Original Article

Imperceptible learners: Students' reasons for keeping webcams off and strategies to address students' challenges

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Abstract:

BACKGROUND: "Should students keep their webcams on or off during synchronous online classes?" is an unanswered question with educators' opinions divided on this aspect. Along with educators' perspectives, it is also important to unfold students' perspectives on this question. The objectives of this study were to determine the routine and opinion of students' regarding webcam usage and identification of students' reasons for not using webcams during online learning.

MATERIALS AND METHODS: A cross-sectional study was carried out at Margalla Institute of Health Sciences, Rawalpindi, Pakistan. Census was done for data collection by including all dental students (n = 180) enrolled at the institute attending synchronous online preclinical and clinical operative dentistry classes. Data collection was carried out using a self-administrated questionnaire. Descriptive analysis was used to describe survey item responses. Pair-wise differences between demographic categories (female vs. male, and preclinical vs. clinical) were analyzed using the Pearson Chi-Square test. Correlation of routine and opinion with students' reasons were done using Spearman correlation. Ordinal regression analysis was done to associate routine and opinion with reasons. The level of significance (P value) was set at 0.05.

RESULTS: Out of 180 students, 141 submitted the survey form, with a response rate of 77.47%. The majority of the students (n = 117, 83%) used to keep their webcams off during online classes and were (n = 69, 48.9%) of the opinion that webcams should be kept off during online classes. The most common reasons for keeping the webcam off during online classes were "comfort" (n = 87, 61.7%) and "distractions" (n = 84, 59.6%). A statistically significant association of gender was obtained, with females more likely than males due to distraction, self-consciousness, and appearance (P = 0.000, 0.003, and 0.016, respectively). The odds of gender highly influenced routine use of cameras, and this was statistically significant (OR: 3.478, P = 0.011). Students tended to keep their webcam off when they were inattentive during online classes (OR; 3.743, P < 0.001).

CONCLUSION: The majority of the students did not agree to keep the webcam on during online synchronous learning. The main reasons for students' reluctance to keep the webcam on were self-consciousness, surrounding consciousness, distractions, and technological issues. Students can be encouraged to turn the webcam on by framing strategies according to students' concerns.

Keywords:

Distance education, distance learning, online learning

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Introduction

With the advancement in technology during the 21st century, many new learning management systems have been introduced, making online learning easy and accessible to a wide range of learners. To continue the learning process during the COVID-19 pandemic, traditional face-to-face

learning was shifted to e-learning from primary to higher education levels around the globe.[1,2] This transition of learning environment brought several challenges for students and educators.[3-6] One such challenge of online learning for educators and students is "Should students keep their webcams on or off during synchronous online classes?" The opinion of educators is divided on this aspect.

Some educators believe that the pandemic and the implementation of the new learning environment have resulted in stress and anxiety for students and mandating that the webcam be kept on during synchronous online learning will further increase stress and anxiety.[7,8] Contrary to this opinion, many educators believe that keeping webcams on should be mandatory as it results in better student–teacher interactions. Nonverbal cues from students, such as a smile, frown, and confused look, help teachers to modify their instructions accordingly.[9] In addition, an enhanced sense of community and connection can be established by keeping the webcam on.[10] They regard webcam off as communicating with a bunch of black boxes with the name written on them [Figure 1] and educators having no idea to whom they are addressing.[11]

Aside from the advantages and disadvantages discussed by educators for keeping webcams on/off, it is also important for educationists to know students' perspectives on keeping webcams on/off during synchronous online learning.[12,13] Being associated with an undergraduate dental institution and shifting to online learning due to the pandemic, we also found that the majority of students preferred to keep the webcam off during synchronous online learning. Although there was no mandatory policy from our institution to keep the webcam on, many faculty members believed that there is better and effective interaction with students in video class. With this background we conducted this study with the following objectives:

Figure 1: A pictorial image showing a bunch of black boxes during synchronous online class

- To determine the frequency of students keeping the webcam on during synchronous online operative dentistry lectures
- To determine students' opinions regarding webcam usage (keeping on) during synchronous online learning
- To identify students' reasons for keeping the webcam off during synchronous online learning.

Materials and Methods

Ethical consideration
The research protocol was approved by the Ethical Review Committee (ERC Ref No: HF/114/21) of Margalla Institute of Health Sciences, Rawalpindi, Pakistan.

Study design and setting
This cross-sectional study was carried out at Margalla Institute of Health Sciences, Rawalpindi, Pakistan at the end of the first operative dentistry module in 2021.

Study participants and sampling
The study population included second-, third-, and final-year undergraduate dental students enrolled for the session 2021 (census was done including all students, n = 180).

Data collection tool and technique
Before the Covid-19 pandemic, the subject of operative dentistry was taught as preclinical operative dentistry to second- and third-year students and clinical operative dentistry to final-year students. On March 13, 2020, all universities and schools were closed in Pakistan as a result of the pandemic. The institution immediately shifted all the lectures online and postponed practical and clinical sessions. For synchronous online learning sessions, the Zoom conferencing application (Zoom Video Communications) was selected. All faculty members and students were given an online briefing for using it.

Initially, faculty and students encountered difficulties with the new learning environment and learning platform. However, with time and continuous use, they became accustomed to this app and environment. Due to the third wave of the pandemic, the 2021 session for all classes was again shifted online. By this time, all students were familiar with online learning with 9 months of experience of attending regular online classes during the academic year 2020. A questionnaire was designed according to the objectives of the study, adding possible reasons for keeping the webcam off after discussion among authors and taking references from published research.[13] To improve the quality of the questionnaire, its validity and reliability were assessed.
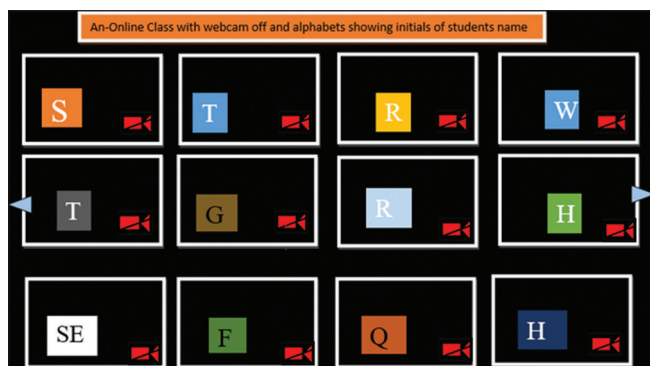
Content validity was evaluated to verify the ability of the questionnaire to measure the intended concept, whereas the reliability of the questionnaire certified the reproducibility or replicability of the results obtained by the questionnaire.[1] Content validity was determined qualitatively by sending the prepared questionnaire to two senior faculty members (medical educationists) for their expert opinion regarding the content, structure, and grammar of the questionnaire. Changes and corrections suggested by them were incorporated in the questionnaire. In the next step, reliability (internal consistency) was measured by pilot-testing the questionnaire on 20 participants (who had attended online classes for the session 2020; now dental interns in the same institution) by sending them the web link of the questionnaire. Cronbach's alpha value of the pilot study was 0.85, suggesting high reliability as well as high internal consistency of questionnaire items.

The finalized questionnaire was used for virtual data collection by using Google Forms (https://docs.google.com/forms) [Supplementary 1] at the end of the first operative module for preclinical and clinical students. The study title was mentioned at the start of the questionnaire, followed by a brief description of the purpose of the study, participants' right to voluntary participation, and reassurance about anonymity. It was also stated that the final submission of survey responses would be considered as the "consent" of the participants. The software allowed only fully completed forms to be submitted by prompting participants to complete the missing sections before the form could be submitted. The questionnaire consisted of two parts. The first part consisted of demographic details (age, gender, and year in which student is studying). The second part constituted the following items related to the webcam on/off dilemma:
1. Student's **routine** of keeping webcam on during online operative dentistry classes
2. Student's **opinion** regarding keeping webcam on during online classes
3. Student's **reason/reasons** for not turning the webcam on during regular online classes.

The first and second items had four possible responses on a Likert scale ranging from always to never. Participants were asked to select one option. For the third item, 14[14] reasons were provided along with an option of "others" if they wanted to type another reason. Participants were allowed to select all those options which applied to them.

Statistical analysis
Data were analyzed using Statistical Package for the Social Sciences for Windows (SPSS, version 20, Chicago, IL, USA). Descriptive analysis was used to describe survey item responses. Percentages were used to describe the categorical variables, whereas mean with standard deviation was used for continuous variables. Pair-wise differences between demographic categories (female vs. male and preclinical vs. clinical) were analyzed using the Pearson Chi-Square test. Correlation of routine and opinion with students' reasons were done using Spearman correlation. Ordinal regression analysis was done to associate routine and opinion with reasons' by using STATA software. The level of significance (*P* value) was set at 0.05.

Results

Out of 180 students, 141 submitted the survey form, with a response rate of 77.47%. The mean age of participants was 21.5 years with a standard deviation of ± 1.62. Out of 141 participants, 114 (80.9%) were female and 27 (19.1%) were male. Sixty-three (44.7%) participants were clinical operative dentistry students and 78 were (55.3%) preclinical operative dentistry students.

The first research objective was to determine the frequency of students who kept their webcam on during synchronous online operative dentistry lectures. Out of 141, only five (3.5%) participants used to keep their webcam "always" on during online classes, whereas the majority of students 117 (83%) answered "never" to this question [Figure 2]. When asked about students' opinion that webcam should be kept on during online classes, a vast majority (69, 48.9%) answered "never," followed by 33 (23.4%) answering "sometimes" [Figure 2].

The reasons selected by students for not keeping the webcam on during online classes were "I was more comfortable when the webcam was off" (61.7%) and "I felt distracted during lecture when my or other students' webcam was on" (59.6%). The least commonly reported reason was "The camera on my device was not working" (9.9%). Table 1 shows in detail all the reasons selected by students along with a breakdown by demographic categories.
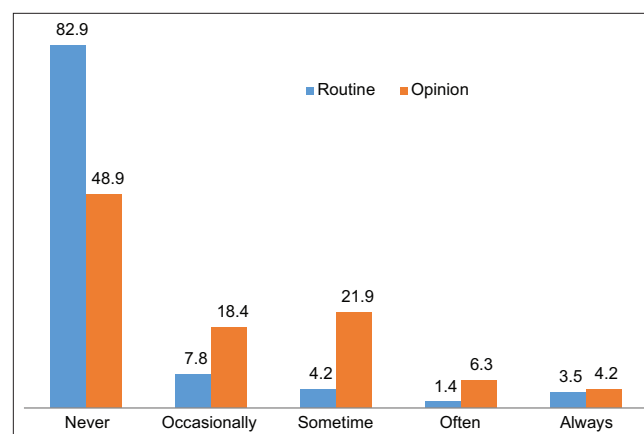

Figure 2: Students' routine and opinion for keeping webcam on during online learning

Females were significantly more likely than males to select the following reasons:
1. "I felt distracted during lecture when mine or others students' webcam was on" (male: n = 4/27; female: n = 80/114; $P < 0.001***$)
2. "I felt that everyone is looking at me" (male: n = 3/27; female: n = 47/114; $P = 0.003**$)
3. "I was concerned about my appearance" (male: n = 7/27; female n = 59/114; $P = 0.016*$).

A marginally significant association was also seen between males and females for the reasons "Keeping webcam on slowed down my internet speed" and "I am more comfortable when the webcam was off" ($P = 0.047*$ and $0.04*$, respectively). No significant association was found between studying year (preclinical vs. clinical) and reasons for keeping the webcam off during online classes [Table 1]. The reasons stated by students in option "others" were "didn't want others to see my home" (1.4%), "didn't want to get ready and look fresh daily for online classes" (2.8%), "students should be forced to turn on webcams always or sometimes as it increases attentiveness" (4.2%), and "wanted to turn the webcam on but hesitated as others are keeping it off" (1.4%).

Table 2 shows the correlation of routine and opinion with the factors affecting the usage of camera/video devices. A statistically significant and negligible relationship was obtained for routine and opinion (r = 0.175, $P = 0.038*$), and routine and "video slowed down my internet speed" (r = 0.183, $P = 0.03*$). A statistically significant, inverse, and weak relationship was obtained for routine and "norm during lecture" (r = −0.232, $P = 0.006**$) and "distraction" (r = −0.321, $P ≤ 0.001***$). A statistically significant, negligible, and inverse relationship was obtained for routine and "eating during lecture" (r = −0.189, $P = 0.025**$).

Correlation of opinion with factors affecting usage of camera/video showed a statistically significant weak relationship with "norm during lecture" (r = 0.204, $P = 0.015*$). A highly statistically significant and weak relationship was obtained for opinion and "doing things/tasks not related to lecture" (r = 0.318, $P ≤ 0.001***$), and "moving away during lecture" (r = 0.293, $P ≤ 0.001***$). A statistically significant and negligible relationship was obtained for opinion and "talking with friends/family members" (r = 0.188, $P = 0.026*$).

Table 3 shows the ordinal regression analysis for factors affecting opinion and routine use of cameras during lectures. The gender highly influenced routine use of cameras and was statistically significant (OR: 3.478, $P = 0.011*$), followed by "video mode slowed down my internet speed" (OR: 2.627, $P = 0.034*$). Factors such as "norm during lecture" (OR: 0.152, $P = 0.014*$), "concerned about appearance" (OR: 0.127, $P = 0.001**$), and "distraction" (OR: 0.165, $P ≤ 0.001***$) were less likely to influence routine use of cameras.

In the opinion of the students, they were twice as likely to switch off their cameras as their peers also did the same (OR: 2.205, $P = 0.017*$) and three times more likely to do so if they were inattentive (OR: 3.743, $P ≤ 0.001***$) or not physically present in front of their screens

Table 1: Association of students' reasons for keeping webcam off during online learning with demographic variables

Reasons for keeping webcam off	All students+	Gender			Year of study		
	n (%)	Male	Female	P*	Pre-clinical years	Clinical year	P*
I was more comfortable when webcam was off	87 (61.7)	12	75	0.04*	46	41	0.45
I felt distracted during lecture when my or other students' webcam was on	84 (59.6)	4	80	<0.001*	46	38	0.87
I was concerned about my appearance	66 (46.8)	7	59	0.016*	36	30	0.86
I was concerned about my surroundings being visible to all	55 (39.0)	7	48	0.12	30	25	0.88
Keeping webcam on slowed down my internet speed	55 (39.0)	6	49	0.047*	28	27	0.4
I felt that everyone is looking at me	50 (35.5)	3	47	0.003*	28	22	0.9
It was a norm to turn off webcam /Everyone's camera was off	46 (32.6)	7	39	0.4	27	19	0.57
I didn't want others to find me sleeping/laying in the bed	43 (30.5)	9	34	0.72	26	17	0.41
I didn't want others to find me eating during lecture	40 (28.4)	9	31	0.52	24	16	0.48
I didn't want others to find me paying no attention to lecture	35 (24.8)	6	29	0.72	22	13	0.3
I didn't want others to find me doing things/task not related to lecture on the device	29 (20.6)	6	23	0.81	18	11	0.41
I didn't want others to find me moving away from computer/device during the lecture	27 (19.1)	7	20	0.32	16	11	0.64
I didn't want others to find me talking with friends/family members during the lecture	25 (17.7)	8	17	0.07	16	9	0.33
The camera on my device was not working	14 (9.9)	4	10	0.34	7	7	0.67
Total number of students	141	27	114	-	78	63	-

n=141. *Pearson Chi-Square Test significant ≤0.05. +Students were allowed to select more than one reason specific to them

Table 2: Correlation of routine and opinion with factors affecting usage of camera/video devices

Factors affecting usage	Routine		Opinion	
	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)
Opinion	0.175*	0.038	-	-
Camera Not Working	0.059	0.484	−0.075	0.374
Video mode slowed down my internet speed	0.183*	0.03	0.053	0.531
Norm during lecture	−0.232**	0.006	0.204*	0.015
Concerned about appearance	−0.303**	0.000	−0.101	0.234
Conscious of surroundings	−0.154	0.068	0.005	0.953
Self Conscious	−0.017	0.839	0.03	0.726
Comfortable when camera is off	0.003	0.974	−0.098	0.246
Distraction	−0.321***	≤0.001	−0.022	0.794
Not paying attention	0.037	0.663	0.109	0.198
Doing things/task not related to lecture	−0.082	0.335	0.318***	≤0.001
Moving away during lecture	−0.068	0.425	0.293***	≤0.001
Eating during lecture	−0.189*	0.025	−0.006	0.945
Talking with friends/family members	−0.098	0.249	0.188*	0.026
Sleeping/laying in the bed	−0.043	0.612	0.073	0.391

n- 141. Spearman Correlation Coefficient. $P \leq 0.05^*$. $P=0.01^{**}$. $P \leq 0.001^{***}$

(OR: 3.636, $P = 0.001^{**}$). They were also of the opinion that the video should be off while they communicated with friends and family (OR: 2.381, $P = 0.029^*$).

The abovementioned reasons were taken into consideration and a strategy was devised by HF to encourage students to switch on their cameras during online lectures [Figure 3]. These strategies hope to encourage and motivate students to turn on their cameras and create a virtual communal environment.

Discussion

Recognizing students' reasons for keeping webcams off during online classes is a foundation step in understanding this behavior shown by them. This step can help educationists and institutions to work on the reasons given by students and make strategies accordingly. The majority of the participants in our research used to keep the webcam off during online classes and were of the opinion that the webcam should be kept off during online classes. The topmost reported reasons for keeping the webcam off during online classes were "I was more comfortable when the webcam was off" and "I felt distracted during lecture when mine or other students' webcam was on."

Irrespective of the geographical location, the majority of the students used to keep their webcam off, and only a small population of students agreed that their webcam should be kept on during synchronous online learning.[12-15] In a study conducted by Gherus *et al.*, more than half of the students (55.1%) showed a reserved attitude toward keeping their webcam on during online classes.[12] Castelli and Sarvary also found that 90% of students kept their webcams off for some duration during remote synchronous class meetings held via Zoom.[13] Although the abovementioned studies mentioned that keeping

the students' cameras on was not a mandatory policy by respective universities, an emphasis was made to understand challenges faced by students regarding camera usage during online learning followed by the development of tailored strategies according to students' needs.

Reasons selected by students from different courses and institutions differ in the order of preference. The most commonly reported reasons among undergraduate students from Cornell University, USA were concerns about appearance and other people visible in the background.[13] In our study, these reasons were the third and fourth most commonly reported reasons (46.8% and 39.0%, respectively). The most frequently identified reasons by students from Politehnica University of Timisoara, Romania were anxiety/shyness/fear of being exposed, followed by the choice to turn the camera on/off and the norm to turn the camera off.[12] In our study, neither this option (anxiety/shyness/fear of being exposed) was given nor was the option stated by any student for "other reasons." The reasons "I am more comfortable when the webcam was off," "I felt that everyone is looking at me," and "I was concerned about my appearance" can be compared with their reasons. The choice to turn the camera on/off and the norm to turn the camera off was the seventh most commonly reported reason (32.6% of the students in our study).

Should the webcam be kept on or off?

To date, there is no agreement among educationists regarding whether webcams should be kept on or off during online classes. Published articles, educationists' views, and interviews mostly favor learners' centered approach to online learning with more emphasis on the introduction of interactive online learning strategies and working on challenges faced by students rather than mandating webcam usage. Furthermore, principles

Table 3: Ordinal regression analysis for factors affecting webcam usage during online learning and demograhic variables with routine and opinion

Variables	Odds Ratio	95% CI	P
Routine			
Gender	3.478	1.335-9.059	0.011*
Age	0.721	0.512-1.013	0.06
Experience	1.052	0.437-2.530	0.909
Year of Study			
2	0.539	0.160-1.815	0.319
3	0.792	0.289-2.173	0.652
Camera not working	1.65	0.419-6.491	0.473
Video mode slowed down my internet speed	2.627	1.077-6.406	0.034*
Norm during lecture	0.152	0.034-0.680	0.014*
Concerned about appearance	0.127	0.036-0.450	0.001**
Conscious of surroundings	0.381	0.133-1.090	0.072
Self-Conscious	0.907	0.359-2.289	0.837
Comfortable when camera is off	1.015	0.411-2.502	0.974
Distraction	0.165	0.061-0.447	≤0.001***
Not paying attention	1.239	0.470-3.269	0.664
Doing things/task not related to lecture	0.528	0.145-1.911	0.331
Moving away during lecture	0.586	0.161-2.132	0.418
Eating during lecture	0.201	0.045-0.902	0.036*
Talking with friends/family members	0.406	0.088-1.859	0.246
Sleeping/laying in the bed	0.768	0.282-2.089	0.606
Opinion			
Gender	1.153	0.496-2.677	0.74
Age	0.825	0.665-1.022	0.079
Experience	0.862	0.464-1.600	0.639
Year of Study			
2	0.678	0.292-1.570	0.365
3	0.692	0.318-1.504	0.354
Camera not working	0.599	0.194-1.847	0.373
Video mode slowed down my internet speed	1.218	0.654-2.269	0.533
Norm during lecture	2.205	1.152-4.220	0.017*
Concerned about appearance	0.685	0.369-1.272	0.231
Conscious of surroundings	1.018	0.546-1.900	0.953
Self-Conscious	1.128	0.586-2.172	0.718
Comfortable when camera is off	0.668	0.347-1.282	0.226
Distraction	0.917	0.486-1.728	0.79
Not paying attention	1.587	0.787-3.201	0.197
Doing things/task not related to lecture	3.743	1.809-7.744	≤0.001***
Moving away during lecture	3.636	1.707-7.742	0.001**
Eating during lecture	0.976	0.495-1.922	0.945
Talking with friends/family members	2.381	1.093-5.186	0.029*
Sleeping/laying in the bed	1.366	0.689-2.711	0.371

STATA software. *n*- 141. Ordinal Regression Analysis. $P \leq 0.05$*. $P=0.01$**. $P \leq 0.001$***

of equity, diversion, and inclusion also support more flexible approaches to accommodate unanticipated issues when working with students in the synchronous online session.[16,17]

Evidence-based strategies to address students' challenges

Although students should not be forced to keep the webcam on, efforts should be made to work on issues that affect the learning process and students' learning satisfaction. Our study identified multiple reasons for

students to keep the webcam off. We grouped different reasons into the following categories:

1. Self-consciousness (I was more comfortable when the webcam was off, I was concerned about my appearance, I felt that everyone is looking at me)
2. Surrounding consciousness (I was concerned about my surroundings being visible to all)
3. Distractions (I felt distracted during lecture when my or other students' video was on and reasons of students' distractions like eating, sleeping, talking, moving away)
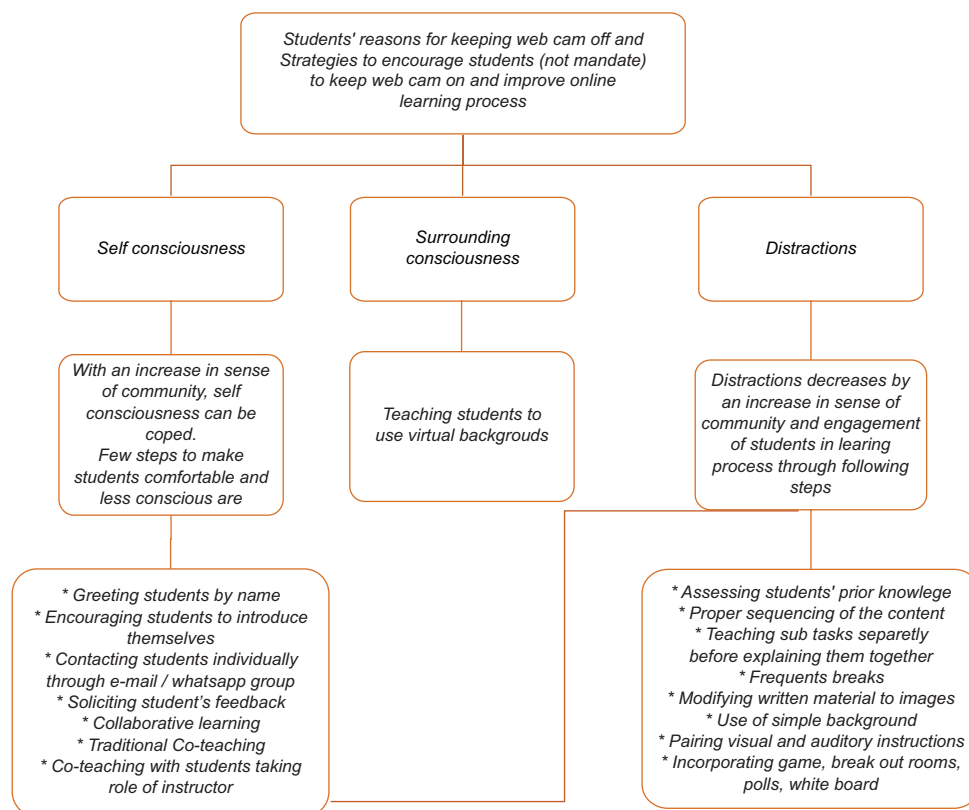
Figure 3: Strategies to encourage students to keep webcam on and improve online learning experience

4. Technological issues (Keeping the webcam on slowed down my internet speed, the camera on my device was not working). The hardest challenge to be resolved by teachers.

With improvements in the online learning process, challenges such as "self and surrounding consciousness and distractions" can be improved. Strategies that can be adapted by teachers for the improvement of the abovementioned challenges (expect technological issues) are discussed below with a flowchart [Figure 3].

Self-consciousness
Online classes are different from face-to-face classes. Classrooms allow students and instructors to freely interact and communicate with each other. There is a reduced sense of community in online classes due to physical distance resulting in feelings of isolation, distraction, uneasiness, and lack of attention.[18,19] Reasons grouped as "self-consciousness" may be the result of this reduced sense of community. Involving students in the learning community and developing learning relationships among students, between students and teacher, and between students and content can increase the level of comfort and satisfaction, thus easing the feeling of "self-consciousness."[20] Different proposed strategies to increase the sense of community in online learning are as follows:[20-25]

- Greeting students by name
- Encouraging all students to introduce themselves in the starting class (this may be time-consuming for large groups but is an effective way of establishing a "sense of community")
- Contacting students individually through e-mail at the start of the semester/session or making a WhatsApp group (asking about their previous experience with online instructions, expectations from the course)
- Soliciting students' feedback: Taking feedback from students regarding the online learning environment, teaching practices and technology-related issues helps teachers to improve themselves. This feedback also increases students' commitment, connection, and engagement in the course.
- Collaborative learning: Establishing study groups or peer groups that work together on a given task help in building a sense of community and connection among students)
- Traditional co-teaching: Two teachers are better than one. In co-teaching, teachers share the responsibility of planning and delivering instructions, assessments, and feedback together. Few strategies for co-teaching in online learning are parallel teaching and small-group teaching (Zoom breakout rooms), team teaching (sharing screen option in Zoom and the co-teachers option in Google classroom). Co-teaching

and ecological momentary assessment study. J Med Internet Res 2020;22:e20185.

9. Mottet T. Students nonverbal communication and its influence on teachers and teaching. In: Chesebro IJL, McCroskey JC, editors. Communication for Teachers. Boston: Allyn & Bacon.; 2002. p. 47–61.

10. Oregon State University C for T and L. Zoom camera pros & cons [Infographic]. Available from: https://oregonstate.app.box.com/s/j6vcszazsgaq3ikyqkcxc4s51pueb53h. [Last accesed on 2021 Jul 02].

11. Matt R. Should showing faces be mandatory? A new question posed by technology. 2020. Available from: https://www.insidehighered.com/blogs/confessions-community-college-dean/should-showing-faces-be-mandatory#.YMN1xyA331M.link.

12. Gherhes V, Simon S, Para L. Analysing students ' reasons for keeping their webcams on or off during online classes. Sustainability 2021;13:3203.

13. Castelli Frank R, Sarvary MA. Why students do not turn on their video cameras during online classes and an equitable and inclusive plan to encourage them to do so. Ecol Evol 2021;11:3565-76.

14. Wunder I, Bedenlier S, Wunder I, Gläser-zikuda M, Kammerl R, Kopp B, *et al*. Generation invisible. Higher education students' (non) use of webcams in synchronous online learning. 2020.

15. Moses T. 5 reasons to let students keep their cameras off during Zoom classes. The conversation. 2020. Available from: https://theconversation.com/5-reasons-to-let-students-keep-their-cameras-off-during-zoom-classes-144111. [Last accessed on 2022 Mar 18].

16. Do J. Understanding instructors' synchronous online design activity. University of Tennessee, Knoxville; 2018. Available from: https://trace.tennessee.edu/utk_graddiss/5009.

17. Costa K. Cameras be damned. LinkedIn. 2020. Available from: https://www.linkedin.com/pulse/cameras-damned-karen-costa/. [Last accessed on 2021 Jun 30].

18. Rovai AP. Development of an instrument to measure classroom community. Internet High Educ 2002;5:197–211.

19. Tayebinik M, Puteh M. Sense of community : How important is this quality in blended courses. In: Proceeding of the International Conference on Education and Management Innovation. Singapore; 2012.

20. Corso M, Bundick M, Quaglia R, Haywood D. Where student, teacher, and content meet: Student engagement in the secondary school classroom. Am Second Educ 2013;41:50–61.

21. Chatterjee R, Correia A. Online students' attitudes toward collaborative learning and sense of community. Am J Distance Educ 2020;34:53–68.

22. Lewis KA. A digital immigrant venture into teaching online: an autoethnographic account of a classroom teacher transformed. Qual Rep. 2018;23(7):1752-72. https://doi.org/10.46743/2160-3715/2018.3036

23. Co-Teaching strategies for remote learning. The Albert team. 2021. Available from: https://www.albert.io/blog/coteaching-remote-learning/. [Last accessed on 2021 Jul 04].

24. Emdin C. For White Folks Who Teach in the Hood… and the Rest Of Ya'll Too: Reality Pedagogy and Urban Education. Boston, MA: Beacon Press; 2016.

25. Shearer R, Aldemir T, Hitchcock J, Resig J, Driver J, Kohler M. What students want: A vision of a future online learning experience grounded in distance education theory. Am J Distance Educ 2020;34:36–52.

26. Khan RA, Atta K, Sajjad M, Jawaid M. Twelve tips to enhance students engagement in synchronous online teaaching and learning. Med Teach. 2022 June;44(6):601-06. https://doi.org/10.1080/0142159X.2021.1912310. [Epub 2021 Apr 20].

27. Goshtasbpour F, Swinnerton BJ, Pickering JD. Twelve tips for engaging learners in online discussion. Med Tech. 2022 Mar;44(3):244-48. https://doi.org/10.1080/0142159X.2021.1898571. [Epub 2021 Mar 17].

28. Bigdeli S, Kaufman D. Digital games in health professions education : Advantages, disadvantages, and game engagement factors. Med J Islam Repub Iran Med 2017;31:117.

29. Dousay T. Teaching in a digital age. Q Rev Distance Educ 2015;16:99.

Supplementary 1: Questionnaire

1. Age: _____

2. Gender: Male/Female/Don't want to reveal

3. Year of BDS (student): Second/Third/Final

4. I used to keep the webcam on during operative dentistry online classes.:
   a. Always
   b. Often
   c. Sometimes
   d. Never

5. In my opinion student's webcam should be kept on during online classes:
   a. Always
   b. Often
   c. Sometimes
   d. Never

6. Below is the list of reasons for not keeping the webcam on during online classes. Please encircle "yes" if that reason is applicable to you. Otherwise, select "no.

Sr. No.	Reasons for not keeping webcam on during online classes	Yes	No
a)	I was more comfortable when the webcam was off		
b)	I felt distracted during lecture when my or other students' webcam was on		
c)	I was concerned about my appearance		
d)	I was concerned about my surroundings being visible to all		
e)	Keeping the webcam on slowed down my internet speed		
f)	I felt that everyone is looking at me		
g)	It was a norm to turn off webcam/Everyone's camera was off		
h)	I didn't want others to find me sleeping/laying in the bed		
i)	I didn't want others to find me eating during lecture		
j)	I didn't want others to find me paying no attention to the lecture		
k)	I didn't want others to find me doing things/tasks not related to the lecture on the device		
l)	I didn't want others to find me moving away from the computer/device during the lecture		
m)	I didn't want others to find me talking with friends/family members during lecture		
n)	The camera on my device was not working		
o)	Others		