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Author's Notes

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Teaching Students Effective Learning Strategies

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Much research has focused on the effect of learning strategies such as completing practice testing and highlighting. Previous research has found that practice tests and distributed practice are the most effective while elaborate interrogative, self-explanation, and interleaved practice are moderately effective (Dunlosky et al., 2013). Other common strategies, such as summarization, are found to be ineffective. Many college students use these ineffective learning strategies, and it is therefore important to teach students to use good learning strategies. The current study compared a video-based teaching method on effective learning strategies versus a text-based method. Undergraduate students (n=109) were taught effective learning strategies via video or text instructions. Our results indicated that a text-based instruction method was more effective in conveying learning strategy information. Students' enhanced understanding of learning strategies, however, did not translate into behavior—students still elected to utilize less-effective learning strategies likely because they required less effort. Implications for pedagogical practices are described in the discussion section.

College students utilize a variety of learning strategies such as re-reading the textbook, highlighting, or engaging in practice testing. Much research has been done to investigate the effectiveness of the various learning strategies (Dunlosky et al., 2013; Weinstein et al., 2018). Many instructors have attempted to teach students effective learning strategies using videos from sources such as the [Learning Scientists](#). The effectiveness of conveying good learning strategies through a video-teaching method is yet to be determined. The current study compared a video-based teaching methodology versus a text-based teaching methodology and their effectiveness on promoting good learning strategies among college students.

Students utilize a variety of learning strategies. A study by Dunlosky and colleagues (2013) examined 10 of the most common learning strategies. These 10 strategies include:

1. Elaborative interrogation—generating an explanation for a concept
2. Self-explanation—linking new information to pre-existing information

3. Summarization—writing down the main concepts of a text
4. Highlighting—marking important concepts in a text
5. Keyword mnemonics—using keywords or acronyms to represent information
6. Imagery—forming mental images while learning
7. Rereading—studying text material again after the initial study session
8. Practice testing—completing practice tests
9. Distributed practice—spacing learning sessions over time instead of cramming
10. Interleaved practice—mixing different types of learning materials into a studying schedule

Of the ten common learning strategies, practice testing and distributed practice have been found to be highly effective. Elaborative interrogation, self-explanation, and interleaved practice have been found to be moderately effective. All remaining learning strategies have been found to have low effectiveness. Many students rely on ineffective learning strategies and tend to cram before an exam (Blasiman et al., 2017). Therefore, it is important to teach students to use the more-effective learning strategies so that students can engage in learning practices that promote long-term information retention.

Many instructors have attempted to utilize short videos, such as the ones produced by the Learning Scientists, to teach students effective learning strategies. Video presentation is a good modality in general because visual motion promotes learner attentiveness and engagement (Chen & Thomas, 2020). Video presentation also offers an authentic and immersive experience for the learner (Sundar, 2008). Conveying effective studying strategies through the usage of engaging videos would seem to be a good teaching method. Ideally, students would be able to watch short video clips and acquire effective learning strategies. The main difficulty with this approach is that students often resort to less-effective learning strategies even though they intend to utilize effective learning strategies (Blasiman et al., 2017). Effective learning strategies tend to require more mental effort and do not fit with the natural human tendency to avoid effortful mental tasks (Kim & Sundar, 2016).

To promote effective learning strategies among college students, one needs to carefully consider the specific teaching and persuasion strategy. Students need

to be taught effective learning strategies, but they also need to be persuaded to adopt the more effortful but more effective learning strategies. According to the heuristic-systematic model (Chaiken, 1980; Chen et al., 1999), there are two modes of processing in the persuasion process: heuristic and systematic modes of processing. Heuristic processing refers to the decision-making process using simple decision rules or schema (Chen et al., 1999). This type of processing requires less cognitive effort and promotes affective response. Systematic processing, on the other hand, refers to the decision-making process through analytic scrutiny (Chen et al., 1999). This type of processing requires more cognitive effort and more in-depth processing of information judgement.

In a study by Kim and Sundar (2016), the researchers compared persuasions presented through text versus persuasions presented through video. The researchers found that the video-presentation mode promoted heuristic processing whereas the text-presentation mode promoted the more-effortful systematic processing. Video presentations include sound and moving objects, and the combined effect triggers viewers' easily accessible heuristic processing and allows for quick judgements (Kim & Sundar, 2016; Sundar, 2008). Heuristic processing is also more likely to promote a less-effortful type of learning (Kim & Sundar, 2016; Sundar, 2008). Based on these findings, a video presentation of effective learning strategies is not ideal. A video-presentation modality would be triggering the less-effortful heuristic processing while trying to convince students to adopt a more-effortful learning approach. The less-effortful heuristic processing elicited by a video presentation is contrary to what effortful learning strategies (such as practice testing) would promote. A text presentation, on the other hand, requires students to engage in effortful systematic processing and is more likely to elicit cognitive trust in the presented information (Kim & Sundar, 2016). A text presentation of effective learning strategies should, therefore, be more suitable in teaching students to adopt good learning strategies. Text presentation promotes effortful systematic processing, and this type of processing coincides with the type of effortful learning encouraged by effective learning strategies, such as practice testing.

The current study included a quasi-experimental design that compared the effectiveness of video-based presentation versus text-based presentation in promoting good learning strategies among college students.

Method

Participants

The current study employed a quasi-experimental between-groups design. Two online classes participated in the current study. Both classes covered similar content materials, had similar course design, and had the same course instructor. Both classes were 300-level psychology courses on the topic of research methods. One class was held during the Spring 2019 semester and the other class was held during the Summer 2020 semester. The class from the Spring 2019 semester utilized a video-presentation modality to learn about effective learning methods ($n=54$). The class from the Summer 2020 semester utilized a text-presentation modality ($n=55$). A total of 109 college students participated in the study across the two classes. Most of the participants were female ($n=88$, 80.7%). Participants' age ranged between 19 and 58 ($M=27.87$, $SD=8.27$). Participants had an average GPA above 3.0 ($M=3.13$, $SD=0.51$).

Materials and Procedure

Participants were told at the beginning of the semester that they would have the opportunity to participate in an optional experiment for bonus points. Students who declined to participate were given other opportunities to earn bonus points toward the course.

Both classes were on the topic of research methods in psychology. Both classes involved reading empirical journal articles, summarizing the articles, creating an in-class experiment, and writing a research paper in APA-style. For the video-presentation class, the research topic was unrelated to learning strategies, but students were still required to read empirical journal articles. In the video-presentation condition, the teaching of learning strategies was conveyed via a YouTube video (Moffit & Brown, 2015). The video was three minutes and 25 seconds in length and presented nine scientific study tips. Students were instructed to watch the video to learn about effective learning strategies. Students in the video-presentation condition completed the optional post-test survey two weeks after they had watched the video on learning strategies. For the text-presentation class, the in-class research project was on the topic of learning strategies. Students were assigned two journal articles related to learning strategies as part of the literature review process (Blasiman et al., 2017; Dunlosky, 2013). Students were asked to read these two assigned papers and create the

literature review section of their class project paper. Students also completed the optional post-test survey two weeks after they had read the two assigned papers.

The post-test survey, a web-based survey tool hosted in Qualtrics, was replicated from the study by Blasiman and colleagues (2017). Post-test survey participation was voluntary, and students were provided with instructions and informed consent prior to taking part in the survey. The first part of the survey asked participants for basic demographic information including age and gender. The second part of the survey asked participants to evaluate the difficulty of the course and time spent on studying for the course. Participants were also asked to provide self-reported usage and effectiveness ratings of 10 studying strategies. The 10 studying strategies included: 1) rereading textbook, 2) looking over notes, 3) copying notes, 4) summarizing, 5) taking practice tests, 6) highlighting notes, 7) highlighting textbook, 8) making and using flashcards, 9) thinking of real-life examples, and 10) creating an outline. Participants rated each studying strategy on a five-point scale, from “not at all effective” to “very effective” for the effectiveness ratings. For the usage rating, participants were asked to report how much they had used each of the 10 studying strategies. The usage rating was also on a five-point scale, from “none at all” to “a great deal” in terms of usage. The third section of the survey included two Likert-scale questions on five-point scales. One question asked participants to self-report usage level of personally adopted studying techniques without being aware of the research evidence. The second question asked participants to evaluate their overall knowledge of the effectiveness of various studying techniques according to psychological research.

Results

Six participants were omitted from the final analyses because these participants rated the course as either “easy” or “somewhat easy”. A previous study had shown that the perception of an easy course was related to lower levels of critical thinking (Garcia & Pintrich, 1992). Students who had above-average confidence in their perception of the course might be suffering from the Dunning-Kruger effect and fail to consider learning strategies (Dunning, 2011). One additional participant’s data were omitted because the person did not complete the entire survey. The data from 102 participants were analyzed. A total of 53 students took part in the study for the video-presentation condition and a total of 49 students took part in the study for the text-presentation condition.

We used a one-way ANOVA to compare participants’ ratings of course difficulty between the two classes (video vs. text presentation). No difference was found

between the two classes' ratings of course difficulty, $F(1, 100)=1.71, p>0.05$. We also used a one-way ANOVA to compare participants' self-reported total study time per week for the two classes. No difference was observed for participants' total study time per week, $F(1, 100)=2.07, p>0.05$. Overall, participants found the two courses to have similar levels of difficulty and dedicated similar amounts of time to studying.

In terms of effectiveness rating, many participants indicated that they had never attempted one or multiple of the studying strategies and were therefore unaware of their effectiveness. In the video-presentation condition, 18 of the 53 participants (34%) indicated that they had never attempted one or more of the 10 listed studying strategies and were unable to rate the effectiveness of these strategies. In the text-presentation condition, 5 of the 49 (10.2%) participants indicated that they had never attempted one or more of the 10 listed studying strategies. Chi-Square analysis indicated that students in the text-presentation condition were significantly more likely to have attempted all of the listed studying strategies than the students in the video-presentation condition, $X^2(1, N=103)=4.14, p<0.05$.

A mixed-ANOVA was used to analyze the data of those who rated the effectiveness of all 10 studying strategies ($n=79$). The 10 studying strategies were re-grouped into three groups: low effectiveness, moderate effectiveness, and high effectiveness. This grouping was based on the study conducted by Dunlosky and colleagues (2013). Flashcards and taking practice tests were classified as strategies with high effectiveness; effectiveness ratings were averaged across the two strategies. Thinking of real-life examples was classified as a moderately effective strategy. All other learning strategies from the survey were classified as having low effectiveness. The effectiveness rating across the low-effectiveness strategies were aggregated and averaged. We investigated the effects of strategy effectiveness (low, moderate, high) as a within-group independent variable and presentation type (video or text) as a between-groups independent variable. Our results indicated that there was a main effect of strategy effectiveness (low, moderate, high) on participants' effectiveness rating. Participants in general were aware that the research-supported highly effective learning strategies were the best ($M=3.88, SD=0.90$), followed by the moderately effective learning strategies ($M=3.76, SD=1.18$), and the low effective learning strategies ($M=3.47, SD=0.79$), $F(2, 146)=6.60, p<0.05, \eta_p^2 = .08$. A main effect was also found for the presentation mode, $F(1, 73)=6.11, p<0.05, \eta_p^2 = .08$. Students in the video-presentation condition had higher average effectiveness rating across all learning

strategies ($M=3.96$, $SD=0.67$) than the text-presentation condition ($M=3.82$, $SD=1.05$). The higher effectiveness rating was likely because students in the video-presentation class failed to discriminate the effectiveness of various learning strategies and rated all learning strategies as similarly effective. This failure to discriminate the effectiveness of different learning strategies was further clarified by a significant interaction effect, $F(2, 146)=3.21$, $p<0.05$, $\eta_p^2 = .04$. Students in the text-presentation condition were able to clearly discriminate across low, moderate, and high effectiveness learning strategies. Students in the video-presentation condition, on the other hand, failed to distinguish highly effective learning strategies from less-effective learning strategies. Figure 1 summarized participants' effectiveness ratings of the three groups of learning strategies.

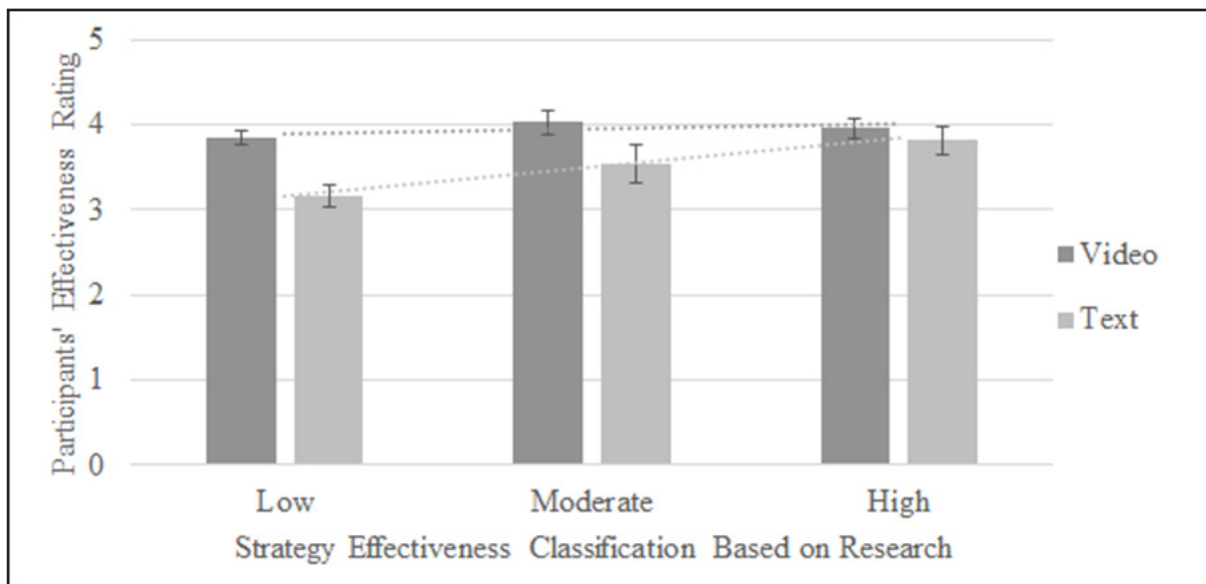


Figure 1. Participants' Effectiveness Ratings of Learning Strategies

Participants also rated their actual usage of the 10 learning strategies. All students across both the video-presentation and the text-presentation conditions indicated that they were aware and understood the list of 10 learning strategies. The analyses for the usage ratings were the same as the analyses for the effectiveness ratings described in the previous paragraph. Our results indicated that there was a main effect of studying strategy effectiveness classification on participants' usage rating, $F(2, 200)=11.70$, $p<0.05$, $\eta_p^2 = .11$. Participants used the moderately effective learning strategies the most ($M=3.37$, $SD=1.31$), followed by the low effective learning strategies ($M=3.09$, $SD=0.90$), and then the highly effective learning strategies ($M=2.78$, $SD=1.16$). Despite their understanding of effective learning strategies, participants reported the lowest usage of the most effective learning strategies. No difference in usage was observed between

the video-presentation class and the text-presentation class, $F(1, 100)=0.117$, $p>0.05$. There was also no interaction between learning strategy classification and presentation mode, $F(2, 200)=0.411$, $p>0.05$. Figure 2 summarizes participants' usage ratings of the three groups of learning strategies.

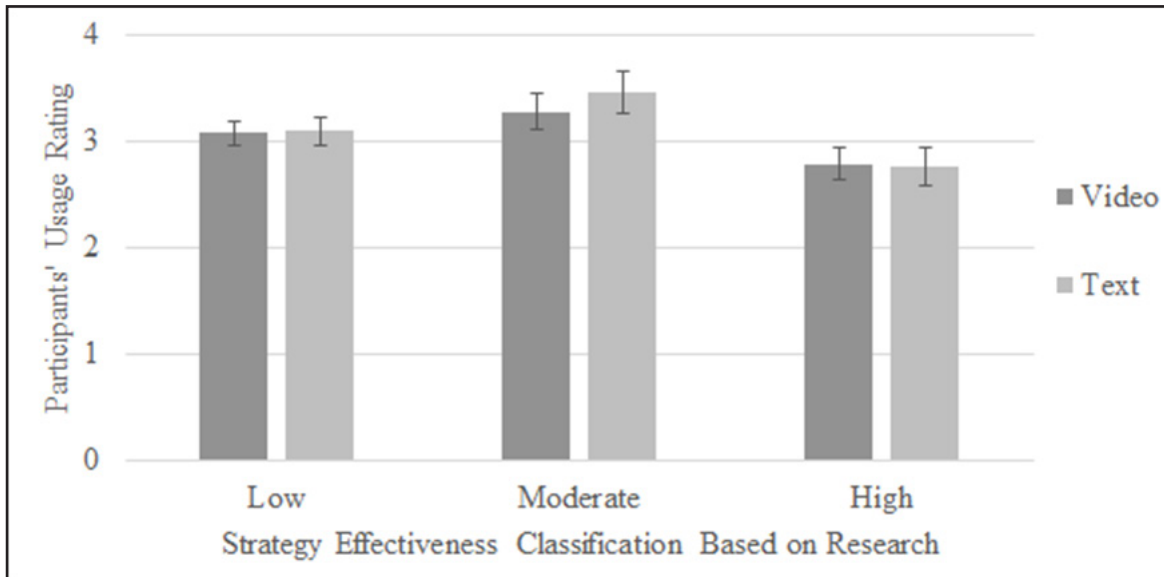


Figure 2. Participants' Usage Ratings of Learning Strategies

Participants' self-reported knowledge of learning strategies was analyzed. The first Likert-scale question asked participants whether they adopted a learning strategy because it worked for them, but they were unaware of the actual research support. Our one-way ANOVA analysis indicated that there was a main effect of presentation mode (video vs. text) on participants' responses, $F(1, 100)=11.84$, $p<0.05$, $\eta_p^2 = .11$. Participants in the text-presentation class ($M=2.94$, $SD=1.33$) more strongly disagreed with the statement that they had adopted a learning strategy without understanding the research than the video-presentation class ($M=3.70$, $SD=0.87$). In other words, participants in the text-presentation class reported higher usage of learning strategies based on research understanding. The second Likert-scale question asked participants whether they understood the general psychological research behind the various learning strategies. Our one-way ANOVA analysis indicated that there was a main effect of presentation mode (video vs. text) on participants' responses, $F(1, 100)=29.41$, $p<0.05$, $\eta_p^2 = .23$. Participants in the text-presentation class had much better understanding of the psychological research ($M=4.55$, $SD=0.77$) than participants in the video-presentation class ($M=3.55$, $SD=1.07$).

Discussion

The current study compared video presentation and text presentation in the teaching of effective learning strategies. We had hypothesized that a text-based presentation modality would be more suitable because it promoted the type of effortful processing that was required by effective learning strategies such as practice testing.

Our findings indicated that a text-based presentation was better for teaching students effective learning strategies. Students in the text presentation class were more likely to attempt all types of learning strategies and evaluate their effectiveness. Text-based presentation promoted higher levels of cognitive trust and likely caused students to be more willing to attempt various types of learning strategies (Kim & Sundar, 2016). Higher cognitive trust could have encouraged students to attempt all the listed learning strategies, even the ones that required more cognitive effort, such as practice testing.

Students in the text-presentation class were also better at discriminating learning strategies as low effectiveness, moderate effectiveness, or high effectiveness. In contrast, students in the video-presentation class failed to discriminate effectiveness levels across the various learning strategies and rated all learning strategies equally effective. This was likely because a video-presentation modality encouraged heuristic and affective processing (Chen et al., 1999; Kim & Sundar, 2016). A video-presentation manipulation likely encouraged students to accept all types of learning strategies as being effective and failed to encourage students to carefully evaluate the advantages, disadvantages, and efficiencies of the various learning strategies. A text-based presentation, on the other hand, encouraged systematic cognitive processing that likely led to increased analyses in the learning process. Students in the text-based presentation class reported higher levels of research knowledge and relied more on research in adopting learning strategies. These findings also coincided with previous findings related to presentation modality (Kim & Sundar, 2016).

Although our findings indicated that a text-presentation modality was a better teaching method of learning strategies, we failed to convince students to adopt good learning strategies. Students still reported higher usage of learning strategies with low or moderate effectiveness; students reported lowest usage of highly effective learning strategies. Even though students in the text-based presentation class had more accurate understanding of the effectiveness level of various learning strategies, they failed to translate this knowledge into practice. This

finding coincided with past research indicating that students often have good intentions but resort to less-effective learning strategies (Blasiman et al., 2017). Students' usage of less-effective learning strategies was likely due to people's natural tendency to avoid effortful mental tasks (Kim & Sundar, 2016). Students might be aware of the types of learning strategies that were most effective, but deliberately chose the less-strenuous and less-effective strategies. Future studies could consider including an intrinsic motivation intervention in conjunction with the text-based presentation to promote students' adoption of effective learning strategies.

The current study had several limitations that were common to most quasi-experimental studies. First, participants in the text-presentation class spent more time reading and learning about various types of learning strategies than participants in the video-presentation class. The difference in participants' exposure to the teaching materials could be a confound in the study. A previous study, however, had found no usability difference for video versus print instructions (Alexandar, 2013). The effect of time exposure difference was likely minimal. Second, participants came from two different classes and from two different semesters. Different student demographics and time of the year could be confounding variables. Student demographic and semester likely had minimal effect because participants from both classes rated the course as similarly difficult and spent similar amounts of time studying. Third, historical factors, including COVID-19 and economic distress, could have affected students' performance in unforeseeable ways. Despite these limitations, the current study provided findings from a naturalistic environment and could have implications on how instructors teach learning strategies. Future studies could continue to involve naturalistic classroom investigations to provide more applicable recommendations for instructors.

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