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Reflective Experiential Learning: Using Active Video Watching for Soft Skills Training

Antonija MITROVIC[a*], Vania DIMITROVA[b], Amali WEERASINGHE[c] & Lydia LAU[b]
[a]Intelligent Computer Tutoring Group, University of Canterbury, New Zealand
[b]School of Computing, University of Leeds, UK
[c]School of Computer Science, University of Adelaide, Australia
*tanja.mitrovic@canterbury.ac.nz

Abstract: Learning by watching videos has become the dominant way of learning for millennials. However, watching videos is a passive form of learning which usually results in a low level of engagement. As the result, video-based learning often results in poor learning outcomes. One of the proven strategies to increase engagement is to integrate interactive activities such as quizzes and assessment problems into videos. Although this strategy increases engagement, it requires changing existing videos and therefore substantial effort from the teacher. We have developed the Active Video Watching (AVW) system that enables the teacher to use existing videos from YouTube without modifications. The teacher is required to define a set of aspects for videos, which serve as reflective scaffolds in order to increase engagement and focus learners' thinking. AVW provides a Personal Space for individual learners to link their personal experiences while watching videos. The comments collected can be used by the individuals to reflect on their own thoughts or to be shared with other learners in the Social Space. We conducted a study with postgraduate students on presentation skills. The results show that the level of engagement with AVW was high, and that the aspects were effective as reflection prompts. We plan to conduct further studies related to other types of soft skills, and also to further extend AVW to provide individualized feedback to students.

Keywords: soft skills, video-based learning, engagement, scaffolding reflection

1. Introduction

Video-based learning is one of the main strategies to provide learning environments for millennials, together with mobile learning and gamification (Arelando, 2013). Learning by watching videos is used in a wide spectrum of instructional settings, ranging from flipped classrooms (Kurtz et al., 2014), online learning and MOOCs (Guo, Kim and Rubin, 2014; Koedinger et al., 2015), to informal learning using YouTube. Videos are especially useful for soft-skills training, as such skills are difficult to teach in classrooms, due to their resource-intensive nature. Soft skills (such as communicating, negotiating, collaborating, critical thinking, reasoning about societal/ethical responsibilities and intercultural awareness) are widely seen as crucial for employability in the knowledge economy (National Research Council, 2012; EU Policy communication, 2012; World Economic Forum Report, 2016). These skills are gaining growing attention in the technology-enhanced learning community, with a focus on ill-defined domains (Mitrovic and Weerasinghe, 2009). Example systems to support learning in ill-defined domains include collaborative spaces building on social interactions or situational simulations where the learners can 'experience' complex situations in, e.g. simulated internships (Chesler et al., 2015).

Watching videos is inherently a passive form of learning (Chi, 2009), which usually results in a low level of engagement. In order to learn effectively, students need to engage with video content and self-regulate their learning. Research shows that several factors influence how students engage with videos. Guo and colleagues (2014) found that shorter videos are more engaging than longer ones, and that video production is also important: students engage more with informal, talking-head style or Khan-style drawing videos in comparison to pre-recorded s lectures.

One of the proven strategies to increase engagement is to integrate interactive activities such as quizzes into videos (Kovacs, 2016). Although this strategy increases engagement, it requires changing

existing videos, requiring substantial effort from the teacher. Additionally, such activities exist outside the video watching space and they do not provide mechanisms to engage with video content while watching. There is evidence in MOOCs that students who engage primarily with videos skip assessment problems and other interactive activities (Guo, Kim and Rubin, 2014).

Therefore, it would be beneficial to provide explicit support for engagement during video watching. Such support can also aim to foster metacognitive skills essential for effective learning, which students often lack (Bannert and Mengelkapm, 2008; Chi, 2000). Explicit prompts have been used to support metacognitive activities such as self-explanation (Conati and VanLehn, 2000; Weerasinghe and Mitrovic, 2004) or reflection (Lin and Lehman, 1999; Bannert and Mengelkamp, 2013) in computer-based learning environments.

We have developed the Active Video Watching (AVW) system that provides such support via aspects. Aspects are prompts that focus the learner's attention on important elements presented in videos, and encourage learners to link the presented material to their previous experience. Therefore, aspects support reflection, by offering students opportunities to think about their own experience in relation to presented material (Verpoorten, Westera and Specht, 2010). While aspects in AVW provide explicit support for reflection, their usage is at the learners' discretion.

In this paper, we focus on the ill-defined task of delivering pitch presentations. Increasingly, researchers are asked to present their work in a short, sharp and engaging manner. This is also crucial in businesses where a new product or a proposal has to be presented to customers or funders. Pitch presentations are being used as a form of public engagement vehicle, which aim to excite, persuade, and open up opportunities. This can be at odds with the usual presentations for research dissemination, which would examine the rigour of approach, grounded in the past for credibility, and the details of the approach/techniques employed. Training students to deliver presentations is mostly based on practical role-based experiences, which is resource intense (Hetzner et al., 2011). AVW provides a scalable way of assisting learners to improve their knowledge about delivering pitch presentations.

The focus of our study is to understand the effect of aspects on engagement and reflection during video-based learning. The work is part of an ongoing collaboration between the University of Leeds (United Kingdom), the University of Canterbury (New Zealand), and the University of Adelaide (Australia), which aims at scaling up the deployment of AVW for soft skills training, and its potential in the development of interactive personalized nudges for self-regulated learning.

The goal of the learning resources used in AVW is to help postgraduate students acquire new skills for a pitch presentation, and use this opportunity to reflect on their own presentation skills. There are assumptions in this approach:

- past experience may be recalled while watching a video that is useful for personal reflection;
- sharing these experiences may be useful for opening up the learner's mind when there is dissimilarity amongst the experiences, or improving the learner's confidence when similar experiences were voiced by others.

We start by presenting the AVW system, and the activities students perform in its Private and Social Spaces. Section 3 presents the design of our experiment, while Section 4 presents the findings. We then discuss the outcomes of the study and the plans for future research.

2. The Active Video Watching (AVW) System

AVW is a controlled video watching environment that facilitates reflective experiential learning. In AVW, the teacher creates a class, and specifies a set of videos to be used. For each video, the teacher provides a short description, and defines a set of aspects. Aspects serve as scaffolds for reflection: their goal is to focus the student's attention to specific points related to the videos. The choice of aspects is important, as they should guide student's thinking, scaffold and foster reflection. The student can use aspects to tag his/her comments.

The AVW system provides a learning environment consisting of two components: the Private Space and the Social Space. Initially students watch and comment on videos individually in the Private Space (Figure 1). In order to enter a comment, the learner needs to stop the video, type in their thoughts and select an aspect. The system records information about the specific place in the video (i.e. the time elapsed from the start) related to the comment together with other relevant information. The student can

watch the video multiple times, including rewinding and skipping parts of the video. Previously made comments are visible at the bottom of the page.

Once the teacher approves comments for sharing, anonymized comments are available to the whole class in the Social Space (Figure 2). In this space, the learner can browse the comments made by the class, and rate them. The learner can sort the comments by the elapsed time in the video, so that comments on the same part of the video are close to each other. That way, the student can check how similar or different those comments are from their own comments. It is also possible to sort the comments by aspects used, which allows the learner to see the reactions of other students about the same concepts presented in the videos. The options for rating are predefined by the teacher. In addition to reading/rating the comments, the learner can click on 'view video snippet' and watch the part of the video that the comment refers to.

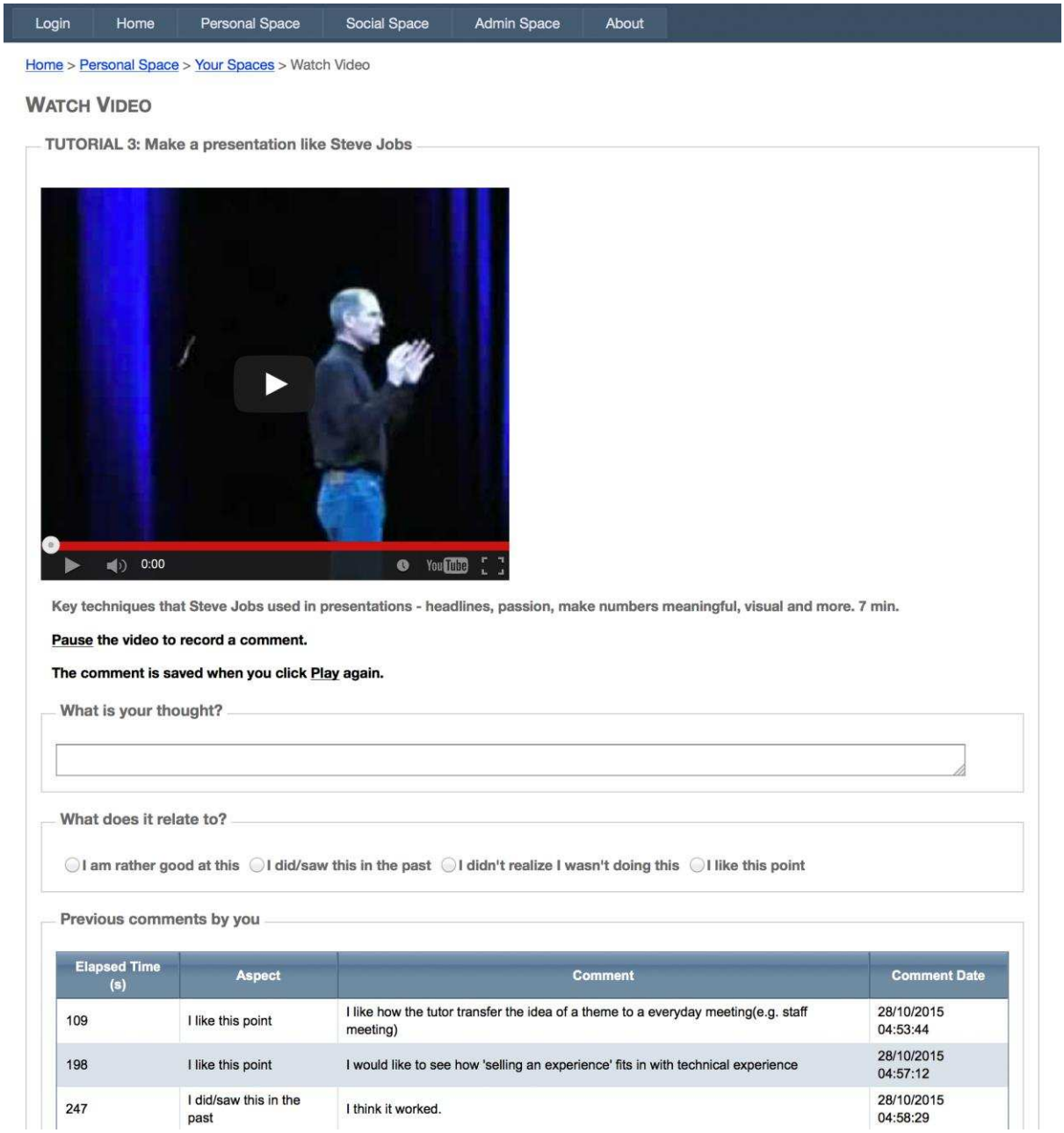

Figure 1. Personal Space

The teacher can observe comments and ratings, and also download the interaction data from the AVW as an XML file that includes comments tagged with aspects, timing in the video when a comment was made and ratings made on comments. The file can be processed for further analysis to get deeper insights into the learners' experience with AVW. In the previous trials of AVW, the researchers within

the ImREAL project processed some of the data to identify the focus of attention for individuals or group of learners (Despotakis et al., 2013).

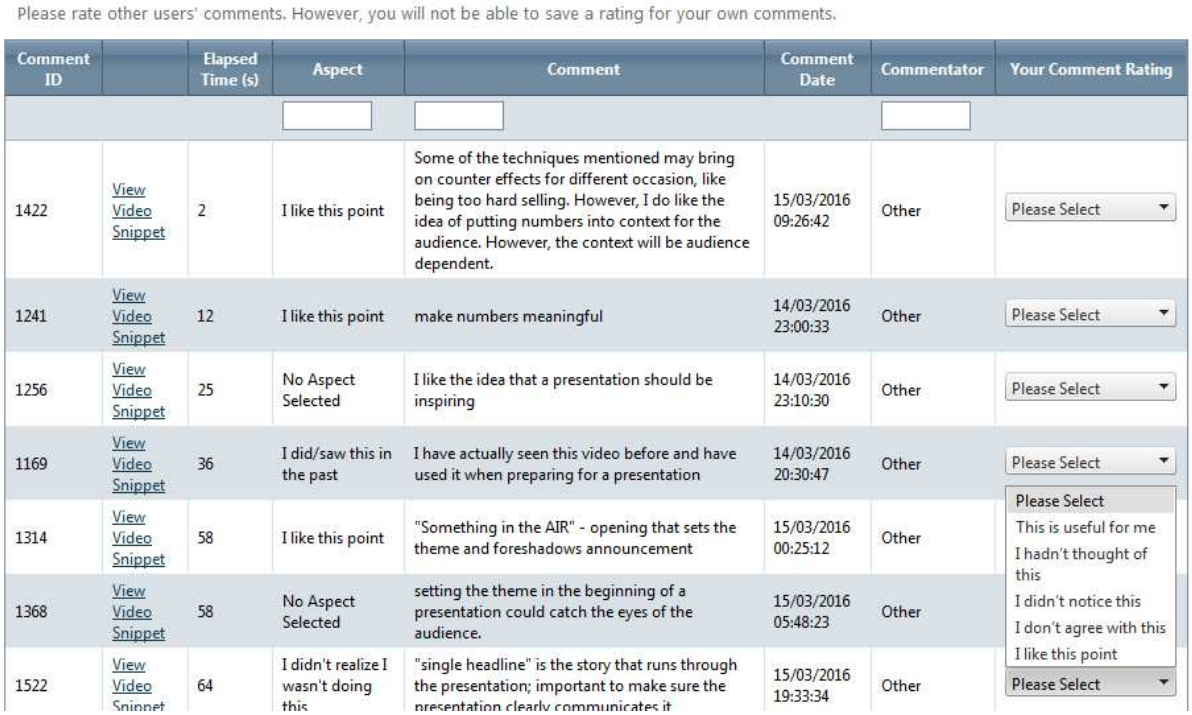

Figure 2. Shared comments in the Social Space

3. Experiment Design

The overarching goal of our project is to investigate whether active video watching is beneficial for teaching soft skills. The focus of the first study we conducted was on pitch presentations, aimed at postgraduate students. There were two specific research questions we wanted to address in this study: Do aspects used in AVW support engagement and reflection? Are there differences in how various categories of participants interact with AVW?

The study was approved by the Human Ethics committees of the University of Canterbury and the University of Leeds. The participants were volunteers recruited from the postgraduate students at those two institutions. The study was performed in two phases, each one week long. Phase 1 was performed in the Personal Space, while Phase 2 was performed in the Social Space. After each phase, we administered online surveys which included questions related to acceptability of the Private/Social space respectively, as well as cognitive workload.

The videos used in the study were carefully selected from Youtube. Four of those videos were tutorials on giving presentations, while the other four were actual recordings of presentations. The criteria for selecting the videos were:

1. appropriate content (covering opening, closing, structure, delivery and visual aids; or examples of pitch presentations);
2. reasonable length (no longer than 10 minutes)
3. balance of gender for the presenters
4. two good examples and two not as good

The aspects used in Stage 1 were designed to encourage the learners to put their comments within selected learning context. For the tutorials, the aspects provided were: "I am rather good at this" , "I did/saw this in the past", "*I didn't realize I wasn't doing it*", and "I like this point" to stimulate learners to recall and reflect on their own experiences. For the example videos, the aspects provided were: "Delivery", "Speech", "Structure", and "Visual aids," corresponding to the concepts that were covered in the tutorials. In the Social Space, the ratings were designed to promote a deeper level of reflection.

The participants could use the following options: "This is useful for me", "*I hadn't thought of this*", "I *didn't notice this*", "*I don't agree with this*", and "I like this point."

3.1 Procedure

After providing informed consent, the participants took an online profile survey, which included demographic information, and questions related to the participant's experience related to giving presentations. After the profile survey, the participants received instructions on how to use the AVW Private Space (Phase 1). The participants were asked to watch and comment on the tutorial videos first, and then continue with four examples.

At the end of Phase 1, we administered a survey related to the acceptability of the Personal Space, and the participants' subjective ratings on cognitive workload (please see more detailed information below). In Phase 2, the participants used the Social space to explore and rate the comments made by the class. At the end of week 2, we administered a similar online survey related to the Social Space.

3.2 Data collection methods

Three surveys were designed to collect data, and to set learning tasks for pre- and post- test analysis.

Survey I: participant's profile such as demographic information, background experiences, motivation and attitudes; a series of questions relating to participant's knowledge of presentations; and his/her action plan for preparing and presenting a pitch presentation.

Survey II: same questions for participant's knowledge of presentations and an update of action plan for preparing and presenting a pitch presentation; NASA-TLX instrument (Hart, 2006) to check participant's perception of cognitive load when using AVW Personal Space; Technology Acceptance Model (TAM) (Davis, 1989) to check the participant's perceived usefulness of Personal Space for informal learning of presentation skills; and questions on usability of the AVW Personal Space.

Survey III: same questions for participant's knowledge of presentations and an update of action plan for preparing and presenting a pitch presentation; NASA-TLX and TAM for the Social Space; and finally questions on usability of the Social Space.

4. Overall Results

We recruited 48 participants, who completed the profile survey. Survey II was completed by 41 participants, some of which have not made any comments in the Private Space. The last survey was completed by 40 participants. Since the goal of this paper is to investigate the effectiveness of AVW and especially aspects on engagement and reflection, we focus on the 38 participants who made comments in Phase 1 and completed Survey II. Table 1 presents the demographic data collected from the profile survey. There were 26 females and 12 males. Seventeen participants were younger than 30, with the biggest group (14 participants) being aged 24-29. There were six participants who were 48 or older. English was the first language for 23 participants (the Native column in Table 1), while the first languages of the remaining 15 participants included various Asian and European languages (Non-Native). Most of the participants (28) were PhD students.

Table 1: Demographic data (means followed by standard deviations in parentheses)

	All (38)	**Female** (26)	**Male** (12)	**Age < 30** (17)	**Age 30+** (21)	**Native** (23)	**Non-Native** (15)
Training	2.15 (.95)	2.04 (.87)	2.41 (1.08)	1 (.79)	2.29 (1.06)	**2.48 (.99)**	**1.67 (.62)**
Experience	2.87 (.78)	2.84 (.83)	2.92 (.67)	2.82 (.73)	2.90 (.83)	2.83 (.78)	2.93 (.79)
Youtube	3.50 (1.11)	3.38 (1.09)	3.75 (1.14)	3.82 (1.07)	3.24 (1.09)	3.39 (1.16)	3.67 (1.05)
Youtube for learning	2.71 (1.01)	2.65 (.89)	2.83 (1.27)	2.82 (1.01)	2.62 (1.02)	2.78 (1.08)	2.6 (.91)

Because one of our research questions is to investigate the effect of individual differences on engagement in AVW, we divided the participants based on their gender, age and the first language, and report the demographic data for those subgroups. One of the questions in the profile student required the participants to report the amount of training they had on giving presentations prior to the study (the Training row in Table 1), using the Likert scale ranging from 1 (No training) to 5 (Extensive training). There was no difference on this measure between males and females, or between younger and more mature students, but there was a significant difference between native and non-native English speakers (Mann-Whitney $U = 210.5$, $p = .014$). We also asked the participants about their experience in giving presentations (1 – Not experienced, 5 – Highly experienced). There was no significant difference on experience for any of the classifications, but there was a significant correlation between the overall scores for Training and Experience ($r = .507$, $p = .001$).

We asked participants how often they watched Youtube videos, and how often they used Youtube for learning (1 - never, 2 - occasionally, 3 - once a month, 4 - every week, 5 - every day). There were no significant differences between the scores provided on each of these questions between various categories of participants. However, the scores on these questions are significantly correlated overall ($r = .615$, $p < .001$).

4.1 Do aspects support engagement and reflection?

In order to investigate whether AVW is effective in supporting engagement, we analyzed the collected data from AVW. For each video available in the Private Space, Table 2 presents its duration and the total number of comments made by the participants. It is encouraging to see that the participants were very active, and made many comments on tutorials and examples. The paired t-test reported a marginally significant difference on the total number of comments the participants made on tutorials compared to the comments made on examples (two-tailed $t = 1.72$, $p = .093$). Table 2 also reports the number of ratings made in the Social Space. The number of comments that were not rated in the Social Space is very small (2.42%). The total number of ratings in the Social Space is 2,706. There were more ratings on comments related to tutorials in comparison to the ratings on examples, but the difference is not significant.

Table 2. Information about videos and comments/ratings

Video	**Length**	**Comments [Personal Space]**	**Comments without ratings**	**Ratings [Social Space]**
Tutorial 1	2.54'	89	2	603
Tutorial 2	7.37'	110	1	382
Tutorial 3	6.55'	120	3	402
Tutorial 4	6.22'	90	3	261
Example 1	3.23'	79	0	272
Example 2	8.28'	93	2	281
Example 3	6.48'	100	3	283
Example 4	3.25'	63	4	222
Total		**744**	**18**	**2,706**

We also analyzed the comments based on different aspects, reported in Table 3. In the Private Space, the participants could make a comment without selecting an aspect, and that happened more often for tutorials than for examples. The most frequently used aspect for tutorials was 'I like this point' (41.8%), but the participants also used aspects that require reflection on their past experiences and presentation skills: 'I am rather good at this' (8%), 'I did/saw this in the past' (12.7%) and '*I didn't realize I wasn't doing this*' (12.22%). The use of those aspects shows evidence of reflective thinking.

For the four examples, the comments are almost equally distributed over various aspects, showing that the participants were watching the videos with those aspects in mind. This is evidence that aspects do scaffold participants' thinking.

Table 3. Distribution of comments on tutorial over aspects

Tutorials		**Examples**	
Aspect	**Comments**	**Aspect**	**Comments**
I am rather good at this	33	Delivery	81
I did/saw this in the past	52	Speech	67
I didn't realize I wasn't doing this	50	Structure	68
I like this point	171	Visual aids	61
No aspect selected	103	No aspect selected	58
Total	**409**	**Total**	**335**

4.2 Are there individual differences in engagement in AVW?

Table 4 presents some statistics for all participants, and also for the categories we introduced earlier. The participants made on average 19.58 comments in the Private Space, commenting more on the tutorials than on the examples. There were differences between the participants on the number of comments made, but none of the differences are statistically significant. Therefore AVW is equally effective in supporting engagement across age groups, gender, and native and non-native English speakers.

Table 4: Average number of comments and ratings on comments

	All (38)	**Female** (26)	**Male** (12)	**Age < 30** (17)	**Age 30+** (21)	**Native** (23)	**Non-Native** (15)
Comments	19.58 (13.19)	20.88 (13.37)	16.75 (12.87)	17.53 (11.53)	21.23 (14.45)	22.09 (15.16)	15.73 (8.51)
Comm/Tutorials	10.76 (7.01)	10.81 (6.55)	11.67 (8.23)	10.59 (5.92)	10.9 (7.93)	11.48 (7.94)	9.67 (5.37)
Comm/Examples	8.81 (7.92)	10.08 (8.78)	6.08 (4.89	6.94 (6.59)	10.33 (8.72)	10.61 (9.21)	6.07 (4.37)
Ratings	68.08 (49.36)	72.96 (50.02)	57.5 (48.29)	63.18 (36.73)	72.05 (58.24)	78.91 (57.28)	51.47 (28.20)

4.3 Cognitive workload

Survey II contained four NASA-TLX questions related to cognitive workload when using the Personal Space, using the Likert scale from 1 (Low) to 20 (High). The summary of responses is given in Table 5. When asked how mentally demanding they found to watch and comment on videos in the Personal Space (the Demand row), the average response was close to the middle of the scale. The participants could provide qualitative feedback in response to this question. Seven participants have not provided feedback. The remaining participants provided generic comments (3 participants), feedback related to videos only (11 participants), and feedback related to the need to think and reflect while watching videos (17 participants). Therefore, 45% of the participants noted that commenting on videos prompted thinking, which is evidence of the effectiveness of aspects to support reflection. Seven participants explicitly stated they made links with their past experience. One participant stated: "I needed to pay proper attention to understand what was explained, to recall my experience, and perceive the usefulness of the tricks and tactics told by the presenter."

The second question asked participant how hard they had to work to watch and comment on videos, and the average score was 8.55 (Effort). There was strong positive correlation between Demand and Effort ($r = .539$, $p < .001$), showing that the participants found the task challenging but were working hard. The third question asked the participants whether they felt discouraged, irritated, stressed or annoyed when watching and comment on the videos (Frustration), to which the average score was 5.79 (out of the maximum score of 20).

The last question asked how successful the participants thought they were in identifying useful points about presentation skills, based on their comments while watching videos (Performance), and

the average score was 12.76. The distribution of scores for Performance was significantly different for female and male participants (U = 229, p = .021).

Table 5: Summary of replies to the questions on cognitive workload

	All (38)	**Female** (26)	**Male** (12)	**Age < 30** (17)	**Age 30+** (21)	**Native** (23)	**Non-Native (15)**
Demand	9.89 (4.87)	10.08 (4.66)	9.5 (5.5)	9.76 (4.68)	10 (5.13)	9.91 (5.66)	9.87 (3.52)
Effort	8.55 (4.21)	8.04 (3.97)	9.67 (4.68)	8.23 (4.69)	8.81 (3.88)	8.44 (3.88)	8.73 (4.82)
Frustration	5.79 (4.48)	5.88 (4.61)	5.58 (4.39)	6.23 (4.28)	5.43 (4.72)	6.13 (4.5)	5.27 (4.56)
Performance	12.76 (4.48)	**11.65 (4.24)**	**15.17 (4.17)**	13.29 (3.82)	12.33 (5)	11.96 (4.83)	14 (3.7)

We analyzed ratings made in the Social Space, and identified the top rated comments as those that were rated 10 or more times. There were 14 such comments, made by 10 participants (5 females and 5 males), all related to Tutorial 1. Two of those participants had two comments each in the top-rated group, and one had three comments. The two most often rated comments (rated 20 and 16 times respectively) were: "Powerpoint presentations can be distracting and possibly misleading. If used incorrectly they can actually detract" and "hand writing and hand drawing are attractive, and let the audience focus on the presentation". Another comment (rated 10 times) clearly shows that the participant was reflecting on his/her previous experience: “It's good to be reminded that people can't really listen to what I'm saying while they read a slide. I always try to avoid reading lots of information off slides because people can read faster than what I'm saying aloud, but maybe I include too much text on my slides for independent reading while I talk.” Eight ratings for this comment were “I like this point” and the remaining two were “This is useful for me.” The average score on the Performance question for those ten participants was 14.6, which is higher than the overall average, showing that they have good metacognitive skills. One participant from that group provided the following comment on the Performance question: "The process was quite helpful. It felt like a good way to summarize and remember the main relevant points from a video. The points I remembered were much more relevant than I think would be the case from reading someone else's summary of the same material."

4.4 Technology Acceptance

Table 6 presents the means and standard deviations of the replies to the TAM questions, using the following scale: 1 - extremely likely; 2 - quite likely; 3 - slightly likely; 4 - neutral; 5 - slightly unlikely; 6 - quite unlikely; and 7 - extremely unlikely. The figures show that the Personal Space was found to be acceptable.

Table 6: Summary of replies to the usability and acceptance questions for the Personal Space

Questions	**Personal Space**
I think I would like to use AVW frequently	3.03 (1.59)
I would recommend AVW to my friends	2.76 (1.51)
Using AVW would enhance my effectiveness when developing soft skills	2.50 (1.18)
I would find AVW useful in my studies/job	2.46 (1.19)
I would find AVW easy to do what I want it to do	2.76 (1.34)
My interaction with AVW would be clear and understandable	2.73 (1.41)
I would find AVW easy to use	2.49 (1.48)
If I am provided the opportunity, I would continue to use AVW for informal learning	2.47 (1.33)
Using AVW would enable me to improve my soft skills quickly	2.59 (1.33)
Using AVW would improve my performance considering the development of soft skills	2.47 (1.11)

5. Discussion and Conclusions

AVW was effective in supporting engagement overall, and also for various categories of participants. Although the participants differed in how much they watched videos in Youtube and used them for learning, it is encouraging that there was no strong correlation between the use of Youtube and the amount of engagement in AVW (in terms of the number of comments the participants made in AVW). In fact, ten participants who stated that they never or only occasionally watched Youtube videos made on average 20 comments in the Private Space (which is higher than the overall average number of comments). Although there was a significant difference in self-reported scores for the amount of previous training for native and non-native English speakers, there were neither significant difference on any measures collected from AVW nor on the self-reported scores for mental workload.

The participants made a lot of comments in the Private Space, and submitted many ratings of the comments in the Social Space. There were more comments on tutorials than on example videos, which shows that the participants paid more attention to the tutorials. This fact is consistent with the relatively low scores the participants selected for the amount of prior training and experience in giving presentations in the profile survey. Since the participants felt they needed to improve their presentation skills, they paid more attention to the tutorials.

Most of the comments made on the tutorials were about liking certain points in the tutorials, showing that the participants were learning from those videos. The participants also used the aspects which show reflection, such ''I am rather good at this,' 'I did/saw this in the past' and '*I didn't realize I wasn't doing this*' (33% of the comments). Therefore, the aspects did scaffold reflection.

When watching the example videos, the participants commented on them in relation to the important aspects of presentations they learnt about in the tutorial videos (delivery, speech, structure and visual aids). Therefore, the aspects were effective in focusing the participants' thinking in relation to the examples.

The findings from our study show that AVW supported engagement and reflective thinking. The level of acceptance was relatively good. The participants reported that the task was demanding (10 out of the maximum score of 20). The qualitative feedback on the four TLX questions showed strong evidence of the participants engaging in reflection, thus showing that the aspects are effective in supporting such metacognitive activities.

Overall, we found evidence that aspects are effective as scaffolds for engagement and reflection. We plan to perform semantic analyses of the open-ended comments provided by the participants, to get a better understanding of how much the participants reflected on their experiences. We also plan to conduct more studies on supporting presentations skills with different populations of students, as well as to conduct studies on using AVW to support other soft skills.

The presented results on using AWV and especially aspects to scaffold reflective learning are encouraging, especially because of the relatively low level of effort required to provide such a learning environment to students. Soft skills are very demanding to teach in classroom situations, as feedback and support needs to be provided at an individual level. AVW is cost-effective, as it only requires the teacher to select videos and specify a set of thought-provoking aspects for them.

Our future research plans include providing adaptive feedback to students while they watch videos, as well as developing tools to provide feedback to the teachers about the individual student's activities in the Personal Space and the activities of the class in the Social Space.

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