

'This research stemmed from the author's work at the previous affiliation, Seoul National University

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our virtual studying teams. The research prototype was designed in three versions: blurred video version, small video version, and no video version. All versions were provided with an activity recognizer that detects absence, leaning, and using a smartphone. For the user study, the virtual studying teams used all three versions of the prototype and participated in an interview asking whether the presence was maintained, whether the problems of video streaming were resolved, and their preference for each version.

The results of the study indicated that the presence was maintained in the blurred video and the small video versions of the prototype, and the problems of video streaming were resolved in

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all three versions. Among the three versions, the blurred video version was most preferred. This paper explored the effects of new design strategies for a new virtual activity that focuses on sharing presence.



# 2 RELATED WORKS

Virtual studying uses video streaming to share presence and awareness while studying. This resembles the use of video streaming in the early studies of media space. Media space is a tool connecting physically remote groups, and its early attempts used always-on video streaming to provide informal awareness of the counterparts' presence and activities [1, 12, 14, 16, 23]. The previous studies on media space point out the problems of video streaming and explore various design strategies to minimize the explicitness of the video.

The two major problems occurring due to video streaming were privacy concerns [2, 3, 9, 10, 17, 19, 22, 24] and excessive selfawareness [2, 8]. The privacy concerns arose as the users of media space had a lack of control over their privacy. When they video streamed themselves, they could not control who is watching them and what is shown on the video. Excessive self-awareness occurred as the users cared about how they appeared on the video and became uncomfortable with the camera. Our previous study on virtual studying also revealed that the users were overly aware of how they appeared on the video and wanted to care less about how they looked [18]. This study explores whether these problems could be mitigated with the new interface.

Design strategies to minimize the explicitness of the video in media space included showing only captured video images [1, 2, 14, 24], simply blocking certain parts of the video [5, 6, 8, 21], and using video filters [2, 4, 7, 8, 11, 13, 15, 17]. Among them, the most common strategy was using blur or pixel filters [2, 4, 7, 8, 11, 13, 15]. In this paper, we investigate whether the strategies to minimize video explicitness can also be effectively applied to virtual studying.

with Google Teachable Machine. It had five classes: upright, upright\_with\_phone, leaning\_with\_phone, and absent, and each class was trained with over 2,000 images collected by filming ourselves studying. The result of the classification appeared on the screen in the form of a traffic signal with red and green circles.

We created three websites containing each version of the prototype for the user study. Screenshots of the three prototype websites are shown in Figure 2.

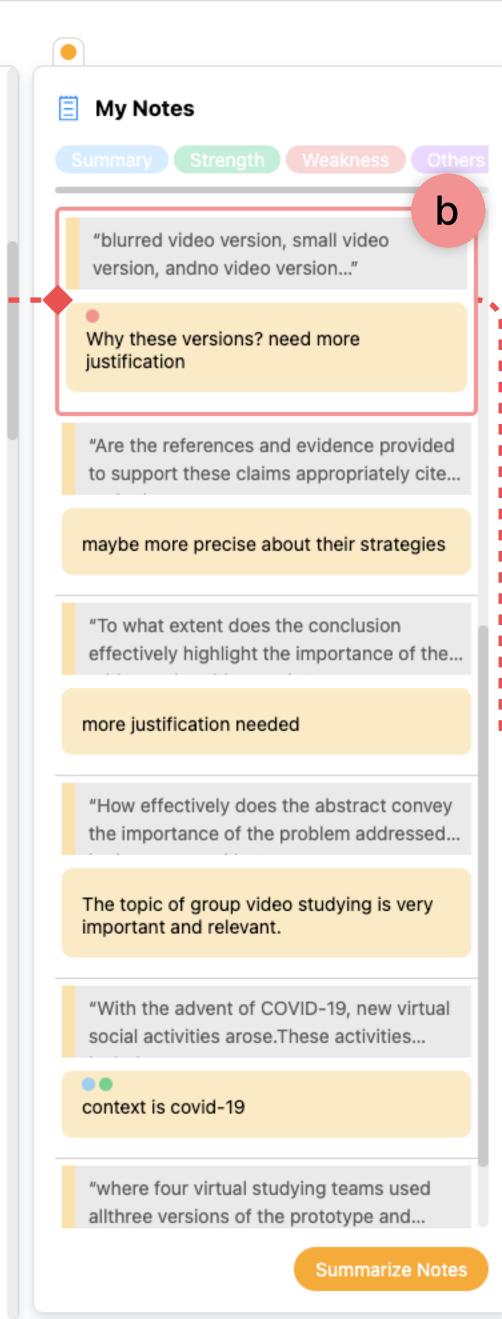
# 3.2 User Study

For the user study, four virtual studying teams used all three versions of the prototype and participated in an interview.

The virtual studying teams were recruited through the online communities of various colleges. Participation criteria were limited to already-existing teams. A total of four teams composed of two to three users participated in the study. They were all female, and ages ranged from 24 to 35 with a median age of 26.5. Table 1 shows the demographic information of the study participants along with the order of the prototype versions used by each team.

The teams were first asked to read the purpose and the procedure of the study and how the information will be used. After agreeing to participate, they were given the links to the three prototype websites and were informed about the order of which version to use first, second, and third. They were then asked to use Discord, a video conferencing tool that allows multi-user screen share, to show each other's prototype website in a gallery view. When they were ready to study, one teammate sent us a picture before starting the studying session (Figure 3). For their 30-minute studying session, they were asked to study as usual while using each version for 10 minutes.

After the studying session, an interview was conducted asking whether the presence was maintained in each version, whether the problems of video streaming were mitigated in each version, and their preference for each version. The interview lasted for about



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### Summary:

Review Draft

- The paper explores media space as a tool connecting physically remote groups, using always-on video streaming for awareness of activities and presence.
- Several design strategies are identified to minimize the explicitness of the video in media. space, such as showing only captured images, blocking parts, and using video filters.
- The paper investigates whether these strategies can be effective in virtual studying, aiming to reduce the explicitness of video while delivering a sense of presence.
- The study occurs in the context of COVID-19, which has prompted new virtual social activities, and the research is relevant to this changing landscape.

## Strength:

- Important research question for conferencing
- Focused on reducing video explicitness and improving virtual studying
- Relevant context amidst COVID-19 pandemic
- Focuses on newly arising virtual social activities due to pandemic
- Addresses important CSCW community topic
- Topic of group video studying relevant for CSCW community

### Weakness:

- Needs detailed citation description
- Citations need to be explicitly described and detailed instead of listing together
- Justification required for video versions
- Justification missing for choosing the three versions of videos: blurred video version, small video version and no video version
- Study sample size is limited
- Sample size limited to only four virtual studying teams that brings the limitation of the potential generalizability of the study

#### Justification

Please provide justification for your paper decision here.

Paper Decision +

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