Absence and Presence of Faces in Videos during the COVID19 Lockdown

Frode Eika Sandnes

Oslo Metropolitan University

The COVID-19 outbreak forced the educators to deploy digital online learning giving rise to a range of new situations. The phenomenon of undergraduate students not activating their cameras during video lectures has been widely reported. Also, the philosophies regarding the goals of pre-recorded online video vary. To get more insight into the role and importance of students' and teacher's faces in video communication a video watching experiment and a questionnaire was designed and deployed in a class of 180 computer science students. The results indicate that students do to see the benefits of activating their own cameras. The results also show that there was a small benefit of including the lecturer's face in lecture videos.

1 Introduction

With the COVID-19 outbreak during 2020 educators worldwide were forced to deploy digital teaching to prevent further spread of the virus. Both students and teachers were suddenly faced with unfamiliar situations. The "black screen" phenomenon was widely reported where the students do not activate their cameras during video conferences. Teachers would typically still activate their own camera. It is natural to speculate that such a situation may lead to an imbalance in teacher-student communication where the students can hear and see the teacher thereby picking up on subtle metacommunication, while the teacher could only interpret the students from text chat messages. Consequently, this could lead to reduced learning as teachers are unable to respond to students' reactions [17] as one would in a physical class. In a physical class the teacher can see students falling asleep, losing interest, and pick up other social signals.

Another question is regarding best practices for the design of pre-recorded video lectures. It is generally accepted that short, focused videos are preferable over long comprehensive videos. The opinions on whether the teacher should be visible in videos differ. Some lecturers make elaborate videos with drones filming the lectures from various angles or record themselves with television-like quality. Others simply just record voice-overs on their PowerPoint presentations.

Pedagogical theory and best practices recommend that the teacher should not be the center point of the learning, the students should be. Moreover, students are believed to learn more effectively when they are active together in social settings. With such a backdrop one may argue that the role of the teacher should be toned down, such that the lecturer's face should not necessarily be used much in videos and students should be using webcams actively to

communicate between themselves. To get more insight into this new situation a video watching experiment was conducted to assess the importance of including the lecturer's face in pre-recorded videos. Moreover, a questionnaire probed student's preferences for the use of cameras in live online sessions.

2 Related work

Students' motivation is a key issue in higher education [10]. Videos may play an important part, and there is a vast literature on this topic [5]. Several useful taxonomy of lecture video types have been proposed [1, 2]. Chorianopoulos [1] argued for the benefit of the Kahn-academy style videos where one does not get the impression of a lecturer looking down at the students, but rather the teacher sitting at a table next to the student working together. There are also specialized types of instructional videos such as those dedicated to piano teaching with simultaneous virtual piano keyboard display [18].

Morris et al. [13] discussed the discrepancy between lectures' negative attitude towards instructional videos versus the benefit of videos for the students. They documented the lectures reservations, while they found that students value use recorded lectures for in-depth studies and repetition. They also noted that students had high expectations regarding the quality of the video. Common quality problems experienced by students included audio that is hard to understand and videos of whiteboard where it was hard to read the writing. Hansch et al. [4] pointed out that video production can easily end up being the most expensive part creating an online course. The authors claimed that there is no evidence that high-quality video productions lead to better learning, and thus encouraged simple video productions. Jill et al. [7] showed that teacher generated instructional videos help students perform better, but also that they do not want lectures to be completely replaced by videos thereby refuting lecturers' fears of becoming redundant. Khee et al. [8] found that students' perceptions towards lecture capture were positive, but technical limitations had negative effects.

Mayer et al. [12] claimed that students learn more when (1) instructors draw and comment live compared to using pre-drawn graphics, (2) instructors employ gaze guiding in lecture videos, (3) applying the generative activity principle, i.e., students are asked to perform some task during the video, (4) following the perspective principle where a first person view of a task is demonstrated with a narrative, (5) videos are subtitled. The authors also proposed the seductive details anti-principle; students do not learn more when inserting unique video clips in their videos to capture interest.

In an eye-tracking study involving 60 students reported that the inclusion of the instructor's face improved transfer performance for challenging themes, reduced cognitive load on difficult topics, and higher level of satisfaction [24]. A related eye-tracking study [23] involved asking 36 participations to watch a 10-minute video without a face and with a face. The authors did not find any learning transfer effects, but they did find a significant effect on recall for easy topics as well as higher satisfaction and lower rate of self-reported errors for difficult topics. Pi et al. [16] conducted a controlled video watching experiment with 120 participants with four videos including the teacher's face and upper body. They studied the factors gaze guiding and pointing and did not find effects of lecturer's gaze but did find a positive effect of lecturer pointing at the content. Similarly, it has been reported that gaze guidance gave the students a stronger sense of social connection to the instructor [25]. They also suggested the lecturer should not look directly into the camera (teleprompter style) but rather use gaze to guide viewers [15]. Body position did not have any effects.

It has been pointed out that the instructor face is useful as it gives the students additional cues [22] but does the instructor's face draw attention away from the content? The authors found no positive or negative effects of gaze and students managed to balance their attention between the contents and the instructor. Using eye-tracking it was observed that viewers spent 41% of the time looking at the instructor [9]. They switched focus between the face and the material every 3.7 seconds. They did not observe any effect of face on recall. An experiment with 54 participants watching a modelling video [21] revealed that participants looked at the instructor about 30% of the time and that the attention on the instructor remained over time. The authors did not observe any differences in learning among those who saw the instructor and those that did not. Results have also shown that during mind wandering [26] the instructor face attracted a larger proportion of the fixations, while each of the fixations on the instructional materials were longer and less dispersed.

The time and effort in producing video lectures were addressed by Li et al. [11]. They proposed the idea of using machine-made substitute for the instructor. The conducted a controlled video watching experiment with a real human, animated human head based on audio, robot, and animated robots. The results showed that users could recall more after watching the human compared to watching the robot, but the results were somewhat in-between for the animated human.

Other relevant studies include the effect of first-person perspective versus third person perspective in video of an assembly task [3], where significant positive effects of the first-person perspective videos have been found. The drawing on a transparent white board, and conventional whiteboard has also been experimentally compared [20]. Results showed that viewers placed more attention on the instructor and the material with the transparent whiteboard because of gaze guidance. The authors concluded that the instructor's face can be as effective as words and other visuals. Sprecher [19] studied the effect of computer mediated communication using text, audio, and video. She found lower scores in affiliative outcomes with text-based communication compared to the others and argued for the importance of audio and video for social relationships. Pi, Tang, and Yang [14] studied the effects of seeing other students' messages during a video lecture using an eye-tracking methodology. They concluded that such messages have a negative effect on attention and learning.

3 Method

A mixed approach was chosen comprising a video watching experiment with a subsequent online questionnaire, and a separate online questionnaire. This study was conducted in an undergraduate course on human computer interaction during the autumn of 2020. A total of 180 students were enrolled.

3.1 Video watching experiment

A video watching experiment was designed. A PowerPoint video was recorded with audio and video of an introductory lecture to human computer interaction lecture using the built-in recording function, and later edited to make the face video fit the contents of the slides. A second video was generated based on the first video in which the face videos were hidden from view while maintaining the audio of the lecturer talking around the contents. The two videos were uploaded onto YouTube. Both videos had a duration of 41:12 minutes.

Next, a google form with four 5-item Likert questions about the video and 7 quiz questions based on the content was created. A second copy of the form was created. The two videos were embedded into the two forms. Next, a link to a random dispatcher was given to the students, implemented using a random number generator. The dispatcher randomly redirected the students to one of the two versions of the form. The students were asked to watch the video and answer the questions before the first online meeting. During the subsequent online meeting, the lecturer reviewed the responses in plenary with the students.

3.2 Online live session questionnaire

One week later a questionnaire was distributed to the students regarding their attitudes regarding the use of video in online live sessions using the conference system (Zoom). The questionnaire had two yes/no questions, 13 five-item Likert questions and one free-text question. Students completed the questionnaire before the online plenary meeting where the responses were reviewed. The questionnaire responses were analyzed using JASP [6] using non-parametric Mann Whitney U tests and contingency tables.

4 Results

4.1 Viewing statistics

A total of 129 students watched the video (71.6% response rate). Of these, 60 students watched the video with the face, and 69 students watched the video without the face. Google viewing statistics showed that the mean viewing

time was 13:06 minutes with face and 10:39 without face. The video with face had 135 total views with 35% of the viewers at the end, while the video without face had 175 views with 22% of the viewers at the end.
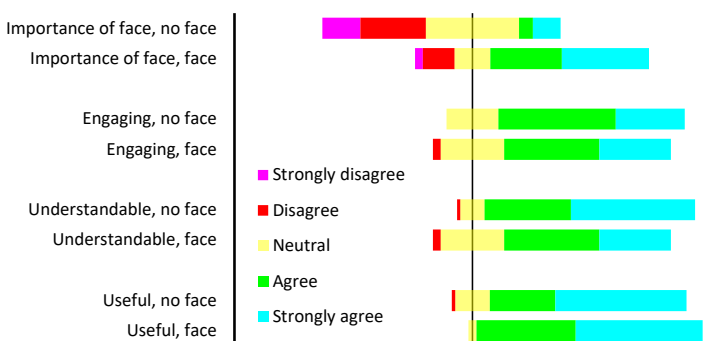

Figure 1: Students' perceptions according to students who watched the video with and without the teacher face.

However, a significant difference was found regarding respondents perceived importance of the face in the video (W = 3058.5, p < .001). The responses from the participants who watched the video without the face rated the importance of face as neutral-not important, while a majority of the respondents who watched the video with the face rated the face as importance or very important (see Figure 1).

4.2 Effects on learning

The mean total quiz score was marginally higher with the video with head (M = 78.8%, SD = 19.4%) compared to the video without the head (M = 74.5%, SD = 23.2%), but this difference was not statistically significant (W = 2257.0, p = .366).

However, the results for one the individual questions stand out where the total correctness ratio for those watching the video with the head was 98.3%, while it was only 82.4% for those watching the video without the head. A contingency table analysis confirms the significant difference ($\chi^2(2)$ = 8.942, p = .011).
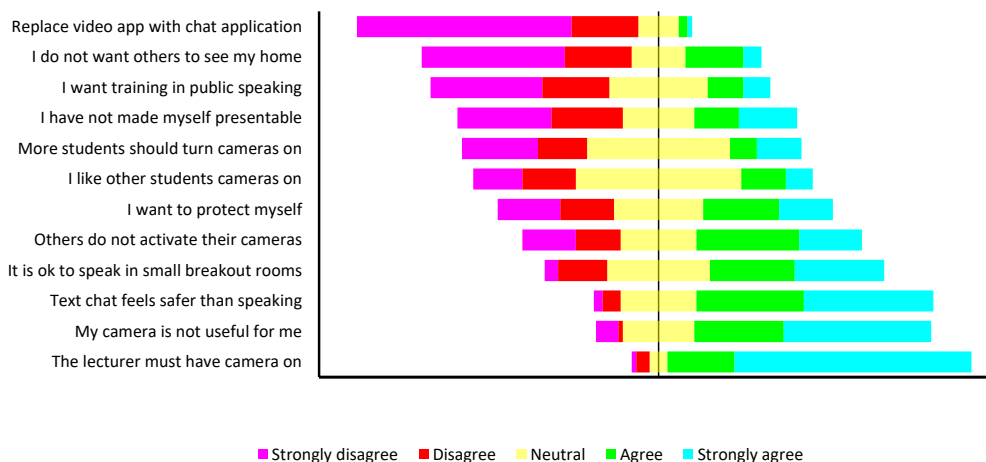

Figure 2: Students' attitudes towards the use of video during online classes.

4.3 Attitudes to video in online class gatherings

A total of 76 students responded to the questionnaire (42% responses). Nearly a quarter responded that they did not have access to a web camera on their computer (26.3%), while only 5.3% responded not having access to a microphone. Most of the students (79.0%) reported that their network connectivity functioned well (38.2% agree, 40.8% strongly agree), 18.4% gave a neutral response, and only 2.6% expressed dissatisfaction with their network connection (disagree).

Figure 2 shows students' preference responses organized from negative to positive. Students' responded tended towards negative (from strong to neural) with regards to a) replacing the video conferencing app with a textual chat app, b) reservations revealing the privacy of their home, c) get training in speaking in front of larger audiences and d) worries regarding having not made themselves visually presentable. The responses appeared neutral regarding whether they preferred other students to have their cameras on and whether they wanted other students to turn cameras on. Responses on the positive side of the scale (from neutral to strongly agree) included a) I do not activate the camera as I want to protect myself, b) others do not activate their cameras (peer pressure), c) it is ok to speak in smaller breakout rooms, d) text chat feels safer than speaking, e) my camera is not useful to me and f) the lecturer must have his camera on.

As there was a large portion of students who reported not having webcams, the preference responses were also analyzed across the group of students with webcams and those without. This analysis revealed a significant difference self-reported impact of peer pressure ($W = 926.5$, $p < .001$) between those who had webcams ($M = 3.6$, $SD = 1.2$), and those who did not ($M = 2.1$, $SD = 1.0$). Also, a significant difference was found in responded to reservations due to not having made themselves visually presentable ($W = 821.0$, $p = .002$), for those with a webcam ($M = 3.0$, $SD = 1.4$) and those without ($M = 1.9$, $SD = 1.1$).

Free-text responses included statements such as "I really like zoom lectures", "video is not that important during lectures, it is more important in one-to-one sessions". "I recommend that students use a profile picture in their window if they do not wish to activate their window so we can get to know each other", "I do not look at my fellow students in a regular lecture, all the faces in zoom are distracting". "Others probably do not care about what one looks like, but one care oneself.", "Discussions are hard to follow via chat". "I would enjoy if more activated video, but then breaks are important so that one can e.g. fetch a glass of water", "Zoom is really a nice tool for this type of teaching. I think the use of camera will increase as we get to know each other.", "I do not like to activate my own camera but enjoy that the lecturer has his camera activated and speaks rather than write. I will break radio-silence if I find it necessary", "In a lecture everyone looks at the lecturer, not the other students. Therefore, I find that it works well that only the lecturer has a camera activated", "I think it is enough that the teacher teaches while the rest of us listen. No need to activate the camera".

5 Discussion

5.1 Viewing statistics

The YouTube viewing statistics for the two videos showed that the mean viewing time was longer for the video with a face compared to videos without a face. Moreover, the video with a face had a higher percentage of the original viewers at the end. This result could support a claim that that the video with face maintain the viewers and their attention, while videos without the face results in a higher chance of viewers losing interest. These results thus support the inclusion of faces in lecture videos. However, the YouTube statistics only included aggregated measurements without detailed access to the individual views. It was therefore not possible to assess if the observed differences were significant or not.

5.2 Perceived impressions

All the students responded that the video was useful, understandable, and engaging, regardless of the presence of a face or not. The students were thus generally positive about the videos, despite the videos being simple and produced

by simple means, agreeing with Hansch et al. [4] observations. This also impression was also echoed through personal communication with individual students throughout the course who generally expressed gratefulness for having access to video lectures.

It is, however, quite remarkable that the students were divided on the importance of having the lecturer's face in the video. The fact that those who watched the video with face were in favor of faces and those that watched the video without a face did not find the face to be important at least strengthens the impression that students were happy with videos regardless as long as the audio and visuals are legible [13], and if lectures does not include a face it does not matter that much. Students will still find it useful. And, if students are provided with face enhanced videos, they find it harder to imagine the videos without the faces.

5.3 Effects on learning

The results did not show any significant difference in learning when comparing videos with face and without face although the total score was marginally higher when the video included the face. Out of the seven quiz questions one stood out revealing a significant difference between the two groups where a larger ratio of students who watched the video with face answered correctly than those who watched the video without a face, suggesting that for this particular question the face in the video somehow contributed to students' understanding. After reviewing the video segment related to the given question it was not obvious that the lecturer provided any specific visual metacommunication that can explain the difference. One possible explanation is that some questions were directly connected to the content of the video and others were more indirect, and this question was indirect. Perhaps the face in the video helped maintain the students' interest such that they were better equipped to answer the question?

The results do not give any indication that the face has any negative effects, but rather than in some cases the redundancy introduced with the face may lead to improvements in learning or understanding. The results reported herein appears to agree with previous studies such as [16, 23, 24].

5.4 Attitudes to video in online class gatherings

The results from the in-class video survey reveal asymmetries in the attitudes to the use of video. The in-class sessions confirmed the observations of others, namely that none of the students enabled their cameras in the plenary session. Yet the results show that students thought the teacher must have their camera enabled. The results confirm the suspected reasons why students do not activate their cameras, most notably that the camera is not useful for themselves. Such responses indicate a lack of understanding of social interaction in that the metacommunication of students is also important to the teacher. This view was also expressed in the comment "I think it is enough that the teacher teaches while the rest of us listen". It is interesting to note that the students were quite indifferent to whether other students had their cameras enabled or not. But as revealed by the textual comments, students do not keep their gaze on the other students in the online class, they observe the lecturer and the materials presented by the lectures, as one do in physical classes.

However, it must be said that about 50% of the students activated their cameras in individual supervision sessions. This may be explained by the students' strong agreement on text chat feeling safer than speaking in front of people, and that they feel safer speaking in smaller groups. The results also suggest that peer pressure is at play. If most students have cameras off, nobody will dare to be the odd one out with the camera on. Also, as shown by the results, students with cameras expressed a stronger feeling of peer pressure than those who did not have a camera.

Contrary to expectations reasons such as students wanting to protect themselves, worries about not looking presentable, and not wanting to show their home did not appear to be viable explanations. Based on these observations one may speculate whether the student-teacher communication improves if the plenary session was implemented such that students can only see the teacher and not the other students, thereby strengthening the experience of a one-to-one meeting, and perhaps leading to students feeling more free to actively engage.

6 Conclusions

This study has explored students' attitudes towards the use of webcams in live online settings as well as the effects of including the teacher's face in online videos. The results show that the teacher's face have a marginal positive effect on the video watching activity. Moreover, students tend not to use their webcams in live online settings as they do not perceive their own camera as useful to themselves. Moreover, they tend to focus on watching the teacher and not fellow students. The results indicate that students were unaware of what constitute effective learning with few reflections regarding their own effect on the social dynamics of the learning environment. One may ponder whether more students would activate their camera if their video stream were only shared with the teacher instead of the entire class?

REFERENCES

[1]   Konstantinos Chorianopoulos. "A taxonomy of asynchronous instructional video styles." International Review of Research in Open and Distributed Learning 19, no. 1 (2018).

[2]   Charles Crook and Louise Schofield. "The video lecture." The Internet and Higher Education 34 (2017): 56-64.

[3]   Logan Fiorella, Tamara van Gog, Vincent Hoogerheide, and Richard E. Mayer. "It's all a matter of perspective: Viewing first-person video modeling examples promotes learning of an assembly task." Journal of Educational Psychology 109, no. 5 (2017): 653.

[4]   Anna Hansch, Lisa Hillers, Katherine McConachie, Christopher Newman, Thomas Schildhauer, and J. Philipp Schmidt. "Video and online learning: Critical reflections and findings from the field." (2015).

[5]   Yo-Ping Huang, Liang-Wei Hsu, and Frode-Eika Sandnes. "An intelligent subtitle detection model for locating television commercials." IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics) 37, no. 2 (2007): 485-492.

[6]   JASP Team (2020). JASP (Version 0.13.1)[Computer software].

[7]   M. D. Jill, Daphne Wang, and Angela Mattia. "Are instructor generated YouTube videos effective in accounting classes? A study of student performance, engagement, motivation, and perception." Journal of Accounting Education 47 (2019): 63-74.

[8]   Chew Meow Khee, Goh Wei Wei, and Shamsul Azwan Jamaluddin. "Students' perception towards lecture capture based on the Technology Acceptance Model." Procedia-Social and Behavioral Sciences 123 (2014): 461-469.

[9]   René F. Kizilcec, Kathryn Papadopoulos, and Lalida Sritanyaratana. "Showing face in video instruction: effects on information retention, visual attention, and affect." In Proceedings of the SIGCHI conference on human factors in computing systems, pp. 2095-2102. 2014.

[10]   Kris MY Law, Frode Eika Sandnes, Hua-Li Jian, and Yo-Ping Huang. "A comparative study of learning motivation among engineering students in South East Asia and beyond." International Journal of Engineering Education 25, no. 1 (2009): 144.

[11]   Jamy Li, René Kizilcec, Jeremy Bailenson, and Wendy Ju. "Social robots and virtual agents as lecturers for video instruction." Computers in Human Behavior 55 (2016): 1222-1230.

[12]   Richard E. Mayer, Logan Fiorella, and Andrew Stull. "Five ways to increase the effectiveness of instructional video." Educational Technology Research and Development (2020): 1-16.

[13]   Neil P. Morris, Bronwen Swinnerton, and Taryn Coop. "Lecture recordings to support learning: A contested space between students and teachers." Computers & Education 140 (2019): 103604.

[14]   Zhongling Pi, Manrong Tang, and Jiumin Yang. "Seeing others' messages on the screen during video lectures hinders transfer of learning." Interactive Learning Environments (2020): 1-14.

[15]   Zhongling Pi, Ke Xu, Caixia Liu, and Jiumin Yang. "Instructor presence in video lectures: Eye gaze matters, but not body orientation." Computers & Education 144 (2020): 103713.

[16]   Zhongling Pi, Yi Zhang, Fangfang Zhu, Ke Xu, Jiumin Yang, and Weiping Hu. "Instructors' pointing gestures improve learning regardless of their use of directed gaze in video lectures." Computers & Education 128 (2019): 345-352.

[17]   Frode Eika Sandnes. "What do low-vision users really want from smart glasses? Faces, text and perhaps no glasses at all." In International Conference on Computers Helping People with Special Needs, pp. 187-194. Springer, Cham, 2016.

[18]   Frode Eika Sandnes and Evelyn Eika. "Enhanced Learning of Jazz Chords with a Projector Based Piano Keyboard Augmentation." In International Conference on Innovative Technologies and Learning, pp. 194-203. Springer, Cham, 2019.

[19]   Susan Sprecher. "Initial interactions online-text, online-audio, online-video, or face-to-face: Effects of modality on liking, closeness, and other interpersonal outcomes." Computers in Human Behavior 31 (2014): 190-197.

[20]   Andrew T. Stull, Logan Fiorella, and Richard E. Mayer. "An eye-tracking analysis of instructor presence in video lectures." Computers in Human Behavior 88 (2018): 263-272.

[21]   Margot van Wermeskerken, Susanna Ravensbergen, and Tamara van Gog. "Effects of instructor presence in video modeling examples on attention and learning." Computers in Human Behavior 89 (2018): 430-438.

[22]   Margot van Wermeskerken and Tamara van Gog. "Seeing the instructor's face and gaze in demonstration video examples affects attention allocation but not learning." Computers & Education 113 (2017): 98-107.

[23]   Jiahui Wang, and Pavlo D. Antonenko. "Instructor presence in instructional video: Effects on visual attention, recall, and perceived learning."

Computers in human behavior 71 (2017): 79-89.

[24] Jiahui Wang, Pavlo Antonenko, and Kara Dawson. "Does visual attention to the instructor in online video affect learning and learner perceptions? An eye-tracking analysis." Computers & Education 146 (2020): 103779.

[25] Hongyan Wang, Zhongling Pi, and Weiping Hu. "The instructor's gaze guidance in video lectures improves learning." Journal of Computer Assisted Learning 35, no. 1 (2019): 42-50.

[26] Han Zhang, Kevin F. Miller, Xin Sun, and Kai S. Cortina. "Wandering eyes: Eye movements during mind wandering in video lectures." Applied Cognitive Psychology 34, no. 2 (2020): 449-464.