Witnessing Discussion and Students' Engagement in Asynchronous Lecture

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Abstract

In this study, we were interested in whether adding third-person perspective of discussions in asynchronous lecture would increase students' engagement in lecture video. We also investigated the effect of different discussion forms (viewing discussion video, reading text-based discussion, and no discussion) in lecture video on students' engagement. The results showed that, in general, watching discussion videos did not increase students' engagement in lecture video. In addition, the effect of discussion condition on video on engagement depended on students' preferred learning format (online vs. in-person class) and language background. Students who preferred online lecture felt the most engaged in the lecture with text-based discussions. Students who were native English speakers felt the most engaged when they were exposed to text-based discussions, while non-native English speakers had the highest engagement score when no discussion was shown.

Introduction

The Covid-19 pandemic has forced universities to shift from traditional classroom to online learning. Although students may enjoy the high flexibility of online courses (Petrides, 2002), they often reported missing social aspects of education in the online learning environment, for example, feelings of isolation or lack of sense of community were recently reported in online learning experiences (Song et.al, 2004). Similarly, a previous study showed that students regarded lack of social interactions as the most important barrier out of six different types of barriers to online learning (Muilenburg et al., 2005). In addition, students who perceived online course to have less overall social presence reported lower perceived learning scores (Richardson & Swan, 2019). In general, lack of social aspects is one of the biggest drawbacks of online learning. Therefore, in order to improve online learning experiences of students, we were interested in improving social aspects of online class.

What specific social aspect we can improve for online course and the method of doing so should be carefully considered. We scrutinized social elements that usually occurred in a traditional class and categorized them into two groups: immediate interactions and non-interactive settings. Immediate interactions require individuals in a social context to actively interact with each other. For example, in-class discussions and real-time conversations are considered as immediate interactions. Non-interactive settings are the remaining elements that help individuals to form a sense of community. For example, a classroom with students inside is categorized as non-interactive setting since each student in this setting naturally forms the sense of shared physical space. In addition, third-person perspective of social interactions or in other words witnessing others interacting is also considered as an example of non-interactive settings.

It is what students often do in an in-person class, but they usually are not aware of how it helps us to form social sense. For instance, many students only listen to what other classmates say during in-class discussion but do not talk. They do not interact with other individuals but still feel like participating in the discussion by witnessing others conversing. A neurobiological study showed that witnessing social interactions activated the precuneus which was a cerebral area considered to be important for social cognition (Petrini et al., 2014).

In this study, we focused on non-interactive social settings of asynchronous online lecture as immediate interactions could hardly be achieved in an asynchronous course. We were specifically interested in whether adding third-person perspective of in-class discussion into asynchronous lecture video led to better engagement in the lecture. Engagement has been widely shown to increase student learning, productivity, and motivation. Additionally, with the rise of concerns about drop-out rates in online courses (Rothkrantz, 2016), improving engagement in online lecture has increasingly gained attention.

We would also like to know whether adding video-based discussion into an asynchronous lecture video would affect students' engagement differently from adding text-based discussion as those are two common forms of discussions that are practiced.

Our research questions are the following: 1. Can witnessing discussions make students feel more engaged in asynchronous lectures? 2. If instructors aim is to increase engagement, should instructors include recorded discussion in lecture video to engage students? 3. In general, can improving social aspects of pre-recorded video increase students' engagement in lecture?

The first question is a specific question that can be addressed by experiments. The answer to the first question allows us to provide some practical advice, therefore answer the second question. And we can make some inferences about the third question that is more general based on our results.

Participants

312 UC San Diego students were recruited in this experiment through the online SONA System from April 19, 2021 to May 28, 2021. 76% of the participants were female, and 22.1% were male. The participants were between 18 and 39 with a median age of 21 years. 73.6% of the participants who reported their major(s) were from Psychology, Cognitive Science, or Linguistics.

Materials

Consent forms were used to inform participants about benefits, risks, voluntary nature of participation, rights, and purpose of the study. Additional materials included a pre-recorded lecture video, two "discussion videos", two "text videos", and a self-report survey including questions about engagement, attitudes towards online class, and demographic information. The pre-recorded lecture video was a 25-minute video that briefly introduced various theories about evolution of language. The lecture video consisted of slides and the instructor's voice. Two content-related questions were raised in the video. One appeared in the middle of the video, and the other appeared at the end of the video. The "discussion videos" were two 5-minute videos of five students discussing the content-related questions. Two "discussion video" discussed two questions respectively. The "discussion videos" were recorded on Zoom. The "text videos" were the text version of the "discussion videos". We transcribed what each discussant said in the "discussion videos" and presented the texts as those discussants discussed the questions in Zoom chat window. To guarantee that participants have enough time to read the texts, we left ~20 seconds between any two messages "sent by discussants". We then screen recorded the

"discussion" presented in Zoom chat window as "text videos". Two "discussion videos" were transformed to two "text videos" respectively. To prevent subjects from skipping the stimuli, we disabled all the functions of controlling videos: playing, pausing, speeding up/slowing down, and scrubbing. Every video stimulus was automatically played after participants saw the video page. Participants had to wait for videos finishing to continue as the "Next" button appeared after videos stopped playing.

The self-report survey included four parts: engagement, preference for class setting, attitudes to discussion, and demographic questions. We constructed 13 statements about engagement (See Appendix) heavily based on VES (Video Engagement Scale, Visser et al., 2016) and three-factor structure of engagement scale (Schaufeli et al., 2002). Participants were asked to report their agreement to each of the statements on a 7-point Likert scale from "Strongly Disagree" to "Strongly Agree". To make sure that participants was paying attention to the statements, we asked them to choose a specific answer to the attention check question. Each engagement statement could be categorized into one of the following dimensions: attention (ATT), dedication (DED), going into a narrative world (GNW), vigor (VIG), learning outcome (LO), and general attitude (GA). For ATT, we would like to know whether viewers were paying attention to the video during viewing. DED was tested based on whether viewers were thinking about the video content during viewing and how much content they were think about. GNW was a special dimension for engagement in video where we were interested in whether viewers had the feelings of being in the world of the video. VIG was about their emotional state that whether they felt board or sleepy during viewing. LO was tested based on whether viewers understood some part of the lecture content. We were not interested in their performance in this study, therefore we only asked them whether they could relate the lecture content to their prior

knowledge. Lastly, for GA, we would like to know their attitudes towards the video in general. We adapted the dimensions of engagement applied in VES and Schaufeli's engagement scale to better describe engagement in lecture video. ATT and GNW were extracted from VES, DED and VIG were from Schaufeli's study, and LO and GA were created by us.

Questions about preference for class setting asked participants to report their preference for in-person versus online classes, and online synchronous classes versus online asynchronous classes. Questions about attitudes to discussion asked participants to report their opinions on different forms of discussion and their usual performance in discussion. Demographic questions not only asked for common demographic information like gender and age, but also specifically asked for language background.

We used Qualtrics XM, a web-based survey tool, to conduct the experiment. Participants got access to the study by opening a Qualtrics link we provided.

Procedures

Participants were randomly assigned to three groups: No Discussion, Discussion Video, and Discussion Text. In each group, participants were first asked to read the consent form. Their agreement was required for continuing the study. If they disagreed with participating in the study, they were automatically directed to the end of the study. Participants in all three groups were then provided with the first part of the lecture video. After they finished the first part, the first question appeared. Subjects in No Discussion group were asked to think about the question for five minutes by themselves. Subjects in Discussion Video were provided with the "discussion video" about the first question, and participants in Discussion Text group were provided with the corresponded "text video". After five minutes, participants in all three groups were asked to continue with the second part of the lecture video. At the end of the video, the second question

appeared. Subjects in No Discussion group were again asked to think about the question for five minutes by themselves. Subjects in Discussion Video were provided with the "discussion video" about the second question, and participants in Discussion Text group were provided with the corresponded "text video". After they finished watching, they were asked to complete the self-report survey.

Results

We removed 97 responses that 1) failed the attention check question 2) had duration time less than 2400 seconds (40 minutes) since video stimuli only required 35 minutes, and they need at least five minutes to carefully think about the survey and complete it 3) provided no answer to crucial questions like engagement questions. We eventually obtained 215 valid responses. Of these 215 participants, 74.9% (161) were female and 23.3% (50) were males. The age range was 18-39 with a median age of 21 years. All these participants reported major(s), and 75.3% (162) of them were from Psychology, Cognitive Science, or Linguistics Department.

We transformed responses on the Likert scale engagement to a numeric 7-point scale from -3 to 3 where negative number represented negative attitudes and positive number represented positive attitudes as engagement score. For each subject, we calculated the average engagement scores of each dimension called "dimension engagement score". We also calculated the "overall engagement scores" by averaging six dimension engagement scores.

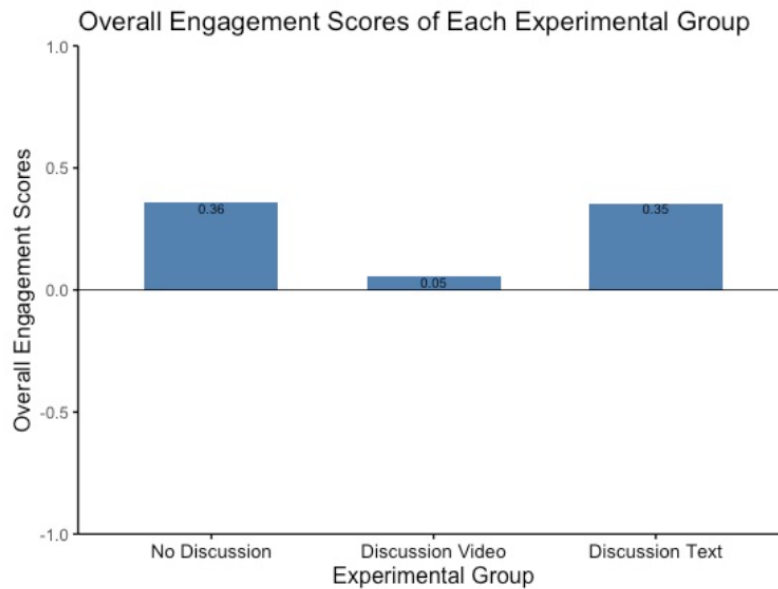No significant difference found in the engagement scores of three experimental groups

Figure 1. Overall engagement scores of each experiment group based on all data. No significant difference among groups.

when we did not take in-person versus online class preference into consideration (p-value = 0.532). However, for participants who preferred online class, the engagement scores of three experimental groups were significant different ($p < 0.05$, ANOVA). The Discussion Text group had significantly higher engagement scores than the other two groups, while Discussion Video group had significantly lower engagement scores than the other two groups. Specifically, three groups had significantly different scores in ATT ($p < 0.05$), DED ($p < 0.1$), and GNW ($p < 0.1$) dimensions.
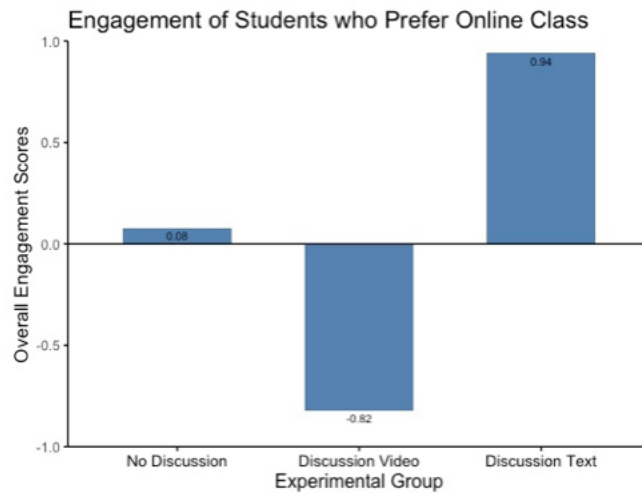
Engagement of Students who Prefer Online Class

Figure 2. Overall engagement scores of each experiment group based on subjects who preferred online class. Significant differences among groups (p-value < 0.05, ANOVA)

experiment group.

We also asked a question about participants' native language. We separated participants into two categories based on whether their native language was/included English. For native English speakers, the highest engagement scores appeared in Discussion Text group, while for nonnative English speakers, the highest engagement scores appeared in No Discussion group.

Specifically, in No Discussion group, native English speakers had significantly lower GA scores and significantly more negative VIG scores than nonnative English speakers ($p < 0.1$, t-test). In Discussion Text group, native English speakers had lower DED scores ($p < 0.1$) but significantly less negative VIG scores ($p < 0.05$) than nonnative English speakers (See *Figure 4* and *Figure 5* in Appendix).

We had a question "Q34" stated that "Do you think you would feel more engaged in a lecture if you can observe others discussing class-related questions" with a 5-point scale from "Definitely yes" to "Definitely not". The responses to these questions reflected participants'

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perception of the relationship between observing discussion and engagement in lecture video. Experimental groups and responses to question "Q34" were found to be dependent ($p < 0.1$, chi-square test). Specifically, participants in Discussion Video group perceived the effect of witnessing discussion on engagement in lecture video less positive than the other two groups.

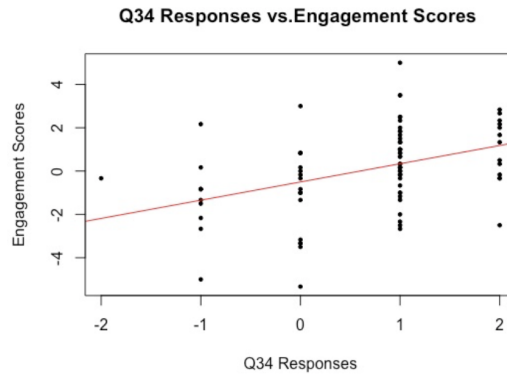For "Q34", we transformed the 5-point scale text answers to 5-point scale numeric values

Figure 6. Scatter plot of Q34 responses vs. Engagement scores and linear model.

from -2 to 2. We extracted the responses from subjects in Discussion Video group. A linear model was created between numeric responses to "Q34" and overall engagement scores. The slope was found to be significant and positive ($p < 0.001$, slope = 0.8412). Therefore, participants who perceived the relationship between observing discussion and engagement to be more positive felt more engaged in the lecture video with discussion videos.

In-person versus online class preference and online synchronous versus asynchronous

		In-person vs. Online Class Preference	
		In-person Class	Online Class
Online Learning Styles Preference	Synchronous Lecture	50	8
	Asynchronous Lecture	68	36

Table 1. Contingency table of general learning styles preference vs. online learning styles preferences.

class preference were found to be dependent ($p < 0.01$, chi-square test). Specifically, participants who preferred online class showed significant preference for online asynchronous class, while

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participants who preferred in-person class showed no preference to online synchronous or asynchronous class.

Discussion

According to the results, watching discussion videos did not increase students' engagement in lecture videos in general, and in fact in the lowest engagement scores in some cases. Therefore, we would not recommend instructors to include recorded discussions in lecture videos as a means to engage students. Furthermore, more social aspects of asynchronous lecture might not imply more engagement. One possible explanation of this result is that students' expectations of online and in-person class are different. Flexibility and convenience are often identified as the advantages of online learning (Petrides, 2002; Poole, 2000). Thus, students might intuitively expect online class to have high flexibility and convenience but do not expect online course to have many social aspects. Then it is possible that when we improve social aspects of online learning that is not included in students' expectations, it has very little effect on students' learning experiences. The dependence between in-person versus online class preference and online synchronous versus asynchronous class preference also implies that students have different expectations of different learning styles. Students who prefer online classes tend to prefer asynchronous lectures to synchronous ones. Compared to synchronous lectures, asynchronous lectures have much fewer social interactions, but more flexibility timing. It is possible that students value flexibility more than social aspects of online courses.

Secondly, the significant differences of three experimental groups in engagement scores when we separated data based on their preferred learning format and language background

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implied that how discussion affects engagement depends on students' attitudes and identities. Pre-course surveys about students' preferred learning format and language backgrounds may be beneficial in order to determine the best form of discussion to increase student engagement in asynchronous lectures. To be more specific, if most students prefer online classes than in-person classes, instructors might choose text-based discussions like discussion board to engage students in the lecture. If most students are non-native English speakers, then it may be better for instructor (who deliver lectures in English) to not provide any form of discussion but instead make space for more self-study to increase student engagement. A possible reason why non-native English speakers felt much more bored and held much more negative attitudes towards lecture including text-based discussions than native English speakers is that reading in a second language might carry a higher cognitive load than reading in one's native language. Research suggests that engagement in lecture is negatively correlated with cognitive load (Altinpulluk et al., 2019). This conclusion might be extended to any second language speakers who take courses in non-native languages, but further experiments should be conducted to demonstrate the generalizability of this conclusion.

The positive correlation between perception of the effect of observing discussion on engagement and actual engagement also demonstrates that the effect of discussion video on engagement depends on students' attitudes. Students who hold more positive attitudes towards the effect of witnessing discussions on engagement tend to feel more engaged in the lecture videos.

The dependence between subjects' responses to "Q34" and experimental groups reflects how students update their perception to bridge the gap between expectations and experiences. For students who are not exposed to discussion video, their expectations of the effect of

third-person perspective of discussions on engagement tend to be positive. However, after they experience discussion video stimulus in lecture video, they feel less engaged than they expected, which shifts their attitudes to be significantly more negative.

Limitations and Future Directions

As we only discussed third-person perspective of discussion as one example of non-interactive social settings in this study, we might not be able to dismiss the effect of improving social aspects of asynchronous lectures on engagement. There are many other possible ways to improve non-interactive social settings. For example, adding some background noise that is usually heard in an in-person class can also be considered.

In this study, we discovered that witnessing social interactions did not increase students' engagement in asynchronous lecture. We discussed a possible reason why this result appeared, but we did not conduct a scientific experiment to test the theory. Therefore, our future step can be to investigate whether expectations of different learning styles are different and whether expectations of learning styles have effect on students' engagement in online course.

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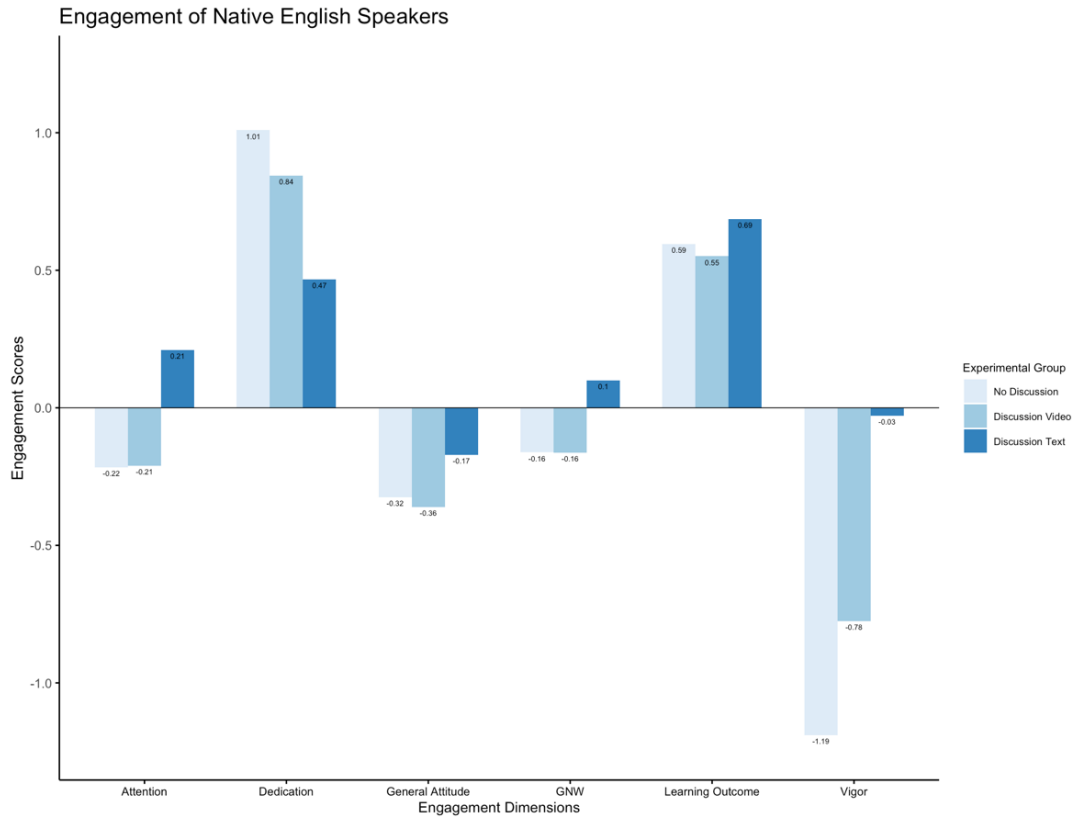
Appendix

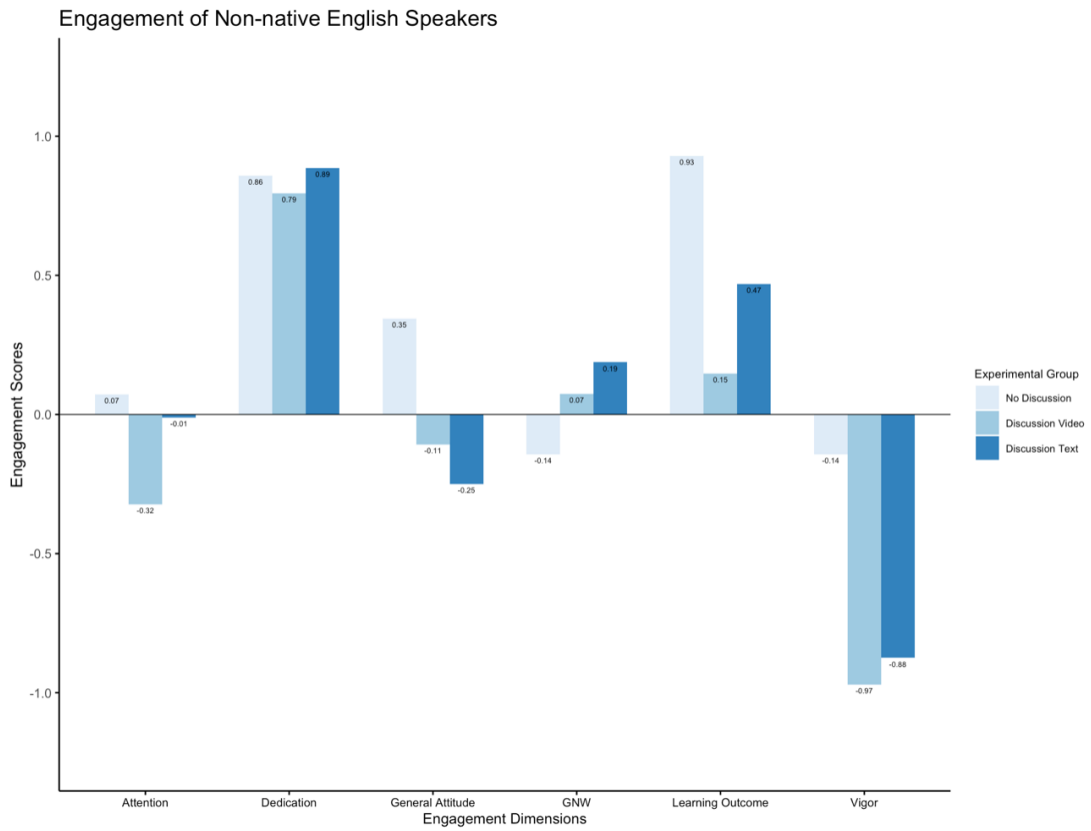*Figure 4.* Dimension engagement scores of non-native speakers in each experiment group.

Figure 5. Dimension engagement scores of non-native speakers in each experiment group.

Engagement Statement:

During viewing I was fully concentrated on the video.

During viewing, it was as if I was present in an in-person class.

During viewing, I felt bored/sleepy/had impulse to yawn.

During viewing, I wanted to skip some of the lecture.

If you are reading carefully right now, please choose "Strongly Agree".

During viewing, I was thinking about why the "single step theory" was rejected.

During viewing, I barely noticed the passage of time.

During viewing, I was thinking about how and why human started using languages.

After the video was finished, I had the feeling I came back into the 'real' world.

Overall, the video held my attention.

I feel confident to connect ideas from the lecture to my prior experiences and knowledge.

I would like to watch another video about similar topics.

I would like to watch a video that includes students discussing similar topics.

I would like to talk about the discussion questions with other students.