

Effects of Instructors' Character in Video Lectures: Does the Age of Lecturer Influence the Students' Learning Under Pandemic COVID-19?

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Abstract: This study investigated the impact of various age of online video lecturers on the learning performance of young college students, based on the previous studies about Model-Observer Similarity Hypothesis. Over the past few decades, many studies proved that learning is enhanced when the observer closely identifies with the model. Consequently, the present study aimed to examine how older or younger lecturers during two 10-minute videos influence the learning outcomes of young students (1), perceived similarity for each instructor of different ages (2), and the perceived explanation for each instructor (3), all other factors being equal. To test these hypotheses, a total of 20 (F = 14, M = 6) participants between the ages of 18 and 30 (F = 14, M = 6) were recruited from diverse college-student backgrounds and randomly assigned to two video lectures on Epigenetics and Behavioural genetics taught by either a younger or older instructor. The younger professor is less than 30 years old, whereas the elder lecturer is older than 40. The experiment's results were analysed using a paired sample t-test to evaluate these three hypotheses separately. All of the results were inconsistent with the model-observer hypothesis' expectations. It demonstrated that there is no significant difference between the learning performance of young students with regard to watch either younger or older instructor. Following that, it has been reported on the potential causes of contradictory results, limits, and prospective future applications.

Keywords: Online education, Video instruction, Model-observer similarity, Age.

1. Introduction

The severe and contagious illness Covid-19 has had a significant impact on the worldwide economy. This tragedy has also shaken the education industry, and this anxiety is likely to spread widely across the education sector. More than 1.5 billion learners of all ages throughout the world are reportedly impacted by school and university closures due to the COVID-19. The number of impacted pupils is around 90 percent of the world's enrolled students, and the closure of schools has expanded learning disparities and disproportionately harmed disadvantaged children and adolescents (UNESCO, 2020).

Due to the epidemic caused by the Covid-19 virus, a number of schools and institutions were compelled to alter their teaching methods. Universities are gradually moving away from the severe situation of pandemic, where fully offline courses and fully online courses will gradually merge into a hybrid online/offline teaching model, and online video courses are gradually becoming the mainstream in university teaching. Colleges and universities must choose how to continue teaching and learning while ensuring the safety of their faculty, staff, and students in order to adapt to the ever-changing ways of teaching and learning (Bozkurt & Sharma, 2020). These conditions convince us that diversified, multimedia teaching application design is a vital need for academic institutions (Rieley, 2020).

As COVID-19 becoming more of a mainstream trend, universities are embracing hybrid learning models, and lecturers have begun providing lectures online asynchronously and recording them. Additionally, students are beginning to take advantage of these new opportunities. As hybrid education grows more widespread, it is essential for pedagogical practise to acquire the skills necessary to

effectively conduct video lectures. This is an essential component of hybrid education. On the other side, there is a discussion about the best way to present online films in order to maximise the amount of information that can be learned from them. It is critically vital to conduct research on the effects of the various video formats.

2. Literature Review

2.1. Development of video lectures

With the development of the times and the rapid improvement of information technology, the popularity of multimedia teaching in higher education is gradually increasing. Based on empirical investigations and learning theories, a significant body of literature has created recommendations on how to design teaching to encourage cognitive processes that facilitate learning. As technology continues to advance, new options appear for the creation of multimedia training, some of which might be used to improve learning. The image principle (Mayer et al., 2001) illustrated a new technology (picture-in-picture video). By manipulating whether the teacher appears dynamically on the screen, the scores of the end-of-course exam, which measures students' learning outcomes on the course material after seeing the instructor's video lectures in different states under varied situations, are compared with the results of other groups and shown to be highly appreciated by the learners, despite the fact that this does not really increase learning outcomes. Furthermore, according to the finding from Mayer and Estrella (2014), the principles of multimedia learning influenced the design and production of video lectures, which were developed to optimize the learning of visual and spoken information based on theories of learning and cognition (Baddeley, 1986; Paivio, 1990; Sweller, 1988, 1994). The

most widely used method of teaching multimedia technology is the use of online video courses. The use of video lectures is an essential component of online education. In addition to slide presentations, teachers use classroom videos to provide instructional content (Crook & Shofield, 2017; Guo et al., 2014).

Marks, Sibley, and Arbaugh (2005) found that students demanded much higher standards of online teachers as the educational landscape shifted progressively towards online courses. Since the uniqueness of Web-based courses, student satisfaction is likely to influence whether a student enrolls in following courses in this format, in the same programme, or even with the same education provider (Chidambaram, 1996; Warkentin et al., 1997; Arbaugh, 2000). It was claimed that, as science and technology advance, students' interest in class and course satisfaction are correlated with instructors' classroom effectiveness. Furthermore, Garrison and Vaughn (2008) provide a framework for online education, which includes three modules: social, cognitive, and a teaching presence. They argued that all three elements are interconnected and have inseparable effects on teaching and learning. Several studies have demonstrated a positive correlation between students' perceived satisfaction with social interactions in online video courses (Hostetter & Busch, 2006). By contrast, when students construct and validate learning outcomes through critical dialogue and reflection, teachers can use this feedback and interaction to design online courses (Garrison et al., 2000). Consequently, it is crucial to examine how much applying best practices impacts student success during the creation and delivery of online video lessons (Mayer, 2014), which were developed to maximize the learning from visual and verbal content (Baddeley, 1986; Paivio, 1990; Sweller, 1988, 1994).

2.2. On-screen lecturer in online education

This study aims to investigate the significance of best practises for student results in the context of developing and creating online video courses. Video lectures play a significant role in online education. They are the major method by which instructors communicate knowledge (Hoogerheide et al., 2018), and students regard them as the most beneficial activity for learning and achievement (Magda and Aslanian, 2018). Importantly, video lectures enhance the instructional and social presence of instructors in virtual classrooms (Draus et al., 2014; Ke, 2010). Teaching and social presence are connected to important outcomes. The design of examples may impact the efficacy of example-based learning, and there are substantial variances in the design of video modelling examples, but little is known about how particular design decisions affect watching behaviour and learning results. There is a great deal of diversity over whether and how the teacher is visible in video modelling examples. (Loyens, & Van Gog, 2014; Kostons et al., 2012) The different conditions of teachers in video lectures online can greatly affect students' learning. For example, the video does not show the lecturer at all, partially includes the lecturer (such as gestures, etc.), or is completely visible in the picture. This wide range of possibilities raises the question of whether the presence of teachers in video modeling examples is important for attention allocation and learning.

Compared to persistent instructor presence, Kizilcec et al. (2015) found that uninterrupted control of instructor disappearance led to increased cognitive load and distraction

for students. However, none of these studies found a significant difference between instructor presence and absence on student learning outcomes (Kizilcec et al., 2015; Fiorella et al., 2019; Henderson & Schroeder, 2021) nor did they find a direct effect of cognitive whether load has a direct effect on student performance. With respect to the cognitive-load theory, it was regarded as an instructional design theory that reflects how humans process information in terms of learning aspect, or our "cognitive architecture." During the process of learning, information must be stored in working memory until it has been adequately processed to be transferred to long-term memory (Sweller, 1988; van Merriënboer & Sweller, 2005). Combining with the multimedia supplement, superior cognitive ability motivated by the higher-level of visual perception and social interaction tend to promote the learning efficacy during the online video course (Mayer & Moreno, 2003; Mayer, 2005). On the other hand, the majority of studies last too long and have limitations, leading to sample attrition, which is especially pertinent when analyzing attrition. And many studies rely on self-reported formats that may have a subjective bias (Kizilcec et al., 2015). On the other hand, in the light of primarily social perspective, previous studies have found that social signals included into a multimedia learning environment may promote learning (Mayer et al., 2003). Domagk's study (2010) implicated that specific social cues, gestures and physical expressions can facilitate learning. Therefore, it is logical to predict that on-screen instructors who use visual and audio signals will interest students and improve their learning (Schroeder NL et al., 2013). However, according to the study by Ouwehand et al. (2015), when the lecturer was standing next to the slide looking directly into the camera, students spent most of their time looking at the lecturer (on average over 40%) and very little (on average about 12%) on the task to which the lecturer was referring. On the contrary, even though there was no instructor showing beside the lecture slides to attract students' attention, most students will still be unable to quickly capture key information due to the complexity of their visual system, thus hindering their learning efficiency.

A large amount of empirical evidence confirmed the importance of the appearance of online lecturers based on the cognitive theory of multimedia learning (Mayer, 2005) as well as cognitive-affective theory (Moreno & Mayer, 2007). The work by Schrader et al. (2021) explored how the gender of instructor influence the learners' experience and outcome, aiming to improve the performance of online education. As a result, how to manage the design of instructors, namely models throughout the lecture, would boost students' learning outcome and efficacy becomes a vital issue to uncover in the future.

2.3. Model-observer Hypothesis

A number of previous literature have investigated how the design of video modeling examples affects students' self-efficacy and learning gains, which include whether the model is visible in the video and if the gaze and gesture signals offered by the model influence students' attention and learning (Hoogerheide et al., 2018). According to the model-observer similarity (MOS) hypothesis (Bandura, 1994; Schunk, 1987), the more similar learners perceive themselves to be to the model, the more they will benefit from modeling. The prevalence of studies has attempted to figure out the impact of gender models that students perceived the same-gender model as more similar to them than opposite-gender

models, and perceived the task as more appropriate for males than females (Beege et al., 2017). Students evaluated the same-gender model as more comparable to them than the opposite-gender one, and viewed the assignment as more suitable for men than women (Ouweland et al., 2015). However, the gender of the model had no effect on students' test scores, self-efficacy and perceived competence improvements, effort investment, learning satisfaction, or perceived explanation quality (Castro-Alonso et al., 2014).

In terms of the hidden prediction of video modeling examples, empirical findings have been mixed regarding the MOS hypothesis. For example, Bussey and Bandura (1984) found that both girls and boys showed greater imitative behavior after viewing same-gender models, but the majority of studies did not show greater benefits of a same-gender compared to an opposite-gender model. In addition, mixed effects have been found in the literature between MOS and self-efficacy. It is possible that task-appropriateness perceptions are not only a catalyst for stronger MOS effects, but can also affect self-efficacy and learning independently of similarity views (Schunk, 1987).

2.4. Instructor credibility and age

In this study, instead of focusing on the gender of the video lecturers, the apparent age of the on-screen teachers might be a more significant variable to investigate. According to the studies of Hoogerheide et al. (2018), MOS studies have produced mixed findings, and one possible explanation might lie in learners' perceptions of task-appropriateness. However, based on the currently available literature, it is difficult to draw firm conclusions about whether and under what conditions model characteristics matter.

On the other hand, when it comes to learning outcomes, it is impossible to avoid discussing students' comprehension and satisfaction. In the light of students' satisfaction or trust, in either the traditional teaching model or the online video teaching model under the application of multimedia, the instructor credibility will be influenced by the age of lecturers (Semlak & Pearson, 2008). According to McCroskey and Young (1981), instructor credibility was described as "the communicator's attitude toward a certain information source at a particular time" and is one of the most powerful aspects of teacher-student interaction. There is a strong correlation between instructor credibility and student satisfaction.

According to the study of Semlak and Pearson (2008), credible instructors are perceived to be more engaging and have higher student evaluations. In addition, instructors' age was found to play a crucial role in their trustworthiness students believed (Smith, 2011). The older a teacher is, the more likely she or he is to exude confidence in the classroom and have an understanding of why certain teaching strategies work or fail. Some previous studies suggested that new teachers express concerns about looking confident, building credibility, and striking a balance between their other responsibilities and their teaching. As a teacher's career progresses, he or she often gains self-assurance since he or she feels like a member of the teaching profession (Thomas, 2004; Smith, 2011). However, despite young students reported more politeness and respects toward older professors among the college-aged students, there is evidence that when asked to describe the ideal teacher, young students are more inclined to depict a teacher their own age (Edwards & Harwood, 2003; Feng & Burleson, 2008).

Therefore, in light of whether the age of instructors has an effect on students' learning outcomes and how it will be impacted by the use of multimedia, primarily online video lectures, there are many unanswered questions about the future design of blended education functions. As a result of these gaps, we conducted an online experiment with 20 students on the blended learning model currently prevalent at the University of Glasgow.

During the experiment, there was presented two different ten minutes videos based on content shown during the Level 3 Physiological Psychology course from the previous year, specifically on Genetics and Epigenetics. We manipulated the videos so that participants viewed either an older lecturer (close to retirement) or a younger lecturer (recently qualified) giving the lecture. The aim was to assess whether younger learners (all below the age of 30) perceived and processed the information given the lecture differently for the younger and older lecturer. They were randomly divided into two groups to watch an online video course, one with and one without a teacher and with only a verbal presentation, to compare the differences in learning outcomes between the two groups. In addition, we added to the variable of presence of instructor or not, a research variable on the model observation hypothesis that the closer the age of the instructor (older than 35 years for older teachers, otherwise classified as younger teachers of similar age to the students) is to the students, the better the students' learning outcomes are likely to be.

The purpose of the present study was to test the MOS hypothesis and task-appropriateness hypothesis with regard to model age while 1) keeping the example content equal by scripting the lecturers' teaching explanations, lecture slides etc.; 2) based on the study of Hoogerheide et al. (2018) conducting the remote tasks and online questionnaire to quantise the students' learning performance.

As the shift from face-to-face to online courses draws to a close and more time becomes available to develop learning materials expressly for the online environment, a crucial challenge emerges: How can we make online multimedia that assist learning most effectively (Henderson & Schroeder, 2021)? Furthermore, the other main question was whether the benefits of video modeling examples would depend on the age of the observer and of the model. This study was designed to investigate whether the age of the instructor in the online video course, which is similar or not to that of the students, affecting the students' learning satisfaction and learning effectiveness. However, for extraneous reasons, the conditional variable of whether the instructors were on-screen had been lost throughout the experiment, thus this study merely focused on the age of the video course teacher.

3. Method

3.1. Participants

Participants were 20 predominantly Chinese postgraduate students from University of Glasgow (Mean age = 25.55, SD = 3.08; 6 males, 14 female). All of participants recruited were aged over 16 years and under 30 years, and whose primary or secondary language is English. Before taking part in the experiment participants were asked to read and give online consent after reading the project information and before taking part in the experiment. They were reminded that they can choose to withdraw at any point by simply closing the web browser that was hosting the experiment. This study

was conducted under the monitoring of University of Glasgow while obtaining the ethics.

3.2. Materials

In this study, four video modelling examples were created, one with an on-screen younger-instructor model (see Fig. 1 in the Appendix G), one with an on-screen older-instructor model (see Fig. 2 in the Appendix G), and the other two without any instructor appearance, delivering contents only through the voices of the two instructors (see Figs. 3 & 4 in the Appendix G). Two female psychology lecturers were invited to record two lectures less than 10 minutes in length related to behavioural genetics and epigenetics. The lecturer content was based on two classes given to 3rd year undergraduates during the Physiological Psychology course taught at the University of Glasgow the year previous but was no longer used in the course. This way, students who participated hadn't viewed the content before during their studies. Each video-lecture was approximately eight minutes in length.

Multiple choice quiz:

In order to measure the students' learning outcome, participants were required to complete two post-quizzes after each video. Each quiz contained 10 multiple choice questions and one point for each correct answer, no points for each wrong answer, total 10 points. The final score of the quiz was regarded as the learning outcomes of participants.

Questionnaires:

As part of the classroom quizzes, participants were asked to complete a questionnaire on similarity and task-appropriateness after each videos. Perceived similarity was measured by asking participants to indicate on a 9-point scale, ranging from (1) not similar at all to (9) very similar much, to what degree they believed that they are similar to the person who presented on screen. This measure was adopted from Hoogerheide, Loyens et al. (2016), and the phrasing of the questions is similar to Bandura (2006). To measure perceived task-appropriateness, it also adopted the scale of Hoogerheide, Loyens et al. (2016), asking participants to indicate to what degree they believed that each lecturer was better at demonstrating and explaining content, on a scale of 1 (not at all) to 9 (very much so).

3.3. Design

The experiment was initially a 2x2 design with a between subject factor of lecturer presence (present/absent) and a within subject factor of age (younger/older). However, due to the technical problem with the online script, the manipulation of presence was dropped from the analysis.

In terms of the counterbalance for bias, it assigned randomly each student to watch lecture about Epigenetics taught by younger lecturer or older lecturer, or lecture about Behavioural genetics taught by younger or older lecturer, which means dividing them into two groups with random contents but equivalent younger and older instructors.

3.4. Procedure

In this study, it manipulated the Experimentum v.0.2 (DeBruine et al., 2020) online from the University of Glasgow School of Psychology and Institute of Neuroscience and Psychology. All participants were provided study information to read online, which outlined the aim and

procedure of the study. In addition, students were provided with a consent form to read and sign if they were willing to participate. The process for collecting data did not begin until each participant completed the consent form.

A total of 20 students were randomly assigned to two video groups: the present group, where the instructor appeared in the top right corner of the screen, and the absent group, where the only video displayed was the lesson screen and the instructor's voice. The presence or absence of the instructor on the control screen is used to determine the correlation between students' comprehension of the lesson, satisfaction and learning performance under the two conditions. Moreover, each student will be taught behavioural genetics and epigenetics by two instructors of different ages. Each student will watch two video sessions throughout the experiment, one with an older instructor and one with a younger instructor. As a means of controlling for confounding bias, each instructor recorded two different lectures and randomly assigned them to different students. According to the model-observer hypothesis, all else being equal, students would benefit from watching an instructor of their age rather than one who is older.

After each video session, each student was required to answer two classroom tests corresponding to the two different content sessions. The questions were identical for each video but were answered in a different order to ensure the accuracy of the experimental data. Each test contained 10 multiple-choice questions, the answers to which could be found in the content of the video lesson the student was watching. Each multiple-choice question contained four options, only one of which was correct. For example, if a student watched the first video of a lecturer on the topic of epigenetics, this participant would randomly start answering the epigenetics-related questions after watching the video. Then, this participant turned to the second video and completed this quiz.

4. Results

In this study, the hypothesis predicted that there were three aspects varying within the student group, under the different age level of instructors. The three aspects include the learning outcomes (students' quiz scores after lectures), the self-reported scale of the perceived explanation towards lectures, and the self-reported scale of the perceived similarity towards instructors. We predicted that the means of quiz score, perceived similarity scale, and the perceived explanation quality while students studied with younger lecturers online were higher than the means that students studied with older lecturers based on the Model-observer hypothesis. Therefore, in the analysing process, this study conducted three within-subject paired-samples t-tests as below.

4.1. Quiz scores after lectures

In light of the learning outcomes after different conditions, the highest mean of score was given to the 'younger instructor' ($M=5.75$, $SD=1.77$) which was aged under 30 years old. However, even though the mean score of younger group was higher than the older group, after the T-test and effect size checking, it was suggested that there was no significant difference in learning outcomes of students between younger lecturers online ($M=5.75$, $SD=1.77$) and older lecturers online ($M = 5.30$, $SD = 2.23$); $t(19) = .75$, $p = .46$, $d = .22$ (see the Table 1.).

Table 1. Mean values and standard deviations of students' quiz scores

epigenetics_young		genetic_young		epigenetics_old		genetic_old	
M	SD	M	SD	M	SD	M	SD
5.70	1.77	5.80	1.67	3.80	1.75	6.80	1.55
Young				Old			
M		SD		M		SD	
5.75		1.77		5.30		2.23	

**Figure 5.** Violin-plot of students' scores distribution among teacher's age

In terms of the effects size, it was suggested that the sample was not powerful enough to support the hypothesis as well, while the given power = .80, $\alpha = .05$ and then the smallest $d = .66$. Therefore, it was not significantly reported that in the online-video courses, young college students' learning outcomes would be better under younger instructors' teaching than older instructors' teaching.

4.2. Perceived explanation quality

According to the study of Hoogerheide, Loyens et al.

(2016), the quality of explanation perceived by students was able to be evaluated as 9-scaled point. From the result of the self-reported scales, participants rated explanation quality as being highest for the epigenetics-topic taught by the younger teacher, and the highest mean of scale was given to the whole 'younger instructor' group ($M=5.95$, $SD=1.88$). However, there was no significant difference in learning outcomes of students between younger lecturers online ($M=5.95$, $SD=1.88$) and older lecturers online as well ($M=5.70$, $SD=1.66$); $t(19) = .45$, $p = .66$, $d = .14$ (see the Table 2.).

Table 2. Mean values and standard deviations of students' explanation assessment

epigenetics_young		genetic_young		epigenetics_old		genetic_old	
M	SD	M	SD	M	SD	M	SD
6.30	1.77	5.60	2.01	5.60	1.50	5.80	1.87
Young				Old			
M		SD		M		SD	
5.95		1.88		5.7		1.66	



Figure 6. Violin-plot of students’ self-reported perceived-explanation scale distribution among teacher’s age

Similar with the examination process of the students’ quiz score, given the power = .80, $\alpha = .05$ and the smallest effect size of interest $d = .66$, the calculation of Cohan’s $d = .14$ suggested that the sample was not powerful enough to support the hypothesis. Therefore, even though it was observed higher level mean in the younger-side violin graph, it was not significantly reported that in the online-video courses, young college students’ perceived explanation quality would be better under younger instructors’ teaching than older instructors’ teaching.

4.3. Perceived similarity

Based on the model of the study from Hoogerheide, Loyens et al. (2016), this part of experiment evaluated the difference of students’ perceived similarity between younger and old online instructors, which was by means of the self-reported 9 point scale. From Figure 7, it can be observed that younger participants identified more with the younger lecturer ($M = 5.60$, $SD = 2.16$) compared to the older lecturer ($M = 4.35$, $SD = 1.84$). However, no significant difference in University students’ perceived similarity with online instructors $t(19) = -1.57$, $p = .13$, $d = .62$ (see the Table 3.).

Table 3. Mean values and standard deviations of students’ perceived similarity

epigenetics_young		genetic_young		epigenetics_old		genetic_old	
M	SD	M	SD	M	SD	M	SD
5.6	2.12	5.6	2.32	4.6	1.78	4.1	1.97
young				old			
M		SD		M		SD	
5.6		2.16		4.35		1.84	

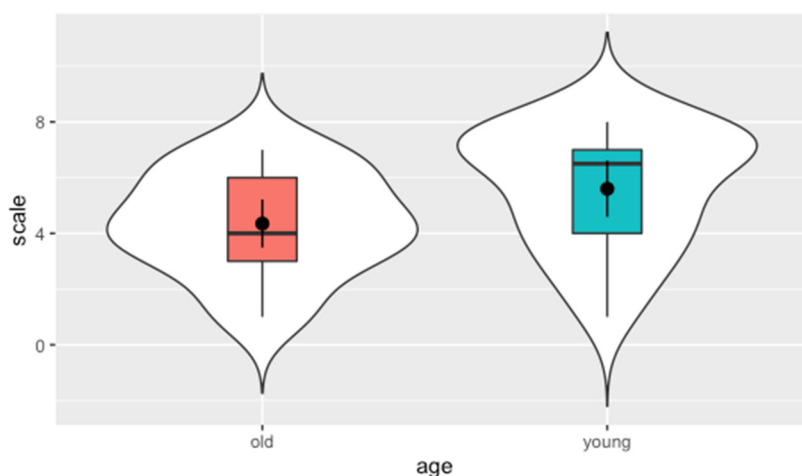


Figure 7. Violin-plot of students’ self-reported perceived-similarity point distribution among teacher’s age

In terms of the effect size result, the Cohen’s $d = .62$ (Power = .80, $\alpha = .05$) was smaller than the smallest effect size, which indicated that the sample size was not reliable enough to

estimate the difference. Therefore, the results report even though it was observed higher level mean in the younger-side violin graph, it was not significantly reported that in the

online-video courses, young students would perceive themselves as being more similar to the younger lecturers compared with older lecturers. It illustrated that it is still obscure to figure out whether the Model-observer hypothesis suggested truly or not.

5. Discussion

The purpose of this research was to investigate whether or not the age of the lecturers who appeared in on-screen video lectures could have an impact on the education received by college students. By analysing the effect of the instructor's age on student learning outcomes, understanding, and satisfaction, we may provide more effective and superior guidelines for the design of online video courses. Due to the new normal of the spread of pandemics, the contemporary social condition is exceedingly volatile; thus, it is an urgent research goal for universities to address the complexity and diversity of hybrid teaching and learning models and to make teaching and learning more effective. Video courses are based on distance education, which, from a social-cognitive point of view, reduces the interactive dialogue between the lecturer and the learner. As a result, the sense of experience and comprehension that students acquire from online education is diminished. However, even within the same setting for online instruction, there can be significant variations across instructors. This study divided lecturers of different ages into two groups and investigated the different effects that instructional videos created by lecturers of different ages had on the learning of young students. The goal of this study was to investigate the factors that led to the existence of this bias and discover the potential causes.

According to the model-observer similarity hypothesis (Schunk, 1991; Bandura, 1994) and the similarity attraction hypothesis (Moreno & Flowerday, 2006), the model-observer hypothesis predicts that better learning will result from the process of observation when the model and observer are more similar to one another. Theoretically, it is hypothesised that a learner may prefer to focus on a very similar person and may use similarity as an indicator of his or her own success (Bandura, 1971). As a consequence of the learner's perception of similarities, the learner may experience an increase in their level of self-assurance regarding their capacity for achievement and may make modifications that lead to a reduction in the amount of mental work required (Linek et al., 2010).

In addition to examining the impact that the age of the instructor has on the academic achievement of young kids, this study looked into the extent to which students' perceptions of the similarities between two distinct types of teachers mirrored their own. It also examined the self-reported similarity of young students self-reported towards two-type of instructors. By monitoring each student's level of self-satisfaction with the learning results as they were presented by a variety of video lecturers, it investigated the viability and scalability of applying model-observer research in the process of designing video courses. Three between-group t-tests were utilised in order to investigate the hypothesised reliability and validity of the idea that younger teachers have a positive impact on the learning outcomes and perceptions of their young students. However, according to our analysis of the three studies that looked at the efficacy of model-observer studies using online instructional videos, there is not compelling evidence to suggest that younger

instructors as similar as college students teaching in the video lecturers broadly aids learning. However, it did give us with certain consequences, and it shed light on the fact that, in comparison to traditional classroom instruction, understanding how to build an online video course is even more crucial in the present climate.

5.1. Effects upon the students' perceived similarity

The assessment of perceived similarity, the most crucial pre-procedural experiment of the model-observer study, fundamentally tested whether there was similarity between the observer (students) and the model (instructor). It was found that we were unable to confirm a significant difference in perceived similarity between students' perceptions of teachers of different ages, nevertheless it would be observed that the mean of younger group was obviously larger than the older group. One possible reason of such non-finding result is that when students are taking an online video course, student-to-instructor interaction is relatively reduced and students' perception of the video content is weakened, therefore, interfere upon the process of students' sensory cognition may occur (Bakker, et al., 2019). From the implication of study by Wouters et al. (2007), observers who are short of social clue driven by the lack of interaction with model tend to show less cognitive ability. Therefore, students have a high propensity to make subconscious judgments that are at odds with the truth, which is made all the more likely by the fact that half of the participants in this experiment carried out the experiment without the presence of the instructors, which increased the risk of cognitive mistake.

5.2. Effects upon the students' learning outcome

Grades in a course are an excellent indicator of how well students can retain and apply what they've learned (Kizilcec et al., 2015). Therefore, examining quiz scores as the indicator of learning outcome after each of the two groups of video courses revealed no statistically significant evidence that younger lecturers teaching was more likely to receive high grades than older teachers. In terms of the result of this aspect, learning outcome was not significantly different between younger and older on-screen instructors on the basis of nonparametric analysis, potentially due to the scores were not normally distributed and the standard deviations were not equivalent between groups (Kizilcec et al., 2015). On the other hand, without considering the effect of different test content on student performance, and taking into account the fact that there remains the possibility that the older the teacher, the more trust the students have in him or her, and thus the greater the learning effectiveness (Cassidy et al., 2018). It is possible that the counterbalance between the effects of MOS that younger instructor enhance the young students' learning outcome, and the trustworthiness theory on the contrary resulted in the insignificant difference between the learning outcomes impacted by the instructors' age.

5.3. Effects upon the students' perceived explanation

In order to figure out how is the learning performance of college students shift along with impacts caused by video-lecturers, perceived explanation towards various instructors was regarded as one of contributing factors. One concern that whether students' self-perceptions of the lecture process differ

in practice between age groups was tended to explore the students' learning satisfaction and efficacy's change. A large number of previous research have demonstrated the strong positive relation between the perceived explanation and learning satisfaction (Pike, 1993; Ke & Kwak, 2013; Valentin et al., 2013). Therefore, as the result of non-significant difference between various age of instructors in terms of the impact on the students' perceived explanation, it could be regarded that the model-observer hypothesis was not established. These null-findings are consistent with previous research focusing on the impact of instructors' gender characteristics in the conclusion (Hoogerheide et al., 2016; Bandura et al., 1963). However, despite the most findings suggested there exists difference of learners' trustworthiness partially depend on the instructors' age, a variety of inconsistency in the results of the learning performance regardless of prediction before.

5.4. Limitations, future research and potential applications

In the current research, the experimental data suggested that the influence of the age of the on-screen teacher on students' learning behaviour could not be determined to be statistically significant, but the experimental technique itself was likely to have flaws that impacted the outcomes orientation of this experiment.

At first, regarding to previous relevant studies including the experiments by Hoogerheide et al. (2016; 2018), there was a preliminary sample size which should not be less than 42 participants. Due to the limitation of space and time, only 20 sample sizes were collected in this experiment, well below the expected minimum sample size. Besides, the female participants were much larger than the male participants ($F = 14$, $M = 6$). As a result, it is possible to suggest our samples might be lack of some degree of representation, and the effect power might be not enough to support the validity of this experiment, which could be the most essential imperfection of our study. In order to improve the reliability of the findings, future research should be conducted using larger sample sizes and should include an equal number of male and female participants in each activity.

In addition, the experiment was open to students of all backgrounds, aged 18 and under, with the majority being international students who speak English as the second language and the remainder being native students. who were regarded as native speaker. However, as our experiment was conducted under the pure English circumstance without any language assistance like subtitle but only course slides. According to the survey of Vandergrift (2007) related to the listening comprehension of foreign language, most second language speakers learn new knowledge through the foreign language, in the aspect of metacognitive, skilled listeners of certain language understand twice as much as less-skilled listeners of the language, and can apply it more flexibly in practice. Furthermore, many international participants declared that did have considerable difficulty in understanding the language and this directly affected their sense of experience of the experiment and even the stage of the perceiving comprehension during the process. Such a circumstance, considering language comprehension, has a high propensity to generate bias in the comprehension of the lecture by various participants. Thereby, it would be worth to counterbalance the inequivalence of language understanding

between international students by employing a number of techniques, or examine the impact of language differences by measuring ANOVA with factors of language and instructors' age.

Besides, given the fact that the quizzes' questions for this experiment, which were evaluated as the tool for determining the students' learning outcome, were generated by the writer of this thesis based on the content of the video course, even though it were supervised by a professional supervisor, it is possible that the difficulty level and appropriateness are inadequate toward most of participants. Many of the participants claimed at the end of the experiment that they were answering the questions more with a common sense or knowledge they had learned during the quizzes process. And it is not difficult to conclude from this, with respect to those participants in experiment who hadn't learned or heard about relevant physiological knowledge before, it would be quite an unfair issue. Therefore, it is suggested that in future studies researchers could conduct pre-test as well as post-test, which could control the original understanding of the relevant contents without interfere the assessment.

Apart from that, as this study measured perceived similarity and perceived comprehension of students through self-reported methods, it is inevitable that there would be less than objective judgmental errors and lead to subjective bias (Kizilcec et al., 2015). Devaux and Sassi (2016) concluded from one of their studies that self-reported information collection has limits. When discussing their personal experiences, individuals are often prejudiced. For instance, a large number of people are either consciously or subconsciously affected by the concept of "social desirability." In other words, they are more likely to report having had experiences that are seen as being socially acceptable or favoured (Kendra, 2020). It is likely that the participants unintentionally assumed that they had a better knowledge of the young instructor's manner of delivery given that they had read the project background. As a result, they may have given the younger instructor a higher perceived comprehension rating. For the future potentially relevant research, mixing self-report data with additional information, such as an individual's behaviour or physiological data, is a superior strategy than a single measuring technique. This "multi-modal" or "multi-method" evaluation delivers a more comprehensive and consequently more probable accurate view of the issue (Kendra, 2020). Furthermore, it should be determined whether the questionnaires employed in study yield consistent findings over time. They should also be verified by another data collection technique that demonstrates that the replies measure what they claim to measure. The questionnaires and replies should make it simple to distinguish between the control group and the test group (Hopwood et al., 2018).

Finally, one necessary research which is worthy to explore based on the present study, is the effects of instructors' presence or absence on the students' learning performance. It is one of the most crucial aspects in the beginning of this study, critically influence the exploration of model-observer hypothesis further more. Based on the impact of the presence or absence of a lecturer in a video course on student learning outcomes, it could help improve research on MOS and enhance the sustainability and validity of the experiment.

6. Conclusion

To put in a nutshell, the results of the present study indicated that younger on-screen instructors presenting in the video lectures won't significantly influence the young college students' learning in a positive direction. In other words, the model-observer hypothesis investigated by Hoogerheide et al. in 2016 could not be confirmed in terms of quiz results following lectures, self-assessment of lecturer-student similarity, or participants' grasp of the lecturer's material. However, due to the small sample size, time constraints, and a lack of motivation among participants, it was not possible to extrapolate these results to the entire student population. Hence, in order to reach a convincing conclusion, additional research with comparable interventions and higher sample numbers is required.

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