	51%	27%	100%
6	I feel that One Lecture / Practical of ONLINE teaching is more tiresome than one Lecture / Practical of OFFLINE teaching	1	8	21	39	23	92
		1%	9%	23%	42%	25%	100%
7	I face poor internet connectivity issue	9	20	27	28	8	92
		10%	22%	29%	30%	9%	100%
8	There is a limited availability of hardware resources like Computer / Laptop	18	27	23	17	7	92
		20%	29%	25%	18%	8%	100%
9	There is a limited availability of resources like Headphone, Web camera, Speakers, etc.	15	27	22	22	6	92
		16%	29%	24%	24%	7%	100%
10	There is an issue of electricity / power supply	15	27	23	21	6	92
		16%	29%	25%	23%	7%	100%

Regarding Challenges faced during Online teaching we got the following response:
Majority of (83 per cent) of the respondents stated that they feel that online examination / evaluation is not very effective in separating good performing student and poor performing student and it was 78 percent respondents feels that they face the problem of extra tiring of eyes during online teaching, while 77 per cent feel there is lack of scope for meaningful interaction and oral discussion.

Table 26: Recording of online lectures (n=92)

Sr. no.	Recording the online lectures by the Respondent	No.	%
1	Yes	33	36%
2	No	59	64%
3	Total	92	100%

Regarding recording the online lectures majority of respondents (64 per cent) were not record their online lectures.

Suggestions

Some of the suggestion received in the study were:

- Facilities like automatic recording of all online lecture so that can be helpful for students
- Compulsory attendance should be there for students for online studies. Some criteria should be fixed for incomplete attendance during the entire semester.
- Training should be given to teachers and students for effective online theory teaching.
- Examination conduction should be via purchased software's
- Each faculty should provide good quality teaching aids like headphones, Digital writing pads, Laptops, etc.
- There is a need to develop better software which can simulate classroom as well as reduce data consumption.
- Perfect blend of offline and online classes is highly recommended
- Need ICT infrastructure for effective teaching, standard evaluation methods have to implement

Result & Discussion

1) Profile

- Majority of the respondents in the study were from Gujarat (55%) followed by Maharashtra (12%) and Rajasthan (2%), Hence around 70% respondents were from the western region (Gujarat, Maharashtra and Rajasthan).
- Out of 20 dairy science colleges in the country in the present study the respondents were from 17 dairy science colleges. Majority of the respondents were from SMC College of Dairy Science (32%) followed by DSC, Amreli, MIDFT and NDRI.
- Majority (83%) of the respondents were Assistant Professors and equivalent.
- There were sufficient respondents from all the Major Departments of Dairy Science College, almost 91% of the respondents were holding permanent posts in their colleges, around 24% of the respondents had less than 5 years of teaching experience, Almost cent per cent of the responds have very good IT skill, Majority (80%) of the respondents did not have any Previous Experience of the Respondent regarding virtual classroom teaching (i.e before pandemic), Majority of the respondents used a PC (50%) followed by Laptop (47%) for the purpose of online Teaching, preferred platform were free version of Google Meet and Google classroom.

2) Technical Aspects of Online Teaching

- Majority of the respondents agreed that - the Connection process to join the online lecture is easy, Internet speed is good at their place, no audio problem during online lecture, the devices processing speed is appropriate, the devices' screen size is appropriate for online teaching, they have sufficient data package / internet facility for online teaching.
- Majority of the respondents said that they always clarify students' questions / queries during the online teaching, they provide e-Content / Materials using PDF, PPT, Word File, etc. during online class. While 35 per cent of the respondents said that they never provide their lectures / practical on social media like YouTube, WhatsApp, Facebook, etc.

3) Teaching Effectiveness (Theory)

- More than half (53 per cent) of the respondents disagreed with Online teaching for theory is as effective as offline theory teaching during the online teaching
- While, 73 per cent of respondents agreed that it is not possible to verify the physical attendance of student throughout the online theory class.

4) Teaching Effectiveness (Practical)

- 34 per cent of the respondents often upload the videos of given practical from YouTube, Vimeo, etc. 36 per cent respondents sometimes personally perform (real time) and demonstrate the given practical during practical classes.
- Most of (89 per cent) of the respondents stated that because of online practical, it is unable to feel the organoleptic (taste, smell, etc.) and other sensory attributes (body, texture, colour, appearance, etc.) which are very important in dairy processes
- While, 80 per cent of respondents disagreed that online teaching for practical is as effective as offline practical

teaching.

5) Type of evaluation during COVID 19 pandemic

- Most of (86 per cent) of the respondents were used Google Form for conducting the online examination for students.
- Majority of (65 per cent) of the respondents were using both objective and subjective questions for conducting the online examination for students.
- Most of (86 per cent) of the respondents stated that in online evaluation supervision is not effective and it was followed by 84 per cent feel online evaluation / exam is unable to distinguish between high performing and poor performing students.
- All most of (96 per cent) of the respondents stated that in online evaluation there is limited scope to conduct practical test and it was followed by 83 percent stated that using MCQ / Objective questions is not very effective in testing the practical knowledge gained by the students.

6) Challenges of Online Teaching-Learning

- Majority of (83 per cent) of the respondents stated that they feel that online examination / evaluation is not very effective in separating good performing student and poor performing student
- Majority (78 percent respondents) feels that they face the problem of extra tiring of eyes during online teaching,
- While 77 per cent feel there is lack of scope for meaningful interaction and oral discussion.

7) Major Suggestions

- Facilities like automatic recording of all online lecture so that can be helpful for students.
- Perfect blend of offline and online classes is highly recommended.
- Need ICT infrastructure for effective teaching, standard evaluation methods have to implement.

Conclusions

The findings were evaluated from the point of view of the Four Quadrants of Online Teaching (MOOC) which are namely Quadrant-I - (e-Tutorial), Quadrant-II - (e-Content), Quadrant-III - (Assessment) and Quadrant-IV - (Discussion Forum) and the findings are concluded as below-

- Majority of the respondents were from the western region, had designation as Assistant Professors from all the Major Departments of Dairy Science College and around 91% were holding permanent posts and had good IT skill, also they did not have any previous Experience of virtual classroom teaching (i.e before pandemic).
- PC (50%) and Laptop (47%) were used for online Teaching, preferred platform were free version of Google Meet and Google classroom. Regarding technical aspects of online teaching it was found that majority of the respondents indicated that – no major problem was there related to internet speed, data package, device screen size, etc.
- Majority of the respondents used to always clarify students' questions / queries during the online teaching, they provide e-Content / Materials using PDF, PPT, Word File, etc. during online class.
- Regarding teaching effectiveness of theory classes it was found that the respondents disagreed with Online

teaching for theory is as effective as offline theory teaching. Regarding teaching effectiveness of practical it was found that 34 per cent of the respondents often upload the videos of given practical from YouTube, Vimeo, etc.

- For evaluation most of the respondents used Google Form and used both objective and subjective questions. Respondents feel that online examination / evaluation is not very effective in separating good performing student and poor performing student. Major suggestions are - facilities like automatic recording of all online lecture so that can be helpful for students and Perfect blend of offline and online classes is highly recommended.

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