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Using active video watching to teach presentation skills

Report

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1. Introduction

Presentation skills and other transferable (a.k.a. soft) skills are highly sought by employers and widely deemed crucial for employability in the knowledge economy [1-13]. Research shows that transferable skills contribute as much as 85% to students' success [14]. Teaching soft skills to tertiary students in technical and business disciplines is challenging, as they are time-consuming and difficult to document [15]. The learner needs to practice under various conditions, receive feedback, reflect on it and do more practice. Tertiary teachers typically do not have enough resources to provide such support to each individual student.

Videos have become the main means for content production and consumption for the millennials and iGeneration. Video-based learning [16,17] is used in a wide spectrum of instructional settings, ranging from flipped classrooms [18], online learning and MOOCs [19, 20] to informal learning using YouTube [21-23]. Videos can be a powerful method for soft skills [15, 24-26], where learning requires contextualisation in personal experience and ability to see different perspectives. Although videos are a highly popular digital medium for learning, video watching can be a passive activity and may result in limited learning [17, 24, 27-29]. It is therefore necessary to provide support for active video learning.

Our approach is to support engagement during video watching via interactive notetaking, tapping into learners' familiarity with commenting on videos in social networking sites. We have developed the Active Video Watching (AVW-Space) system aimed at soft skills training. AVW-Space builds upon previous research and findings [30-36] from the ImREAL project (funded by the European Commission).

This report is structured as follows. Section 2 presents the AVW-Space platform. We then present the study on presentation skills we conducted in July-August 2016. Section 3 describes the Presentation Skills Space we developed for the study. The study design is presented in Section 4, while the findings from the study are presented in Sections 5-7. We conclude with a discussion of future work.

2. AVW-Space Platform

AVW-Space[1] is a controlled video-watching environment designed for self-study that resembles informal learning with popular social environments, such as YouTube. It can be customised by the teacher who defines a list of aspects that serve as scaffolds for learning with the selected videos. The choice of aspects should direct the student's attention on skill-related concepts and foster reflection.

Learning in AVW-Space consists of two phases.

In Phase 1, students watch and comment on videos individually, using aspects to tag their comments made anytime during the viewing (Figure 1). AVW-Space shows time-stamped comments (i.e. the time elapsed from the start of video). The student can watch the video multiple times, including rewinding or skipping parts of the video.

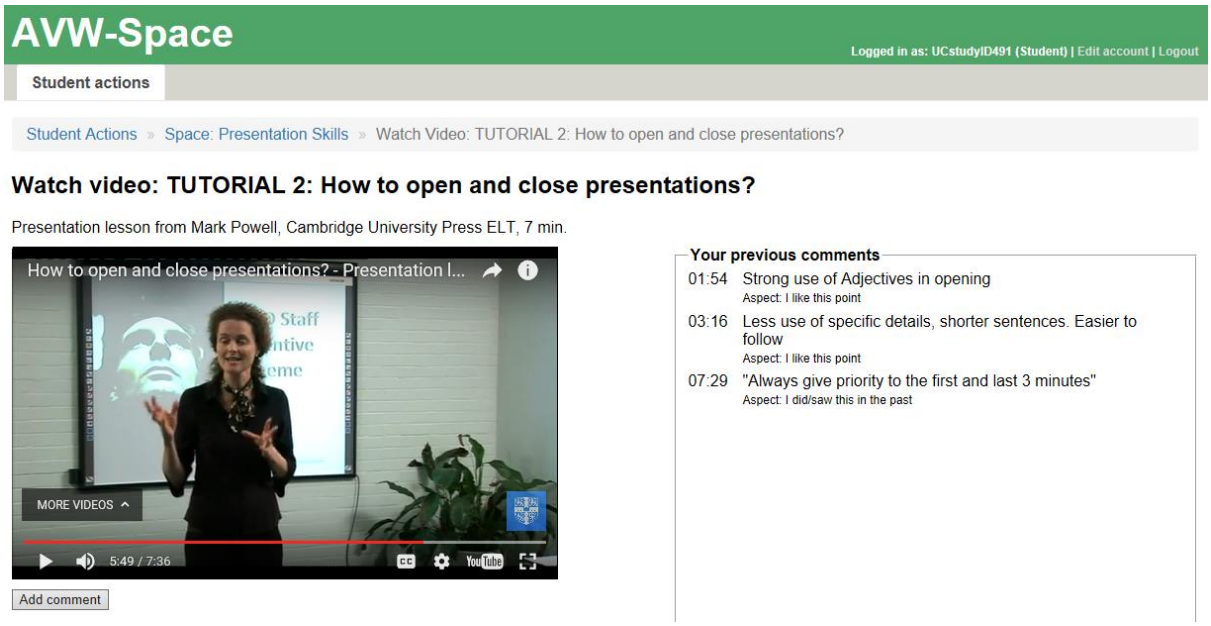

Figure 1. Phase 1

At the beginning of Phase 2, the teacher needs to review comments and approve comments for sharing. Anonymised comments are then available to the whole class. Students can browse and rate comments made by others. The students can sort the comments by timestamp or aspect, so that they can position their own comments amongst the others. The options for rating are predefined by the teacher to promote deeper reflections (Figure 2). In addition to reading/rating the comments, the students can watch the part of the video that associates with a comment.

[1] AVW-Space is available online at http://ictg.cosc.canterbury.ac.nz:8007/login

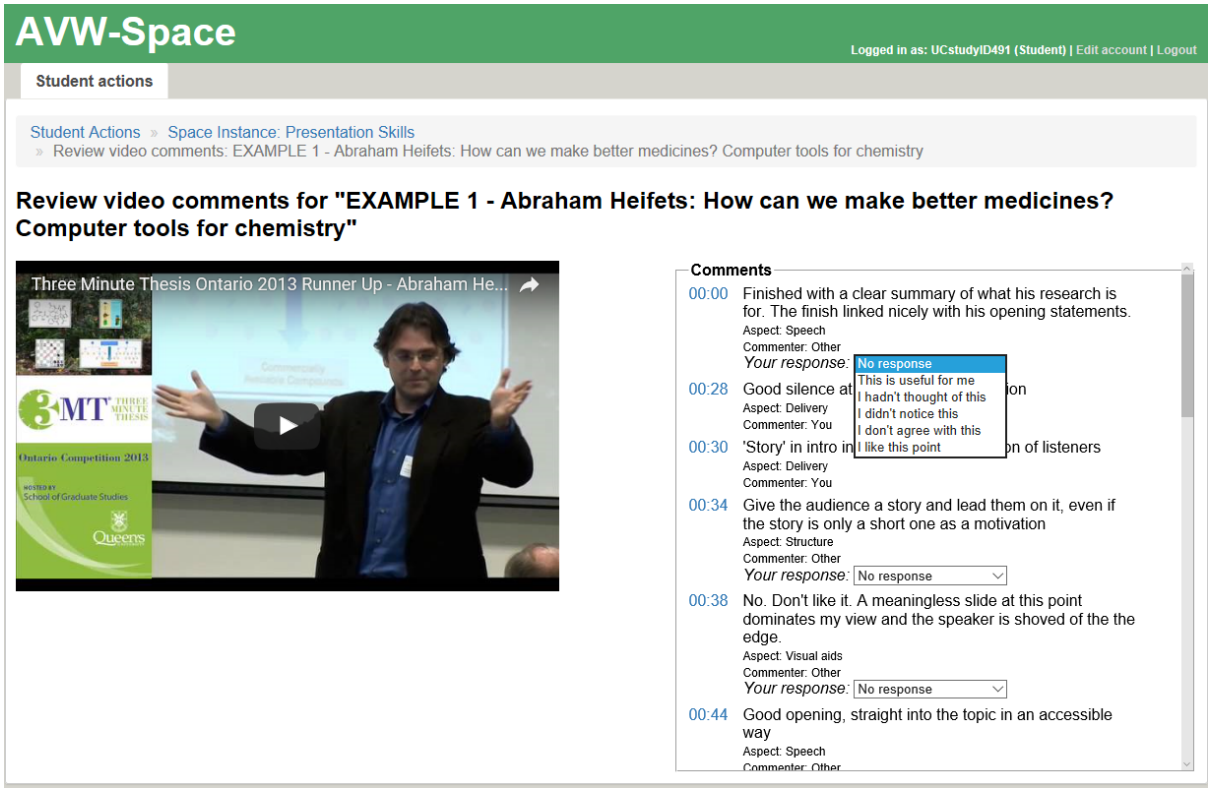

Figure 2. Rating a comment (Phase 2)

AVW-Space is a general-purpose online platform for soft-skills training. In this report, we present the study performed with AVW-Space; please see the Manual for Instructors [37] for detailed instructions on how to use AVW-Space. In the next Section, we introduce the Presentation Skills Space, which was developed for our study.

3. Presentation Skills Space

Our study focused on presentation skills. We selected four videos to serve as tutorials on presentations skills (one of the tutorials is shown in Figure 1). The tutorials are short videos (between 3 and 8 minutes) providing tips on how to make good presentations. To support students in reflecting on their past performance, we specified four aspects for tutorials:

- *I am rather good at this*
- *I did/saw this in the past*
- *I didn't realize I wasn't doing this*
- *I like this point*

When adding a comment, the student needs to specify an aspect (Figure 3).

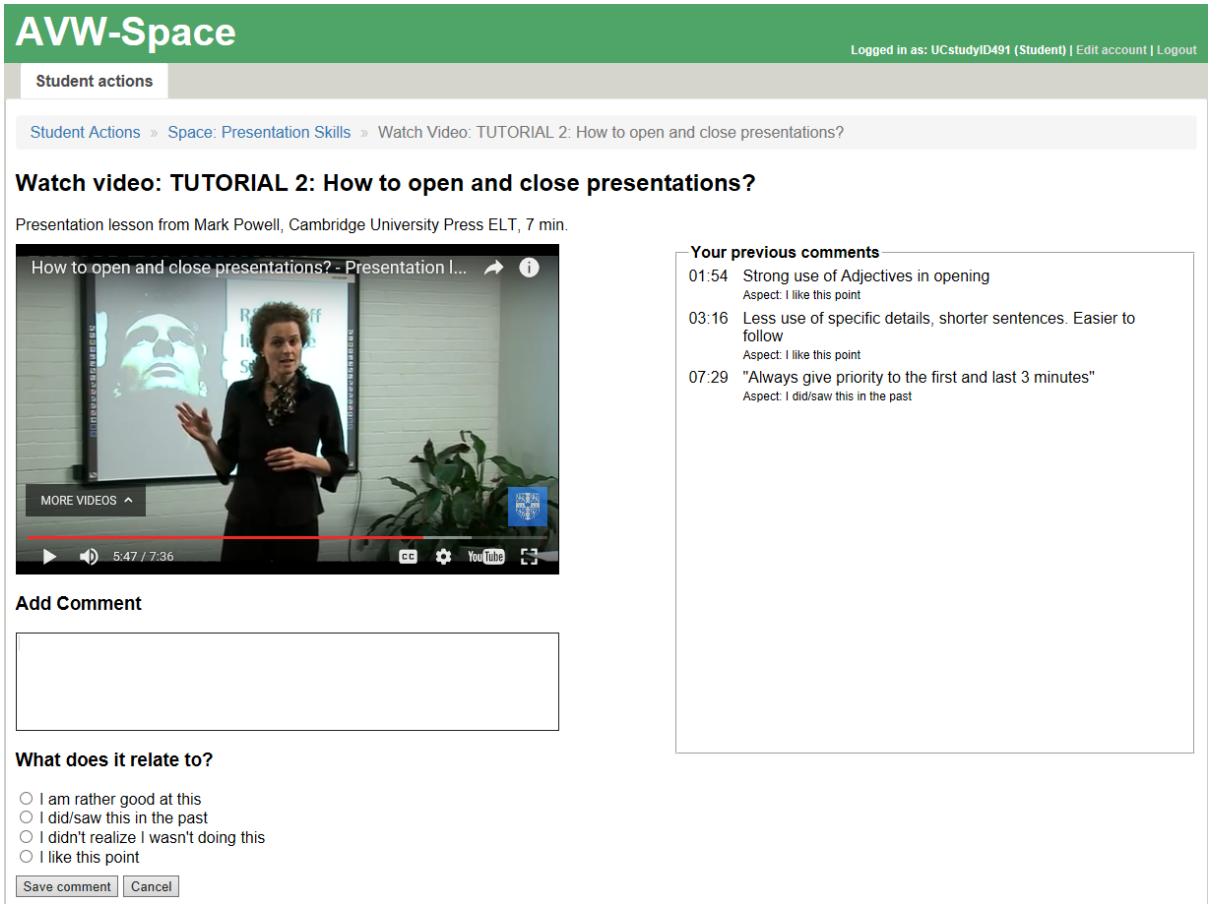

Figure 3. Entering a comment

We have also selected four videos to serve as examples, and asked participants to comment on the examples in term of four aspects: *Structure, Delivery, Visual Aids and Speech* (Figure 4). The criteria for selecting the videos were: (i) appropriate content (covering opening, closing, structure, delivery and visual aids; or examples of pitch presentations); (ii) no longer than 10 minutes; (iii) balance of gender for the presenters; (iv) two popular examples and two not so popular (based on the YouTube ratings).

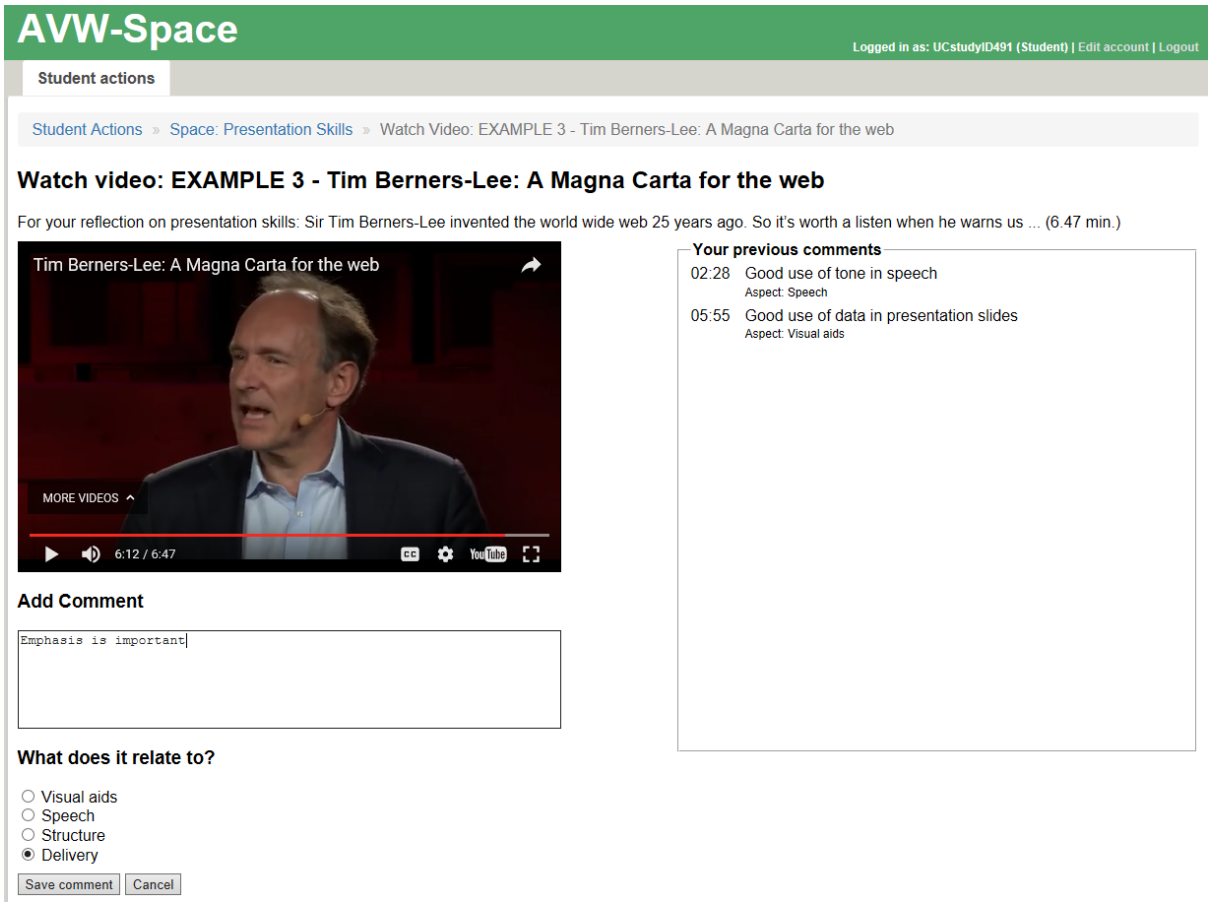

Figure 4. Commenting on an example video

After phase 1 was completed, we approved the comments to be used in phase 2. When reviewing comments made by other students, the participant saw others' opinions, and might have noticed something he/she missed. We have specified five rating options, which also aim to focus the student's attention to comments and support learning (Figure 2):

- *This is useful for me*
- *I hadn't thought of this*
- *I didn't notice this*
- *I do not agree with this*
- *I like this point*

The first three ratings show that the student has noticed something new and useful in comments (thus indicating learning). The last two options allow the student to state their opinion about a comment.

4. Study

The study[2] was performed with 37 volunteers from two third-year engineering courses at the University of Canterbury. Those two courses required students to give presentations to the class. The goal of the study was to investigate the following research questions:

- What kind of student behaviors do students engage with in AVW-Space?
- What kind of student behaviors lead to learning in AVW-Space?
- Do aspects enhance learning?
- What is the participants' experience with AVW-Space?

We designed three surveys to collect data. Survey 1 was administered at the beginning of the study, and collected participants' profiles (demographic information, background experiences, motivation and attitudes using Motivated Strategies for Learning Questionnaire (MSLQ) [38], and participants' knowledge of presentations. Survey 2 was administered after phase 1, and included the same questions for knowledge of presentations from survey 1. Additionally, survey 2 included the NASA-TLX instrument [39] to check participant's perception of cognitive load when commenting, the Technology Acceptance Model (TAM) [40] to check participants' perceived usefulness of commenting on videos for learning, as well as questions on usability related to commenting on videos. Survey 3 was similar to survey 2 but related to rating others' comments, and was administered at the end of the study.

In order to answer the research questions, we implemented two versions of the Presentation Skills Space. The participants were randomly assigned to the control or experimental group. There were 18 students in the control group (13 males and 5 females), and 19 in the experimental group (2 females and 17 males).

At the start of the study, the participants completed survey 1, and had one week to watch and comment on videos. Both groups watched the same videos. We advised the participants to watch tutorials first, and then move on to the example videos. The difference in phase 1 was that the control group had no aspects when specifying comments, while the participants in the experimental group had to select an aspect for each comment they made. The control group only watched videos. At the end of phase 1, the control group completed survey 2 and finished the study. The participants from the experimental group completed survey 2, and had one week to review and rate comments by others. At the end of the second week, the experimental group participants completed survey 3.

[2] The study was approved by the Human Ethics committee of the University of Canterbury.

Table 1. Distribution of ages of the participants

Age	Control (18)	Experimental (19)
18-23	15	16
24-29	0	1
30-35	2	0
36-41	1	1
42-47	0	1

The majority of participants (83.8%) were aged 18-23 (Table 1).

Table 2 summarizes the participants replies on how much experience they have had with presentations prior to the study, using the Likert scale from 1 (No training) to 5 (Extensive training).

Table 2. Summary of experience in giving presentations

Training	Control (18)	Experimental (19)
No training (1)	6	8
Some (2)	10	9
Quite a bit (3)	2	2
A lot (4)	0	0
Extensive (5)	0	0

Table 3 presents other demographic data about the two groups. The questions related to experience, using YouTube and using YouTube for learning were also based on the Likert scale from 1 (Low) to 5 (High). There were no significant differences[3] between the two groups.

Table 3. Demographic data

	Control (18)	**Experimental** (19)
Male	13	17
Female	5	2
Native English speakers	12	17

[3] Due to the low number of participants, we have used non-parametric statistical tests in all reported analyses.

Non-native English speakers	6	2
Training	1.78 (.65)	1.72 (.67)
Experience	2.33 (.59)	2.72 (.67)
YouTube	4.17 (.79)	4.28 (.83)
YouTube for learning	2.83 (.99)	3.11 (1.13)
Conceptual Knowledge[4] - survey 1	11.23 (4.34)	12.84 4.63)

5. What kinds of behaviours do student engage in?

As stated in the introduction, watching videos could be a passive activity, when the learner does not engage fully with the learning material. We have observed three kinds of behaviours in our study, based on the analysis of system logs[5]. Table 4 summarizes the number of participants from the two groups who completed various activities in the study.

Table 4. Summary of activities performed by participants

Group	Survey 1	Watched videos	Made comments	Survey 2	Survey 3
Control	18	10	6	11	N/A
Experimental	19	11	7	11	9

All 37 participants completed survey 1. Sixteen participants have never logged onto AVW-Space. We refer to this group as **Inactive Learners** (IL). The remaining 21 participants logged onto AVW-Space, and watched videos. However, not all of them commented on videos. We refer to the participants who watched videos but made no comments as **Passive Learners** (PL). The remaining 13 participants watched videos and commented on them – we refer to this group as **Constructive Learners** (CL). The comments made by constructive learners show higher levels of engagement, such as remarks on important events in videos, and contain statements showing reflection and self-explanation. For example, one of the participants wrote: "*Must keep an (internal) focus on your body posture and pace. Control it. If you're panicking or distracted you can become too focused on your content and forget about these other factors that affect the quality of your presentation*."

Table 5 presents the number of comments and ratings made by constructive learners from the two groups. There was no significant difference on the number of comments made by participants from the two groups. The number of comments ranged from 6 to 51 for the control group, and from 1 to 29 for the experimental group.

[4] Conceptual knowledge is discussed in detail in Section 6.
[5] AVW-Space collects information about all user actions and stores them in the system log. The data from the log can be exported.

Table 5. Summary of actions by constructive learners

	Control (6)	**Experimental** (7)
Comments – total	149	90
Avg. comments	18 (20.13)	12.86 (11.65)
Comments per video	3.17 (2.45)	2.19 (1.43)
Ratings - total	N/A	332
Avg. ratings	N/A	55.3 (37.8)

As the three categories of learners engaged in very different ways, it is interesting to compare how much they have learnt. We discuss learning in the next section.

6. What kinds of behaviours lead to learning?

The three surveys contained identical questions related to the participants' conceptual understanding of presentation skills. These questions required the participant to describe in his/her own words properties of good presentations, in terms of Structure, Delivery, Visual Aids and Speech. Please note that those four terms correspond to the aspects the participants from the experimental group were given when commenting on example videos.

In order to be able to score participants' replies on the four questions, we have developed taxonomies of concepts related to structure, delivery, visual aids and speech. The score for a reply represents the number of concepts from the taxonomy that the student has used in his/her reply. Three markers have independently marked the replies, using the taxonomies. There was a high level of agreement between the markers: the Krippendorff's alpha[6] was for 0.907. The final scores for conceptual understanding were confirmed by a fourth marker using the majority vote, or if that was not possible, re-marking the entries.

Table 6 presents the scores on the conceptual knowledge questions from the surveys. Please note that not all participants completed all three surveys – for that reason, we report the actual number of participants who completed each survey in the table.

Table 6. Conceptual knowledge scores (means and standard deviations)

	Constructive learners	**Passive learners**	**Inactive learners**
Survey 1	13.62 (4.03) n = 13	11.63 (2.97) n = 8	10.63 (4.95) n = 16
Survey 2	17 (4.52) n = 10	11.2 (5.45) n = 5	10.13 (4.82) n = 8
Survey 3	18.4 (3.72) n = 5	7.5 (9.19) n = 2	9.5 (6.36) n = 2

[6] Krippendorff's alpha is a statistical measure of agreement achieved by multiple markers [41]. It was calculated using the online tool http://dfreelon.org/recal/recal-oir.php

There were no significant differences between the three categories on the conceptual knowledge scores from survey 1, showing that all categories started with similar conceptual knowledge. However, the Kruskal-Wallis test revealed a significant difference on the conceptual knowledge scores for survey 2 ($H = 7.25$, $p = .03$), with a significant difference between inactive and constructive learners ($p = .03$). We have not compared scores from survey 3 due to low user numbers.

Constructive learners have improved their scores on conceptual knowledge questions significantly from survey 1 to survey 3 ($\chi 2(2) = 7.89$, $p = 0.02$), with a large effect size (eta squared = 0.67). There was not enough data to analyse statistical significance of differences for passive and inactive learners, but their scores on survey 3 are lower than earlier scores. Some inactive learners completed surveys 2 and 3 without watching any videos; their conceptual knowledge answers contained the same entries, often using irrelevant concepts.

These results show that constructive learning (i.e. commenting on videos and rating comments made by peers) does lead to improved conceptual understanding of presentation skills. Not all participants engaged in constructive learning; the conceptual knowledge of those passive/inactive learners who completed surveys has not improved. A large group of participants (43%) have not watched any videos (IL). We have no data about why ILs have not watched videos. We attribute this to the voluntary nature of the study and demands by other learning activities.

7. Do aspects enhance learning?

The students in the experimental group had to specify aspects for comments they made, while the control group participants could freely specify comments. The goal of aspects was to focus the participant's attention to relevant points of videos, as well as to support reflection.

In order to investigate how aspects affect learning, we compared the conceptual understanding scores of the participants from the two groups. Since the students engaged in different kinds of behaviours, Table 7 reports the scores for constructive and passive learners from each group separately. Please note that we report the scores for only those participants who completed all three surveys

Table 7. Comparing conceptual knowledge scores

	Constructive Learners		**Passive Learners**	
	Control (5)	**Exper. (5)**	**Control (3)**	**Exper. (1)**
Survey 1	13.2 (3.96)	12.2 (2.28)	11 (2.65)	13
Survey 2	15.8 (2.59)	18.2 (5.98)	12 (6.93)	13
Survey 3	N/A	18.4 (3.72)	N/A	15

The only significant difference on conceptual knowledge scores is for constructive learners from the experimental group ($\chi^2(2) = 7.89$, $p = 0.02$). The effect size was large (0.67), and the scores from survey 1 and survey 3 are significantly different ($p = .01$). The improvement from survey 1 to survey 2 was not significant for constructive learners from the control group. Therefore, aspect and ratings do make a significant contribution to learning.

Table 8 presents the distribution of ratings made by the experimental group participants, over different rating categories.

Table 8. Number of ratings on comments

	Rating category	No. of ratings
Trigger Learning	R1: This is useful for me	122
	R2: I hadn't thought of this	23
	R3: I didn't notice this	30
Induce Opinion	R4: I do not agree with this	29
	R5: I like this point	128

8. Usability and perceived usefulness of AVW-Space

Survey 2 contained the TAM and NASA-TLX questions, related to usability and usefulness of commenting on videos and cognitive load while commenting on videos respectively. Survey 3 contains the same questions related to rating comments. We present the summary of responses in Table 9. We do not report the scores for Inactive participants, as they have not interacted with AVW-Space.

Table 9. Average scores for NASA-TLX cognitive load (Likert scale from 1-*Low* to 20-*High*) and TAM perceived usefulness (Likert scale from 1-*High* to 7-*Low*)

		Constructive learners	Passive Learners
NASA-TLX Demand	Commenting	11.1 (4.95)	10 (7.28)
	Rating	9 (4.42)	13.67 (3.21)
NASA-TLX Effort	Commenting	8.9 (2.99)	7.4 (5.03)
	Rating	7.4 (4.34)	15.67 (.58))
NASA-TLX Frustration	Commenting	8.5 (5.06)	5.8 (5.45)
	Rating	8.8 (5.36)	5.67 (6.43)
NASA-TLX Performance	Commenting	11.5 (5.29)	9.4 (7.7)
	Rating	7.6 (3.91)	9.67 (8.5))
TAM Usefulness	Commenting	3 (.89)	3.68 (1.61)
	Rating	4.72 (1.35)	3.87 (6.43)

The NASA-TLX instrument [39] is a widely used, validated set of questions, which are used to determine the user's impression of a particular task. In the context of our study, we used four questions from this instrument to identify the participants' opinion on the cognitive load imposed by commenting on videos (survey 2) or while rating comments written by other stu-

dents (survey 3). The four questions in survey 2 and survey 3 asked participants to rate, on a scale from 1 (lowest) to 20 (highest), *how demanding* commenting/rating comments was, *how much effort* was required, *how frustrating* the activity was, and *how well* the participant felt he/she performed. There were no significant differences between the two types of learners (constructive vs. passive) on any of the cognitive load values. The participants found commenting on the videos and rating comments moderately demanding. One participant wrote: "*It was not necessarily difficult, but I often paused the videos of presentations to think back to how they related to the videos on how to give presentation. Lots of thinking, remembering, searching for examples of what I had already seen*". The qualitative feedback on frustration pointed at the large number of comments to be rated, which was time-consuming, as well as the fact that many comments were similar. The participants suggested presenting comments in a structured way, and providing ways to discuss comments with others.

The Technology Acceptance Model (TAM) is an Information Systems theory which analyses how users of a computer system view it in terms of perceived usefulness (i.e. how would using the computer system enhance the user's performance), as well as perceived ease-of-use (i.e. the degree of effort necessary to use the computer system) [40]. Surveys 2 and 3 contained TAM questions about commenting on videos and rating others' comments respectively. The participant was asked to provide a rating on a scale from 1 (highest) to 7 (lowest) for each question. The ten questions below were phrased differently for commenting on videos or rating comments; for example, the first question in survey 2 was "*I think I would like to use AVW to comment on videos frequently*", while in survey 3 it was "*I think I would like to use AVW to rate others' comment frequently*."

1. I think I would like to use AVW frequently
2. I would recommend AVW to my friends
3. Using AVW would enhance my effectiveness when developing soft skills
4. I would find AVW useful in my studies/job
5. I would find AVW easy to do what I want it to do
6. My interaction with AVW would be clear and understandable
7. I would find AVW easy to use
8. If I am provided the opportunity, I would continue to use AVW for informal learning
9. Using AVW would enable me to improve my soft skills quickly
10. Using AVW would improve my performance considering the development of soft skills

The TAM Usefulness (reported in Table 9) is the average of scores on questions 3, 4, 8, 9 and 10. Passive learners have found usefulness of commenting and rating very similar. The constructive learners have found rating less useful, although the difference is not significant.

9. Discussion and Conclusions

The findings presented in previous sections show that the participants who commented on videos and rated comments made by their peers (i.e. the constructive learners) have improved their conceptual knowledge significantly. Looking deeper, we found that only constructive learners in the experimental group improved their conceptual knowledge significantly. Therefore, both activities (i.e. commenting on videos and rating comments) are necessary for significant improvement in conceptual knowledge. Therefore, our **first recommendation for using AVW-Space** is to develop spaces which support students in both commenting on videos, and in rating others' comments.

However, not all participants engaged in such constructive learning. The participants who completed surveys but have not interacted with AVW-Space at all, or who have passively watched videos, have not improved their conceptual knowledge.

We also found that aspects do improve learning: the conceptual knowledge of constructive learners from the experimental group improved significantly, which was not the case for constructive students from the control group. For that reason, our **second recommendation** is to use aspects in AVW-Space in all spaces.

There are several avenues for future work on AVW-Space.

As stated above, not all participants engaged in constructive learning. Our future work involves enhancing AVW-Space with intelligent support to foster constructive learning while watching videos. We will add user profiling to AVW-Space, so that the user profile will capture information about the student's engagement in AVW-Space. Using user profiles, we will add intelligent support in order to influence user behaviour towards constructive learning. Such intelligent support may be achieved by providing prompts to students who are not engaging well. It is also possible to provide visualizations, to point out important parts of videos that the student has not commented on. Additional support may include visualizations of the student profile as well as the visualization of the engagement of the whole class.

We also plan to enhance the rating of comments by pointing out to each student comments which will be valuable to him/her, as well as comments of high social value (i.e. highly rated comments).

The reported study had a small pool of participants. A larger study is planned for Semester 1 of 2017, which will be useful for eliciting further recommendations for enhancing AVW-Space. We also plan to perform studies with other transferable skills in the future.

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