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Improving Face-to-Face Communication Skills using Active Video Watching

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Abstract: Although communication skills are widely recognized as crucial for effective software development teams, many graduates lack such skills, which are difficult to teach. We adopt the active video watching (AVW) approach to teach face-to-face communication skills to second-year software engineering project course. We conducted an experiment with AVW-Space, an online platform which supports video-based learning. The participants watched and commented on tutorial videos first, and later on provided videos of meetings. In the last phase, the participants commented on the recording of their own team meeting. We found that students who commented and rated others' comments increased their conceptual understanding of face-to-face communication skills.

Keywords: Active video watching, face-to-face communication in software development meetings

1. Introduction

Communication is crucial in software engineering (SE) projects to promote continuous information sharing with various stakeholders (Prenner et al., 2018). Face-to-face communication between team members enables adequate information flow (de Souza Almeida, 2019). In highly incremental and iterative software development planning, review and retrospective meetings and daily "stand-ups" help structure the project and ensure information sharing (Schwaber & Beedle, 2002).

However, teaching these competencies is time-consuming, requires hands-on exercises and regular feedback from instructors (Anthony & Garner, 2016; Galster, Mitrovic & Gordon, 2018). SE education generally fosters soft skills training in group projects (Sedelmaier & Landes, 2018). Exercising soft skills needs real project work with diverse team members and constant feedback and guidance from instructors. However, universities often do not have the resources (time and budget) to support such training systematically.

Video-Based Learning (VBL) supports teaching soft skills, where the process of learning requires contextual experience to retain knowledge (Cronin & Cronin, 1992; Mitrovic et al., 2017). Active Video Watching (AVW) was recently suggested as a VBL approach that encourages self-reflective learning (Mitrovic et al., 2017; Dimitrova & Mitrovic, 2021). AVW-Space allows instructors to embed YouTube videos for students to watch and comment on, using teacher-specified scaffolds for reflection. We investigate using AVW-Space to enhance SE students' face-to-face meeting communication skills.

2. Methodology and Results

Following the ethical approval, this study collected data from a second-year SE project-based course at the University of Canterbury with 56 students. The course runs over one semester. The students worked in teams of 4 to 6, and had weekly face-to-face meetings. In addition, the students were invited to use AVW-Space to learn face-to-face meeting communication skills. We administered Survey 1 consisting of questions on demographic, training and experiences with face-to-face meetings; a question relating to participant's knowledge of face-to-face meetings communication skills; then a self-reported

face-to-face meeting communication scale developed for this study. After the survey, the participants watched and commented on ten carefully selected short videos (2 to 5 minutes) on effective communication skills for SE meetings. Six videos were tutorials on communication skills, and four were recordings of real meetings. In phase 2, students rated anonymised comments from phase 1. In the third phase, each team commented on the recording of their own meeting, and subsequently rated comments written by their peers. We administered Survey 2 at the end, consisting of the same questions on participants' knowledge of communication skills and the self-reported scale. Survey 2 also had three other instruments: CAP perceived learning gain scale (Rovai et al., 2009); NASA-TLX (Hart, 2006) cognitive load scale; Technology Acceptance Model (TAM) (Davis, 1989) scale to capture students' overall perception of AVW-Space; and questions on usability of the AVW-Space.

Out of 56 students enrolled in the course, 49 completed Survey 1. Of those, 83.7% were male, and 16.3% were female. Most participants (98%) were in the 18-23 age group, and were native English speakers (78%). We classified students post-hoc based on their observable learning behaviours using the ICAP framework (Chi & Wylie, 2014). ICAP identifies four categories with decreasing level of engagement: *Interactive, Constructive, Active and Passive*. Interactive mode is not relevant for our study as AVW-Space does not support direct interaction between students. We distinguish constructive from active students by observing the number of high-quality comments. High-quality comments are those which show self-reflection, critical thinking about the content of the video, or planning for future performance, while low quality-comments simply repeat video content verbatim or are short (Mohammadhassan et al., 2020). The median number of high-quality comments on tutorial videos was 2. Hence, we described active students as those who wrote up to two high-quality comments. In comparison, students who wrote more than two high-quality comments were categorized as constructive students.

Table 1 presents the summary of students' activities in AVW-Space. There was a significant difference among different categories ($p < .05$) in all activities except the number of comments on their own meeting ($p = .68$), and the number of ratings ($p = .47$). Constructive students watched more videos, wrote more comments, and rated more comments compared to other categories.

Table 1. *Summary of Activities for Students who Completed both Surveys (* means $p < .05$)*

	Passive (10)	Active (5)	Constructive (15)
Videos *	9.90 (0.32)	7.40 (2.79)	10.0 (0.00)
Tutorial Comments *	0	4.00 (6.16)	17.20 (13.79)
High-quality Comments *	0	0.80 (0.45)	3.93 (2.99)
Example Comments *	3.50 (7.38)	3.00 (6.16)	9.80 (9.79)
Ratings	116.10 (148.99)	108.80 (201.56)	166.67 (195.87)
Meeting Comments	4.30 (3.47)	5.60 (6.66)	7.20 (7.59)
CK1	6.20 (3.61)	6.00 (2.55)	7.13 (5.60)
CK2	8.10 (5.34)	11.20 (5.81)	10.67 (8.20)

Students' responses for the conceptual knowledge questions from Surveys 1 and 2 (CK1 and CK2 respectively) were analysed using an ontology developed by the authors for face-to-face meeting communication. The scores represent the numbers of ontology concepts mentioned by students. Using ANCOVA with CK1 as co-variate, we found a statistically significant difference in the CK2 scores ($F(3, 26) = 10.98$, $p < .001$). The Wilcoxon signed-rank test revealed a significant increase from CK1 to CK2 for constructive students only ($W = 100$, $p = .003$). The number of comments and CK2 were found to be positively correlated, $r(28) = .41$, $p = .025$.

In Phase 3, we asked students to comment on their meeting recordings. We found that students' comments focused on opportunities for improving their meeting behaviour (for example, "*I might be over contributing while not leaving space for others to contribute.*" and "*I need to construct/deliver my ideas clearer.*"). In Survey 2, we asked students about the usefulness of watching their meetings and rating comments written by their peers. Out of 30 responses, only one response was negative (*"Not useful."*), and the remaining were positive (e.g., *"Primarily useful for reflecting on my own behaviour in meetings.", "Very useful, it provides me with many of my weaknesses and my improvements." and "... This allowed me to consider things from not just my point of view, but that of my peers, which I feel*

is very important."). Most students found Phase 3 helpful to reflect on their performance during meetings.

3. Conclusions

The increasing emphasis on the value of transferable skills for the success of SE projects requires novel methods to equip students with a broader set of non-technical competencies. We examined the impact of active video watching on SE students' face-to-face meeting communication skills. Our study shows that when learners engage in commenting on videos and rating other's comments, their conceptual understanding of face-to-face meeting communication skills increases.

In this paper, we reported some preliminary results from our study. Data analysis still needs to be completed. The limitation of our work is the small population size. We plan to conduct another study in 2021, in the context of the same SE course. Our future work will investigate the impact of active video watching in SE industry, with the goal of enhancing SE practitioners' learning and professional development training.

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