# Examining situational interest and its relationship with self-efficacy in asynchronous and synchronous video lectures

Christopher Lange[1]*

*Correspondence:
christopherhlange@dankook.
ac.kr

[1] Department of British
and American Humanities,
Dankook University, 152
Jukjeon-Ro, Jukjeon 1(Il)-Dong,
Suji-Gu, Yongin, Gyeonggido
16890, South Korea

## Abstract

Recently, the number of online courses provided for university students around the world has increased substantially. Instruction is delivered most commonly through either asynchronous video lectures (pre-recorded videos with no real-time communication) or synchronous video lectures (live-streamed videos with real-time communication). From a learning perspective, it is important to capture the interest of learners based on specific situational aspects of both asynchronous and synchronous video lectures, and situational interest of learners may vary depending on the overall intrinsic qualities of each modality. Additionally, there may be variations in regards to the way in which self-efficacy interacts with situational interest depending on which modality is used. This study examines survey responses of university students ($n = 93$) in South Korea to determine if students perceive differences in situational interest between two different conditions: asynchronous video lectures and synchronous video lectures. Additionally, the difference between situational interest levels of learners with low self-efficacy and learners with high self-efficacy within each condition was examined. The main results showed no overall difference in situational interest between the two conditions and no difference in situational interest between learners with low self-efficacy and learners with high self-efficacy in the synchronous video lecture condition. However, there was a significant difference in situational interest found between learners with low self-efficacy and learners with high self-efficacy in the asynchronous video lecture condition. Results are explained through the differing effects of self-efficacy on situational interest based on the amount of autonomy provided in online learning environments.

**Keywords:** Asynchronous video lectures, Self-efficacy, Situational interest, Synchronous video lectures

## Introduction

The educational landscape of higher education in recent years has made a significant shift toward online learning, revealing a number of ways to engage in instructional delivery across a variety of subjects taught through both asynchronous and synchronous modalities (Ivanjek et al., 2022). With the increasingly prevalent use of technology as a means of promoting learning in online university settings, it becomes

prudent from a pedagogical standpoint to use such technology ways that capture student interest. Examining student interest is important in online settings not only because of its connection to academic success (Simmermeyer et al., 2022), but also because there have been inconsistencies found in regards to the relationship between student interest and specific aspects of both asynchronous and synchronous remote lectures (Jones et al., 2012; Simmermeyer et al., 2022). Comparing these two modalities should provide insight into ways in which content presentation can generate student interest in online learning settings. Furthermore, it makes sense to look at student interest within online settings through the lens of situational interest. Situational interest represents interest formed by students based on specific elements in the learning environment (Hidi & Renninger, 2006), thus making it an appropriate variable to examine when comparing asynchronous and synchronous online lectures, both of which intrinsically contain distinct situational elements.

Video lectures are commonly used to represent both online modalities, asynchronously through pre-recorded videos containing no real-time communication and synchronously through live-streamed videos containing real-time communication (Belt et al., 2021). The two modalities differ in terms of how interaction is used to acquire knowledge within the online environment. While asynchronous video lectures (AVL) emphasize learner interaction with the content, synchronous video lectures (SVL) put more emphasis on interaction with individuals such as instructors and students within the learning environment (Ivanjek et al., 2022). AVL serve as a means for learners to take advantage of learner-system interaction of content through the use of both auditory and visual media formats (Alraimi et al., 2015). Instructional delivery through a variety of media within recorded video lectures allows learners to organize and process information by constructing schema to assist in information transfer (Mayer, 2014). AVL, while beneficial for allowing learners to interact with material, fall short in terms of real-time feedback, as interaction with the instructor and other learners is relegated to asynchronous forms of communication such as email or message boards (Sun & Rueda, 2012). According to transactional distance theory (Moore, 1993), this lack of real-time interaction presents a greater feeling of distance among the learners in the learning environment. Furthermore, as transactional distance increases, the autonomy required for an effective learning experience also increases due to the lack of interaction (Chen et al., 2014). Therefore, AVL provide more autonomy, as learners are given more responsibility to complete tasks, which requires more self-regulation in the absence of any real-time feedback or verbal interaction with the instructor (Jansen et al., 2020; Sun & Rueda, 2012). As an alternative to AVL, SVL allow for communication and the exchange of ideas in a real-time setting free from interruption (Belt et al., 2021). Platforms such as Zoom, WebEx, Microsoft Teams, and Google Meet serve as practical tools for SVL in that they allow for learner-to-learner and learner-to-instructor interaction, replicating face-to-face instructional environments among physically separated participants (Belt et al., 2021). The pedagogical benefits of such technology include the ability to socially construct knowledge in ways that AVL generally prohibit (Smyth, 2011). In terms of student interest, both AVL and SVL have been tied to situational interest due to differing aspects that are designed to engage learners (Lange, 2018; Jones, et al., 2012; Simmermeyer et al.,

2022); however, research is inconsistent in terms of which modality more effectively generates situational interest (Jones et al., 2012; Simmermeyer et al., 2022).

One variable which potentially affects the level of situational interest of learners in different ways depending on the type of modality is self-efficacy. Self-efficacy is a motivational orientation that reflects the amount of confidence in exerting appropriate levels of effort to achieve goals, specifically when learners are faced with challenging situations (Bandura et al., 1996; Pintrich et al., 1991). It is formed by appraising and judging one's own ability in successfully accomplishing specific tasks (Pintrich et al., 1991). Research supports the notion that learners with high self-efficacy tend to produce more effort in challenging situations than learners with low self-efficacy (Fitriyana et al., 2021). Adaptive learning strategies associated with highly self-efficacious learners have been shown to contribute to both higher levels of interest (Niemivirta & Tapola, 2007) and higher levels of success when attempting tasks associated with challenging aspects of specific learning environments (Komarraju & Nadler, 2013). Both AVL and SVL environments contain challenging aspects, but the general consensus is that AVL are more challenging due to the transactional distance and autonomous nature associated with them (Simmermeyer et al., 2022; Sun & Rueda, 2012; Wang et al., 2022). Because of the positive relationship found between self-efficacy and interest in general (Niemivirta et al., 2007) and evidence that highly self-efficacious learners tend to put more effort into challenging learning environments, determining the difference in levels of situational interest between low with low self-efficacy and learners with high self-efficacy in both AVL and SVL environments may provide insight into ways in which online video lectures can maximize interest levels based on varying levels of learner self-efficacy.

## Theoretical background

### Situational interest

Situation interest is defined as interest determined by student perception of specific instructional elements of a learning environment (Hidi & Renninger, 2006). There are two phases associated with situational interest: a catch phase known as *triggered* and a hold phase known as *maintained* (Bernacki & Walkington, 2014). Triggered situational interest represents the focus on particular information considered relevant for learning at a specific moment during instruction (Bernacki & Walkington, 2014), and is often associated with the way in which the material is presented rather than the material itself (Bernacki & Walkington, 2014; Linnenbrink-Garcia et al., 2010). While interest is initially captured through presentational aspects of lectures, such interest becomes maintained through the hold phase when learners become effectively engaged with the material itself (Linnenbrink-Garcia et al., 2010), allowing them to remain engaged with instructional content over a prolonged period of time (Knogler et al., 2015). Overall, situational interest is a reflection of the learners' desires to build on their existing knowledge of content being delivered in a specific learning environment (Hidi, 2001). It is conceptualized in a different way than personal interest in that it represents an intense focus on stimuli within the learning environment regardless of individual values or beliefs (Hidi & Renninger, 2006; Knogler et al., 2015). Because both asynchronous and synchronous video lectures represent two differing learning environments in terms of both form and presentation, an examination of triggered-situational interest based on varying aspects

of the two instructional modalities serves as a practical means to encourage efficient content presentation within online learning environments.

### Relationship between asynchronous video lectures and situational interest

In a general sense, AVL have been perceived by learners as an effective means to encourage situational interest (Jones et al., 2012). One factor that contributes to a rise in such interest in AVL is the use of media (Kizilcec et al., 2015; Mayer, 2014). In particular, higher levels of situational interest have been found when multimedia is used within AVL (Chen et al., 1999). Lim et al. (2006) showed that the use of multimedia within AVL increased the interest of the learners due to its ability to allow learners to more efficiently visualize and enhance understanding of concepts associated with the content. Furthermore, the visual presence of the instructor incorporated as part of the multimedia has been shown to increase situational interest due to the nonverbal cues encouraging participation within the video lecture (Wang et al., 2020). Although AVL have been shown to be beneficial for generating interest, such benefits are contingent on how the information is delivered. For example, inefficient media delivery within AVL has been shown to limit learners' interest due to learners' issues involving concentration, engagement, and attention (Koumi, 2013). Additionally, interest has been shown to suffer in AVL due to inefficient use of media associated with pace of delivery, intelligibility, quality, and congruence (Lange & Costley, 2020). Another factor that influences interest within AVL is learner control. Learners tend to be more interested in aspects of the learning environment when they can learn at their own pace through interaction with the materials in ways they feel suit their learning needs (Ivanjek et al., 2022). It has been found that AVL had a stronger relationship with interest compared to SVL due to the ability to review the content at one's own pace, watch videos multiple times, and save and download material (Raymond et al., 2016). Additionally, learner-control options such as the ability to pause, re-watch or skip portions of lectures, download materials, segment videos, and select hyperlinks associated with the video lecture have been shown to have a direct relationship with situational interest (Lange, 2018). While such aspects of AVL are positive in terms of generating interest, the transactional distance created due to the lack of real-time communication and feedback associated with AVL tends to decrease engagement, resulting in lower levels of interest in general and situational interest specifically (Ivanjek et al., 2022; Karal et al., 2011). Automated features within AVL that provide immediate feedback may go some way in addressing this issue, however, as such features have been tied to higher levels of situational interest (Magner et al., 2014).

### Relationship between synchronous video lectures and situational interest

As is the case with AVL, the ability to capture the interest of learners in SVL is somewhat contingent on the instructional presentation provided by the instructors (Reinholz, Stone-Johnstone, White, Sianez & Shah, 2020). The intrinsic nature of SVL allows instructors to present instruction in ways that learners can socially construct knowledge (Reinholz et al., 2020), potentially generating more interest. An example of this would be a feature in Zoom called *breakout rooms* which allow physically separated learners to visually and verbally interact with each other in small groups, ultimately increasing their levels of social presence (Reinholz et al., 2020). Such social support is advantageous to

SVL in that it aids learners in the social construction of knowledge during the planning stages of tasks, something that is unavailable to learners participating in AVL (Hrastinski, 2008; Ivanjek et al., 2022). While AVL may have the advantage of giving learners more time to view the content, SVL prevent misunderstanding of such content due to immediate feedback provided by instructors (Giesbers et al., 2014). This type of engagement within SVL has been shown to have a specific effect on situational interest, evident in that compared to AVL, SVL were shown to produce higher rates of situational interest due to real-time engagement and interaction with instructors that replicate a face-to-face instructional setting (Simmermeyer et al., 2022). For these reasons, Ivanjek et al. (2022) recommend the instructional presentation of SVL to focus on the delivery of real-time feedback and group discussions. Another aspect of face-to-face learning replication is that learners are able to feel the presence of their instructor in real time, which has specifically been tied to higher levels of interest in SVL environments (Karal et al., 2011). The downside in capturing student interest in SVL compared to AVL is the lack of autonomy within SVL due to the inability to study at one's own pace and using one's own methods (Raymond, et al., 2016). Additionally, another issue that has been connected to lower interest levels of learners participating in SVL concerns issues related to the lack of flexibility in the scheduling of lectures (Ivanjek et al., 2022; Xie et al., 2018).

### Relationship between self-efficacy and situational interest in asynchronous and synchronous video lectures

Although direct evidence is lacking in terms of the difference of situational interest levels between learners with low self-efficacy and learners with high self-efficacy in both AVL and SVL, the way in which engagement, self-regulation, and autonomy interact with self-efficacy suggests a more significant gap in interest between the two types of learners in AVL than in SVL. Before examining the interactions of these variables, it is important to note the relationship between self-efficacy and interest. Within computer supported environments, it has been shown that when learners engage in complex problem-solving tasks, those who have higher levels of self-efficacy also show higher levels of interest (Niemivirta & Tapola, 2007). It is also important to remember that self-efficacy has a positive relationship with learner engagement, and that same relationship has been empirically established in AVL (Sun & Rueda, 2012). Furthermore, learners with high self-efficacy prefer engaging in more challenging tasks compared to learners with low self-efficacy (Fitriyana et al., 2021). Research further suggests that AVL are more challenging because of their autonomous nature and the increased level of responsibilities associated with them (Eom, 2012). This has been confirmed in studies where learners have indicated that AVL are more challenging than SVL due to the inability to receive real-time instructional feedback or take part in any learner-to-learner real-time interaction (Simmermeyer et al., 2022). Accordingly, the autonomous nature of AVL requires self-regulation, which has a direct relationship with self-efficacy (Jansen et al., 2020; Zheng et al., 2018; Zimmerman, 2008). Learners with high self-efficacy generally tend to use self-regulating strategies such as monitoring, generating explanations, setting goals, planning, and reflecting on progress (Pi et al., 2022; Zimmerman, 2002). Comparing AVL and SVL specifically, research has shown that tasks associated with AVL require more of these kinds of self-regulating strategies compared to tasks associated

with SVL (Simmermeyer et al., 2022). Because learners with high self-efficacy generally prefer more challenging, autonomous environments and are more willing to use self-regulation in order to succeed, it makes sense that they would have significantly higher levels of situational interest than learners with low self-efficacy when participating in AVL. SVL environments, however, should narrow the gap of situational interest levels between learners with low self-efficacy and learners with high self-efficacy. This is due to the fact that the situational interest of learners with high self-efficacy may drop in the absence of the need to exert greater effort, and the situational interest of learners with low self-efficacy may rise, as according to Ding and Zhu (2021), they generally prefer less challenging learning environments containing more instructional guidance with little to no autonomy. Thus, the way to promote interest among all learners participating in AVL may be to find ways in which to increase self-efficacy among learners with low-self-efficacy in order to ultimately increase their levels of interest. This can be done with the inclusion of more interactive AVL containing automated feedback. It has been shown that relative feedback in computer supported learning environments helps learners gain confidence and promotes greater levels of self-efficacy as they progress in the task (Niemivirta & Tapola, 2007). Within AVL specifically, a more interactive environment consisting of automated feedback actually promotes higher levels of self-efficacy (Boateng et al., 2022). Thus, perhaps a reasonable solution may be rather than addressing the potential interest gap between learners with low self-efficacy and leaners with high self-efficacy, the focus should be on trying to narrow the self-efficacy gap itself by providing a more interactive AVL experience with the use of features such as automated feedback which may help reduce the transactional distance felt by learners. If interacting features can reduce the transactional distance felt by learners during AVL, self-efficacy can be increased. Empirical evidence supports this notion in that Taghizadeh Kerman et al. (2023) found that a decrease in transactional distance leads to higher levels of self-efficacy.

## Current study

The increasing popularity of online university courses reinforces the need to promote student interest though efficient presentation of course material, with two of the more common ways of doing so occurring through the use of AVL and SVL. Because both AVL and SVL vary in terms of situational aspects of presentation, it makes sense to examine the difference in situational interest between the two modalities in order to promote effective instructional presentation within online learning environments. The results of extant research are inconsistent in terms of which modality is linked to higher levels of situational interest (Raymond et al., 2016; Simmermeyer et al., 2022). Some of the selling points to capture student interest in AVL are the use of media and the level of control learners are given to process information in ways that meet their learning needs (Chen et al., 1999; Lim et al., 2006; Raymond et al., 2016). However, sometimes learner control without the presence of feedback can lead to confusion in the learning environment, potentially decreasing levels of interest (Ivanjek et al., 2022; Karal et al., 2011). While SVL requires less autonomy, it can increase student interest by providing the opportunity to socially construct knowledge through real-time group discussions and instructor feedback, reducing the likelihood of confusion (Giesbers et al., 2014).

Self-efficacy has a relationship with interest (Niemivirta & Tapola, 2007), and situational interest of AVL and SVL may vary based on self-efficacy levels. The current study seeks to provide insight into the relationship between situational interest and varying levels of self-efficacy within both AVL and SVL, something that has yet to be directly examined by extant research. While no direct observation has been made in research regarding situational interest of learners with low self-efficacy and learners with high self-efficacy in both AVL and SVL, implications can be made from extant research that there should be a significant gap in situational interest levels between the two types of learners in AVL but not in SVL. This is due to fact that learners with high self-efficacy generally prefer more challenging environments, and AVL are viewed as more challenging due to their autonomous nature (Eom, 2012; Niemivirta & Tapola, 2007). Additionally, the interest gap should be narrowed in the SVL condition due to the fact that learners with low self-efficacy generally prefer less autonomous, instructor guided learning environments (Ding & Zhu, 2021). The current study seeks to determine the difference of situational interest between AVL and SVL. Additionally, this study seeks to confirm the fact that there is a relationship between self-efficacy and situational interest. Finally, this study also seeks to bridge the gap in extant research by directly examining the impact of self-efficacy on situational interest in both AVL and SVL to see if video lecture-type affects the relationship between self-efficacy and situational interest. Based on a review of the research, the current study proposes the following hypotheses:

> **H1**: Participants will report significantly higher levels of situational interest in the SVL condition than in the AVL condition.
>
> **H2**: There will be a statistically significant relationship between self-efficacy and situational interest.
>
> **H3**: Learners with high levels of self-efficacy will report significantly higher levels of situational interest than learners with low levels of self-efficacy in the AVL condition.
>
> **H4**: There will be no significant difference in situational interest between learners with low levels of self-efficacy and learners with high levels of self-efficacy in the SVL condition.

## Methods

### Context and participants

The participants (n = 93) of this study were students who answered survey questions in response to the first eight weeks of online lectures taken as part of their remote learning from a university in South Korea. The survey focused on the differing aspects of two types of online video lectures that the participants were a part of (asynchronous video lectures and synchronous video lectures) during the eight week study. Of the 93 participants, 19 were male and 74 were female. The average age was 22 with a standard deviation of 2.08. The experiment was carried out across six classes covering four separate course subjects. The breakdown of the classes and course subjects are as follows: *Creative and Discursive Writing 1* (two classes), *Creative and Discursive Writing 2* (two classes), *critical thinking* (one class), and *British Parliamentary-style debate* (one class). Although the courses vary in regards to subject matter, the delivery of content and the

use of online tools and resources remained consistent across all six classes for both the asynchronous video lectures and synchronous video lectures respectively.

### Procedure

During the first four weeks of the semester, the participants received instruction via asynchronous video lectures designed with consistent instructional techniques and consistent use of various forms of media throughout the four week period. Each video was approximately 40 min in length, and consisted of the professor giving direct instruction by explaining general concepts about a specific topic to be learned each week. In order to enhance the participants' conceptual understanding of the topics, each lecture was accompanied by various forms of media including PowerPoint presentations, images, charts, audio files, and streaming video clips. The asynchronous video lectures did not allow for any real-time learner-to-learner or learner-to-instructor interaction. There was a basic level of learner-control options associated with the video lectures. For example, participants had the ability to control the size of the text and the size of the talking head in the video, which in this case was the professor of the class. Additionally, participants were able to pause, skip, control the speed, and re-watch portions of the videos. At the end of each video lecture, participants were given assignments to complete offline that were reflective of the content delivered to them in the video lecture. The assignments were to be submitted to the course's learning management system and evaluated as part of the participants' in-class participation grade for the semester. For the four creative and discursive writing classes, the assignments given to the participants focused on writing parts of academic paragraphs or essays. For the critical thinking class, the assignments consisted of completing steps of argument development. For the British Parliamentary-style debate class, the assignments consisted of constructing arguments based on specific debate techniques taught during the lesson. As the assignments were to be completed offline, the participants did not receive any form of automated feedback while working on them.

During the fifth through eighth weeks of the semester, the participants took part in synchronized video lectures consisting of real-time instructional delivery through the use of the Zoom platform. Each Zoom lesson delivered throughout the four week period was approximately 80 min in length, and was delivered in a consistent manner across all six classes. The initial twenty minutes of the lesson consisted of direct instruction pertaining to the weekly topics. During the direct instruction phase, student engagement was encouraged. For example, the participants were occasionally called on to answer questions. They were also encouraged to use the *raise hand* feature in Zoom, and once recognized by the professor, prompted to turn on their microphones and ask questions about parts of the instruction from which they needed clarity. The additional time was reserved for instructional activities that the participants were asked to complete in groups using the Zoom feature known as *breakout rooms.* These instructional activities were based on the content delivered during the direct instruction phase. During the group work portion of the class, the instructor periodically joined each breakout room separately to check on the participants' progress and to see if they needed any help. Real-time feedback was given at this time as needed. The tasks given to the participants as part of their group work focused on the planning stages of writing academic paragraphs

or essays for the four creative and discursive writing classes. For the critical thinking class, the group work consisted of the planning stages of argument development. For the British Parliamentary-style debate class, the group work consisted of small-group discussions between debate team members about how to develop their main points of argument and avoiding any potential overlap of main points made between members of the same team. The participants were given individual assignments based on their group work discussions from which they were asked to write parts of academic paragraphs or essays for the four creative and discursive writing classes, complete steps of argument development for the critical thinking class, and construct arguments based on specific debate techniques taught during the lesson for the British Parliamentary-style debate class. These activities were to be completed on the participants' own time outside of the Zoom class and submitted to the course's learning management system to be evaluated as part of their in-class participation grade for the semester.

Regarding the learning conditions in both types of lectures, AVL and SVL, although there were variations in how the participants were able to engage with the content, it should be noted that the direct instruction used for both conditions contained similar instructional methods for explaining the content. The following examples are of the direct instruction used in the different courses regardless of video lecture-type. Regarding the four Creative and Discursive Writing classes, the direct instruction consisted of step-by-step instruction containing worked examples of how to write a specific type of academic paragraph or essay. After each step was explained in isolation, all steps were combined with all interacting elements as a final part of example study. For the critical thinking and British Parliamentary-style debate classes, similar conditions were provided for the direct instruction portion of the lectures. Instruction for the debate class for example, consisted of the same type of example study mentioned as part of the writing courses, where participants were asked to complete four steps in justifying their arguments for the debates (set advantages, provide examples, provide statistical evidence, and add support with quotations). Each step was initially taught individually and then combined all together into one final worked example. The direct instruction in critical thinking consisted of the same conditions except students learned separate parts of an argument (premise, conclusion, and issue) individually before combining all parts into a single argument, for example.

### Instruments

In order to determine the perceived levels of their overall self-efficacy and to determine how much situational interest they perceived during both the asynchronous and synchronous video lecture conditions, participants responded to survey items linked to Google Forms. For the self-efficacy construct, there were four items adapted from the Motivated Strategies for Learning Questionnaire (MLSQ) which was originally developed by Pintrich et al. (1991) to assess motivational orientations and learning strategies of university students. For the situational interest constructs used for the two differing conditions (AVL and SVL), there were four items adapted from a *triggered* situational interest scale which was originally developed by Linnenbrink-Garcia et al. (2010) to assess how content captures the interest of learners based on differing situational aspects of instructional presentation. Regarding the situational interest

constructs, there was slight variation of the wording of the items between the AVL and SVL conditions to reflect either the asynchronous or synchronous video lecture.

The self-efficacy items were measured using a Likert-type scale that ranged from 1 to 7, with 1 representing *strongly disagree* and 7 representing *strongly agree.* The Cronbach's alpha for the self-efficacy items used in this study was 0.892. The four items used from the MLSQ for the self-efficacy construct are as follows:

1) *I'm confident I can understand the basic concepts taught in this course.*
2) *I'm confident I can understand the most complex material presented by the instructor in this course.*
3) *I'm confident I can do an excellent job on the assignments and tests in this course.*
4) *I'm certain I can master the skills being taught in this class.*

The situational interest items were also measured using a Likert-type scale that ranged from 1 to 7, with 1 representing *strongly disagree* and 7 representing *strongly agree*. The Cronbach's alpha for the items associated with the asynchronous video lectures was 0.675. The Cronbach's alpha for the items associated with the synchronous video lectures was 0.638. The four items used for the situational interest construct are as follows:

1. *During the lectures, my professor was exciting.*
2. *During the lectures, my professor did things that grabbed my attention.*
3. *During the lectures, my professor was often entertaining*
4. *During the lectures, the lessons seemed to drag on forever.*

## Results

To obtain the results for the first hypothesis claiming that participants will report significantly higher levels of situational interest in the SVL condition than in the AVL condition, the mean situational interest score related to each condition was calculated. This was followed by performing a paired-samples t-test to determine whether there was a significant difference in situational interest between the two conditions. The situational interest means and the results of the t-test can be seen in Table 1. Based on these results, the first hypothesis claiming that there will be higher levels of situational interest in the SVL condition cannot be confirmed as there is no statistically significant difference between the two conditions ($p = 0.799$).

To obtain the results for the second hypothesis claiming that there will be a statistically significant relationship between self-efficacy and situational interest, Pearson's bivariate correlation was tested between the two variables for both the AVL condition

**Table 1** Difference of situational interest between AVL and SVL

| Condition | n | Mean | SD | t | p |
|-----------|-----|------|------|-------|-------|
| AVL | 93 | 5.59 | 1.02 | 0.256 | 0.799 |
| SVL | 93 | 5.57 | 1.01 | | |

**Table 2** Relationship between self-efficacy and situational interest

|  | AVL situational interest | SVL situational interest | Self-efficacy |
|---|---|---|---|
| AVL situational interest | 1 | 1 |  |
| SVL situational interest | 0.756 | | |
| Self-efficacy | 0.335* | 0.281* | 1 |

*Correlation is significant at the 0.01 level

and the SVL condition. As shown in Table 2, positive statistically significant correlations were found at the 0.01 level between self-efficacy and AVL situational interest (0.335) as well as self-efficacy and SVL situational interest (0.281), confirming the second hypothesis.

To obtain the results for the third and fourth hypotheses, the first step was to create two different groups, a low group and a high group, based on self-efficacy scores. A cut point for two equal groups was created at a self-efficacy score of 5.75, resulting in 47 participants in the low self-efficacy group and 46 participants in the high self-efficacy group. The next step was to use independent sample t-testing to compare the situational interest scores between the learners with low self-efficacy levels and the learners with high self-efficacy levels for both the AVL condition and the SVL condition.

As shown in Table 3, there was a statistically significant difference of situational interest scores found between the low self-efficacy group and the high self-efficacy group within the AVL condition (p = 0.008), favoring the learners with high levels of self-efficacy. This confirms the third hypothesis stating that there will be a significant difference in situational interest between learners with low self-efficacy and learners with high self-efficacy in the AVL condition.

As shown in Table 4, there was no statistically significant difference of situational interest scores found between the low self-efficacy group and the high self-efficacy group within the SVL condition (p = 0.064). This confirms the fourth hypothesis stating that there will be no significant difference in situational interest between learners with low self-efficacy and learners with high self-efficacy in the SVL condition.

## Discussion

Because the way in which content is presented to university students generally varies depending on whether they are receiving instruction from AVL or SVL, it is important to examine whether content presentation affects their levels of interest based on

**Table 3** Difference of situational interest based on self-efficacy level in AVL condition

| Self-efficacy level | n | Mean | SD | t | p |
|---|---|---|---|---|---|
| Low | 47 | 5.31 | 0.942 | − 2.71 | 0.008 |
| High | 46 | 5.87 | 1.03 | | |

**Table 4** Difference of situational interest based on self-efficacy level in SVL condition

| Self-efficacy level | n | Mean | SD | t | p |
|---|---|---|---|---|---|
| Low | 47 | 5.38 | 0.904 | 1.87 | 0.064 |
| High | 46 | 5.77 | 1.08 | | |

situational factors within the learning environment. Additionally, self-efficacy may affect situational interest in different ways depending on the type of video lecture in which learners participate. Furthermore, as extant research has yet to find direct evidence linking self-efficacy to different levels of situational interest between AVL and SVL environments, this study seeks to directly examine the potential link and justify it through indirect evidence found in previous research. Thus, the present study has examined the following: whether there is a difference between AVL and SVL in terms of situational interest, whether there is a relationship between self-efficacy and situational interest, and whether there is a difference in situational interest based on levels of self-efficacy within both AVL and SVL environments. The results showed (1) no statistically significant difference of situational interest between the AVL and the SVL condition, (2) a statistically significant relationship between self-efficacy and situational interest, (3) a statistically significant difference of situational interest in favor of learners with high levels of self-efficacy in the AVL condition, and (4) no statistically significant difference of situational interest between learners with high levels of self-efficacy and learners with low levels of self-efficacy in the SVL condition. While the first findings can neither confirm nor deny findings in previous research that claim one modality is more efficient in capturing interest of learners based on specific situational factors in the environment, and the second finding confirms what previous research has found in regards to the relationship between self-efficacy and interest, the third and fourth findings add to the discourse by providing evidence through direct observation that self-efficacy is linked to higher levels of situational interest in AVL but not in SVL, which has yet to be done.

The first hypothesis of this study was rejected due to the statistically similar levels of situational interest found between both the AVL and the SVL condition. It was believed that the lack of real-time engagement in AVL as found in other research (Ivanjek et al., 2022; Karal et al., 2011) would lead to SVL showing higher levels of situational interest. This is evident in that *breakout rooms* in SVL allow leaners to socially construct knowledge in group settings (Reinholz et al., 2020), learners feel the presence of their instructor in real time, which has specifically been tied to higher levels of interest in SVL environments (Karal et al., 2011), and real time engagement and interaction has been linked to higher levels of situational interest in SVL compared to AVL (Simmermeyer et al., 2022). It was therefore surprising that the results of the current study showed no difference in situational interest between the two conditions. With that being said, it is important to note that although SVL have been linked to higher levels of situational interest based on the real-time engagement and interaction, AVL have been also been shown to generate high levels of interest under certain conditions. For example, higher levels of situational interest have been found in AVL that employ a variety of different media to present content (Chen et al., 1999; Lim et al., 2006), the use of video of the instructor presenting the content has been linked to higher levels of situational interest in AVL due to nonverbal cues (Wang et al., 2020), and AVL that allow for more learner control have been tied to higher levels of interest (Lange, 2018; Raymond et al., 2016). The AVL in the present study were delivered under similar conditions to the aforementioned studies. It could be that the variety of media, video of the professor, and the various options for learner control

that were part of the AVL in the present study generated enough situational interest to overcome the lack of real-time engagement and interaction in the eyes of the participants, thus generating similar situational levels among the two modalities.

Extant research supports the findings in the current study that a relationship between self-efficacy and situational interest exists, and that such a relationship is stronger within AVL than it is in SVL. Research suggests that AVL are more challenging because of their autonomous nature, the increased level of responsibilities associated with them, lack of real-time feedback, and lack of learner-to-learner interaction (Eom, 2012; Simmermeyer et al., 2022). Furthermore, it has been found that within more challenging computer-supported learning environments, highly efficacious learners have higher levels of interest due to the desire to take on more challenging tasks (Fitriyana et al., 2021; Niemivirta & Tapola, 2007). These studies align with the results found in the current study in that the relationship between self-efficacy and situational interest is somewhat stronger in the AVL condition than in the SVL condition. Based on the results of the current study, it is apparent that there is a general relationship between self-efficacy and situational interest, and more specifically, it is likely that the more challenging aspects and autonomous nature of the AVL condition created an even stronger relationship between self-efficacy and situational interest. Knowing that there appears to be a stronger connection between self-efficacy and situational interest in AVL compared to SVL, it is worth it to look further into the relationships by seeing if the difference of situational interest between self-efficacy levels in AVL is greater than in SVL.

Although no direct evidence has been found in previous studies concerning the difference of situational interest between learners with low self-efficacy and learners with high self-efficacy within AVL, the statistically significant difference found in the current study is supported indirectly by extant research. The fact that previous research showed that AVL is more challenging (Fitriyana et al., 2021; Niemivirta & Tapola, 2007) and that highly self-efficacious learners show more interest in participating in more challenging computer-supported environments (Eom, 2012; Simmermeyer et al., 2022) justifies the results of the current study. The more challenging and autonomous nature of AVL lends itself to highly self-efficacious learners who generally take advantage of such environments though the use of self-regulating activates such as monitoring, generating explanations, setting goals, planning, and reflecting on progress (Pi et al., 2022). It has been shown that such self-regulation is required more with AVL than SVL (Simmermeyer et al., 2022). This explains the results of the current study based on the third hypothesis which was confirmed. It may be the case that in the current study, the learners with high levels of self-efficacy showed greater interest in the presentation of content that required more self-regulation. The AVL condition contained no learner-to-learner interaction and no real-time feedback. It is most likely the case that in this study, the learners with high levels of self-efficacy were more willing to adapt to the more autonomous environment though self-regulation, while the learners with low levels of self-efficacy were less likely to do so, resulting in a difference in situational interest levels between the two groups.

On the other hand, although no direct evidence exists in extant research showing that within SVL, situational interest remains the same among learners across the self-efficacy spectrum, the results of the current study showing no difference of situational interest between learners with low levels of self-efficacy and learners with high levels

of self-efficacy in the SVL condition can be indirectly explained by extant research that shows how SVL affect learners in different ways based on self-efficacy levels. Several points can be made to justify the results of the current study showing that the situational interest gap narrowed significantly between low and high self-efficacy levels in the SVL condition. First, the results showed that learners with high levels of self-efficacy had lower situational interest in the SLV condition than they did in the AVL condition. This is most likely do to highly self-efficacious learners' preference for more autonomous environments (Eom, 2012). The AVL condition in the current study was more autonomous in nature compared to the SVL condition in that the participants were left on their own to determine how to solve specific problems. The fact that the SVL condition was less autonomous may have had something to do with the lower levels of situational interest were found among the learners with high levels of self-efficacy in the SVL condition than in the AVL condition. Another reason why the situational interest gap narrowed in the SVL condition could be due to the fact that learners with low levels of self-efficacy generally prefer less challenging, less autonomous learning environments with more instructional feedback and guidance (Ding & Zhu, 2021). Thus, it makes sense that the results of this study showed that learners with low levels of self-efficacy showed higher levels of situational interest in the SLV condition than they did in AVL condition. It is likely that the situational interest levels of learners with low levels of self-efficacy were able to rise due to the more structured condition of SVL in this study as it was set up with more instructional guidance requiring less autonomy. The fact that the SVL condition in the present study was set up so that the professor was able to give real-time feedback and learners were able to plan and discuss problem solving solutions with each other in real time is reflective of learning environments that are more conducive for satisfying the needs of learners with low self-efficacy (Ding & Zhu, 2021).

## Conclusion and limitations

A few key points can be taken from the results of this study. First, providing SVL appears to be a way of promoting equal levels of situational interest among all learners across the self-efficacy spectrum. This is most likely due to the fact that learners with low self-efficacy are able to increase situational interest to a similar level as learners with high self-efficacy due to the real-time instructional guidance and less autonomous nature of SVL. However, it may not always be practical to only use SVL rather than AVL for higher education online courses. While AVL supports a stronger positive relationship with situational interest for learners with high self-efficacy due to its more challenging and autonomous nature, there needs to be more focus on ways in which self-efficacy levels can be raised by learners who are less self-efficacious. One way in which this can be done is through instructional design methods that focus on the presentation of more interactive content within AVL environments. Perhaps using interactive tools such as automated feedback can reduce the transactional distance felt by learners in AVL. This is important due to the fact that a reduction in transactional distance felt by learners has been linked to higher levels of self-efficacy (Taghizadeh Kerman et al., 2023). Furthermore, AVL environments that provide automated feedback have been shown to help learners gain confidence and further promote higher levels of self-efficacy (Boateng et al., 2022). Ultimately, one of the goals of online instruction is to capture the interest of all learners

though the various situational factors associated with online content presentation. This may be best done by either relying on SVL or making some adjustments in AVL that would benefit those who are less inclined to work autonomously.

While this study provides valuable insight into the ways in which online learning content should be presented to capture the interest of all learners regardless of self-efficacy levels, there are some limitations. First of all, it should be noted that due to non-random assignment of the participants involved in the study, the design is considered quasi-experimental in nature. In other words, because the participants of the study were chosen based on registered students of specific classes within a specific university in South Korea, the sample is not representative of all university students studying online. Also, other variables such as the different course subjects may have had an influence on the results. Although the delivery of content and the use of online tools and resources remained consistent across all four course subjects, it is possible that the varying content associated with the course subjects may have influenced the results. Future research should examine what role subject matter may play in relationships examined in the current study. While three of the four hypotheses of this study were confirmed through analysis of subjective measurements based on perceived levels of self-efficacy and situational interest, isolating specific aspects of both AVL and SVL with experimental interventions would add to the results of this study in that it would shed some light on which specific features of both AVL and SVL affect situational interest based on differing levels of the participants' self-efficacy. Specifically, it would make sense to continuously monitor situational interest levels as learners are participating in various aspects of each modality. For example, situational interest levels can be measured immediately following direct instruction and then again immediately after group work in SVL. Similarly, AVL can be segmented into sections based on varying levels of learner control options and interest levels can be measured immediately following each segment. This should shed some light on which particular elements of each modality are affecting situational interest during specific times in the lectures, something the present study does not examine.

## Declarations

**Competing interests**
The author declares that they have no competing interests.

## References

Alraimi, K. M., Zo, H., & Ciganek, A. P. (2015). Understanding the MOOCs continuance: The role of openness and reputation. *Computers & Education, 80*, 28–38.

Bandura, A., Barbaranelli, C., Caprara, G. V., & Pastorelli, C. (1996). Multifaceted impact of self-efficacy beliefs on academic functioning. *Child Development, 67*(3), 1206–1222.

Belt, E. S., & Lowenthal, P. R. (2021). Video use in online and blended courses: A qualitative synthesis. *Distance Education, 42*(3), 410–440.

Bernacki, M.L. and Walkington, C. (2014), "The impact of a personalization intervention for mathematics on learning and non-cognitive factors", EDM (Workshops).

Boateng, A. A., Essel, H. B., Vlachopoulos, D., Johnson, E. E., & Okpattah, V. (2022). Flipping the classroom in senior high school textile education to enhance students' learning achievement and self-efficacy. *Education Sciences, 12*(2), 131.

Chen, A., Darst, P. W., & Pangrazi, R. P. (1999). What constitutes situational interest? Validating a construct in physical education. *Measurement in Physical Education and Exercise Science, 3*(3), 157–180.

Chen, Y., Wang, Y., & Chen, N. S. (2014). Is FLIP enough? Or should we use the FLIPPED model instead? *Computers & Education, 79*, 16–27.

Ding, L., & Zhu, Y. (2021). The Effect of Self-Efficacy on Online Learning Efficiency in Cross-Cultural Perspective. In 2021 4th International Conference on Humanities Education and Social Sciences (ICHESS 2021) (pp. 1697–1703). Atlantis Press.

Eom, S. B. (2012). Effects of LMS, self-efficacy, and self-regulated learning on LMS effectiveness in business education. *Journal of International Education in Business, 5*(2), 129–144.

Fitriyana, N., Wiyarsi, A., Sugiyarto, K. H., & Ikhsan, J. (2021). The influences of hybrid learning with video conference and "chemondro-game" on students' self-efficacy, self-regulated learning, and achievement toward chemistry. *Journal of Turkish Science Education, 18*(2), 233–248.

Giesbers, B., Rienties, B., Tempelaar, D., & Gijselaers, W. (2014). A dynamic analysis of the interplay between asynchronous and synchronous communication in online learning: The impact of motivation. *Journal of Computer Assisted Learning, 30*(1), 30–50.

Hidi, S. (2001). Interest, reading, and learning: Theoretical and practical considerations. *Educational Psychology Review, 13*(3), 191–209.

Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. *Educational Psychologist, 41*(2), 111–127.

Hrastinski, S. (2008). Asynchronous and Synchronous e-Learning. *Educause Quarterly, 31*(4), 51–55.

Ivanjek, L., Klein, P., Geyer, M. A., Küchemann, S., Jeličić, K., Dahlkemper, M. N., & Susac, A. (2022). Studying physics during the COVID-19 pandemic: Student perceptions on synchronous and asynchronous course formats and implications for the future. *Physical Review Physics Education Research, 18*(2), 020149.

Jansen, R. S., van Leeuwen, A., Janssen, J., Conijn, R., & Kester, L. (2020). Supporting learners' self-regulated learning in Massive Open Online Courses. *Computers & Education, 146*, 103771.

Jones, B. D., Watson, J. M., Rakes, L., & Akalin, S. (2012). Factors that impact students' motivation in an online course: Using the MUSIC Model of Academic Motivation. *Journal of Teaching and Learning with Technology, 1*(1), 42–58.

Karal, H., Cebi, A., & Turgut, Y. E. (2011). Perceptions of students who take synchronous courses through video conferencing about distance education. *Turkish Online Journal of Educational Technology-TOJET, 10*(4), 276–293.

Kizilcec, R. F., Bailenson, J. N., & Gomez, C. J. (2015). The instructor's face in video instruction: Evidence from two large-scale field studies. *Journal of Educational Psychology, 107*(3), 724–740.

Knogler, M., Harackiewicz, J. M., Gegenfurtner, A., & Lewalter, D. (2015). How situational is situational interest? Investigating the longitudinal structure of situational interest. *Contemporary Educational Psychology, 43*, 39–50.

Komarraju, M., & Nadler, D. (2013). Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter? *Learning and Individual Differences, 25*, 67–72.

Koumi, J. (2013). Pedagogic design guidelines for multimedia materials: A call for collaboration between practitioners and researchers. *Journal of Visual Literacy, 32*(2), 85–114.

Lange, C. (2018). The relationship between system-provided learner control and maintained situational interest within e-learning courses. *Interactive Technology and Smart Education, 15*(3), 205–219.

Lange, C., & Costley, J. (2020). Improving online video lectures: learning challenges created by media. *International Journal of Educational Technology in Higher Education, 17*, Article 16.

Lim, E. C., Ong, B. K., Wilder-Smith, E. P., & Seet, R. C. (2006). Sustaining interest during lectures with the use of multimedia. *Med Educ Online*, 1–4.

Linnenbrink-Garcia, L., Durik, A. M., Conley, A. M., Barron, K. E., Tauer, J. M., Karabenick, S. A., & Harackiewicz, J. M. (2010). Measuring situational interest in academic domains. *Educational and Psychological Measurement, 70*(4), 647–671.

Magner, U. I., Schwonke, R., Aleven, V., Popescu, O., & Renkl, A. (2014). Triggering situational interest by decorative illustrations both fosters and hinders learning in computer-based learning environments. *Learning and Instruction, 29*, 141–152.

Mayer, R. E. (2014). Multimedia instruction. *Handbook of research on educational communications and technology* (pp. 385–399). Springer.

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (p. 22e38). Routledge.

Niemivirta, M., & Tapola, A. (2007). Self-efficacy, interest, and task performance: Within-task changes, mutual relationships, and predictive effects. *Zeitschrift Für Pädagogische Psychologie, 21*(3/4), 241–250.

Pi, Z., Liu, C., Meng, Q., & Yang, J. (2022). Co-learner presence and praise alters the effects of learner-generated explanation on learning from video lectures. *International Journal of Educational Technology in Higher Education, 19*(1), 1–20.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). *A manual for the use of the motivated strategies for learning questionnaire (MSLQ)*. The University of Michigan.

Raymond, E., Atsumbe, B. N., Okwori, R. O., & Jebba, M. A. (2016). Comparative effects of the synchronous and the asynchronous instructional approaches concerning the students' achievement and interest in electrical engineering at the Niger state college of Education. *International Journal of Engineering Pedagogy, 6*(3), 4–9.

Reinholz, D. L., Stone-Johnstone, A., White, I., Sianez, L. M., Jr., & Shah, N. (2020). A pandemic crash course: Learning to teach equitably in synchronous online classes. *CBE Life Sciences Education, 19*(4), a60.

Simmermeyer, E., Walsh, S., Karcher, E., & Erickson, I. M. (2022). Associating synchronous and asynchronous remote teaching formats with student situational interest and motivation. *NACTA Journal, 66*, 57.

Smyth, R. (2011). Enhancing learner–learner interaction using video communications in higher education: Implications from theorising about a new model. *British Journal of Educational Technology, 42*(1), 113–127.

Sun, J. C. Y., & Rueda, R. (2012). Situational interest, computer self-efficacy and self-regulation: Their impact on student engagement in distance education. *British Journal of Educational Technology, 43*(2), 191–204.

Taghizadeh Kerman, N., Banihashem, S. K., & Noroozi, O. (2023). Relations between Students' Perceptions of Transactional Distance and Self-efficacy in Online Peer Learning. In 2023 International Conference on Humanities, Education, and Social Sciences (ICHESS) (pp. 204–211). Atlantis Press.

Wang, J., Antonenko, P., & Dawson, K. (2020). Does visual attention to the instructor in online video affect learning and learner perceptions? An eye-tracking analysis. *Computers & Education, 146*, 103779.

Wang, Y., Cao, Y., Gong, S., Wang, Z., Li, N., & Ai, L. (2022). Interaction and learning engagement in online learning: The mediating roles of online learning self-efficacy and academic emotions. *Learning and Individual Differences, 94*, 102128.

Xie, H., Liu, W., & Bhairma, J. (2018). Analysis of synchronous and asynchronous E-learning environments. In 2018 3rd Joint International Information Technology, Mechanical and Electronic Engineering Conference (JIMEC 2018) (pp. 270–274). Atlantis Press.

Zheng, C., Liang, J. C., Li, M., & Tsai, C. C. (2018). The relationship between English language learners' motivation and online self-regulation: A structural equation modelling approach. *System, 76*, 144–157.

Zimmerman, B. (2002). Becoming learner: Self-regulated overview. *Theory into Practice, 41*(2), 64–70.

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal, 45*(1), 166–183.

## Publisher's Note