

National College of Art & Design

**The Evolving Role
Of Multimedia Learning
in the Classroom**

Kelley Counahan
BA in Graphic Design & Education
2025

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Submitted to the School of Visual Culture in Candidacy for the Degree of

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I declare that this *Critical Cultures Research Project* is all my own work and that all sources have been fully acknowledged.

Signed:

A handwritten signature in black ink, appearing to read 'Kelley', written over a horizontal line.

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Table of Contents

Declaration	2
Table of Contents	3
Introduction	4
1. Multimedia learning is useful in the classroom.	6
a. What is multimedia learning?	
b. Multimedia design principles	
c. Limitations of multimedia learning studies	
2. The obstacles of multimedia training are impeding its benefits in the classroom.	9
a. The classroom environment	
b. When multimedia is used correctly	
c. The obstacles of teacher training	
d. A Nation College of Art & Design survey	
3. Why multimedia learning will never take over the role of the teacher.	12
a. The impact of COVID-19	
b. Self regulated multimedia learning	
c. The presence of the teacher	
4. Evolving with technology.	15
a. The changing role of multimedia	
b. Moving on from text heavy multimedia presentations	
c. Implementing the latest multimedia technology	
d. The adaptability of multimedia learning	
Conclusion	18
Research Questions	20
Appendix	21
Bibliography	22

Introduction

With the introduction of all new technological advancements for the classroom, they bring with them an excitement that they will be the ‘thing’ to change the face of learning as we know it, however all too often that level of enthusiasm diminishes, as the classroom falls back to their tried and tested teaching methods, sometimes with new said technology alongside, aiding the learning environment, and sometimes without. The use of multimedia presentations is one technological advancement that has stuck around, over the course of this research essay I aim to understand why.

The first focus will be on the use of multimedia learning in the classroom. Several authors have continuously reported the effectiveness of multimedia use in the classroom when used correctly (Holzl, 1996; Mayer, 1997; Olurinola, 2015). Considering the choice of colour, the font size, the placement of the text, and the type of narration, can greatly impact students learning. Students have also reported enjoying learning through the use of multimedia (Apperson, 2008; Vagg, 2020).

These studies indicate the need for multimedia presentation within the classroom, but only when used correctly. The incorrect use of multimedia in the classroom has been shown to negate the benefits of its uses (Markovic, 2012). The reason for the incorrect use of multimedia by teachers may be due to the time and cost of teacher training in this area (Gotsick, 1996; Parrish, 2004).

The next section will then look at the limitations of both, multimedia learning, and classroom learning. With the growth of the internet and the availability of information now at our fingertips, the role of the teacher can and has been called into question, however the events of Covid and the shift from classroom based learning to online learning, taught us the significance of the role of teacher and the classroom, and

highlighted the restraints of learning independently through the use of multimedia (Lorenza, 2021; Yu, 2022).

While the role of the teacher has been shown to be imperative, it shouldn't prevent us from continuing to recognise the power of being in the age of information, and how proper use of multimedia learning can be harnessed to become the portal between the classroom and the internet, that the teacher can continuously adapt, to mould around their own tried and tested teaching methods (Young, 2009).

1. Multimedia learning is useful in the classroom.

a. What is multimedia learning?

The term multimedia is used to describe the method of ‘communicating or sharing information in the form of sound, pictures, and video as well as text’ (Cambridge dictionary). Multimedia learning in the classroom often takes place in the form of multimedia presentations through the use equipment like smart-boards, projectors and student tablets.

Multimedia learning is useful as a learning method as it interacts with multiple stimuli of learning simultaneously, such as visual, verbal, and aural. In Mayer’s (1997) early studies, he developed an understanding of how information is retained through the process of selecting, organising, and integrating the new information. When new information is presented, students first select which information they deem important to remember, this new information sits in the short term memory where it is then organised into a manner that is coherent to each individual. If both of these steps can occur effectively, the new information can then be integrated into the students relevant prior knowledge and progress into their long term memory. When a student is presented with multiple related stimuli, there is more opportunity for the information to integrate with the students relevant prior knowledge, thus multimedia presentations can be an effective method for teaching. (Mayer,1997).

b. Multimedia design principals

Other authors have also documented the elements within a multimedia presentation that enhance the effectiveness of a students cognitive comprehension of the information presented. Text needs to be clear and legible from all corners of the classroom. This means font size must be dependent on the room size. In a classroom of fifty students or less the optimum font size is twenty-four point (Holzl, 1997). The correct use of

font is one that has a uniform thickness of line for better clarity, such as a sans serif font (Holzl, 1997). The addition of colour in a multimedia presentation enhances memory retention, when used properly. Warmer background colours are preferred by all students, especially students with dyslexia, as they reported better legibility over cooler colours (Rello, 2017). Congruent colours that relate to the information being presented facilitated better learning, while incongruent colours performed worse than using no colour at all, according to studies (Olurinola 2015).

While the interaction of multiple stimuli helps with the retention of information, students can also be negatively impacted by extraneous cognitive processing if presented with too many stimuli that do not act congruently to each other. This cognitive overload hinders learning as it's too much to process in the short term memory (Mayer, 2023). While Mayer (2023) looks at ways to lessen the impact of extraneous processing in multimedia learning, the frequency of this happening within classrooms has not yet been studied. One such way to avoid extraneous processing, as purported by a student survey, is for the teacher to elaborate beyond the presentation. This way the presentation can remove extraneous material, and only include key points, while allowing the teacher to continue on an explanation further (Apperson, 2006).

c. Limitations of multimedia learning studies

It is important to recognise that many of the studies (Mayer, 1997; Mayer, 2023; Olurinola, 2015) address long term memory, yet only focus on the studies that show the effect on short term memory. The lack of long term memory studies is a common reflection on their shortcomings within their publications, and it should be noted that this is an area of concern that should be studied further, as it's difficult to understand the full effect of correct multimedia learning without understanding the effect it has on student's long term memory. Additionally, there is rarely a comment on the correlation between how the presentation of information within multimedia presentations affects student's note taking capabilities. Apperson (2006) does acknowledge note-taking while

addressing the benefit of sending students the multimedia presentation beforehand and narrating slowly so that students have time to take notes alongside the presentation.

While studies by Mayer, Olurinola, and Holzl, among others, have documented the clear benefits of correct multimedia presentations on students memory, many other authors (Casteleyn, 2013; Markovic, 2012; Vagg, 2020) came up short when applying similar principles in their studies. The impact of graphic organisers in presentations to help students organise the information, showed no significant statistical difference, possibly due to extraneous cognitive load (Casteleyn, 2013).

Students enjoyment should also be considered when choosing the medium to deliver information in the classroom, as full attention by the student is needed in order to learn (Gagne, 1970). In all studies where students were asked directly about their preference of multimedia learning, all results showed that students preferred multimedia presentations in the classroom (Apperson, 2006; Casteleyn, 2013; Nesbit, 2006; Vagg, 2020). While students preference of one medium over another doesn't correlate to better cognitive learning, Casteleyn (2013) notes the importance of acknowledging self-determination theory and the power of students intrinsic motivation towards multimedia learning.

2. The obstacles of multimedia training are impeding its benefits in the classroom.

a. The classroom environment

Multimedia learning in the classroom has been proven to enhance the learning of students when presented correctly, however the incorrect usage of multimedia negates these benefits. Considering that every classroom environment is different and not all teacher training is performed to the same standard, it is difficult to estimate how often multimedia learning is impeded, this chapter aims to highlight the possible obstacles that may have a negative impact on meaningful multimedia learning in the classroom, in hopes that more consideration could be developed in these areas moving forward.

b. When multimedia is used correctly

In the studies by Mayer (1997) it is clear that while learning through multimedia is proven to be beneficial for students, there is no one medium that stands out, rather it is the combination of multiple media that proves to be effective. This observation showed that the most positive combination is providing instructional information through text or narration alongside a visual element, be that static or dynamic visuals. This observation shows that media and method cannot be separated during the learning process, and that if they are the quality of learning depletes. To understand this in the context of the classroom, a teacher with a high quality of instructional explanations can be more effective when adding visual elements during their explanations, and a high quality multimedia presentation can be ineffective if no human explanation coincides with the presentation. In order for the most effective learning, teacher and multimedia must work cohesively together.

Markovic (2012) re-emphasises the connection between the quality of the media and the quality of the method through a study conducted in Croatia. The study set out to question the quality in multimedia learning and how the harmonisation between design

and description of content affected students. The study concluded that multimedia presentations that scored highly on quality media design also scored highly in the quality of the learning material. Both Markovic (2012) and Mayer (1997) show that multimedia learning in the classroom is a careful balance of elements that needs a teacher knowledgeable in this area in order to obtain positive learning results.

c. The obstacles of teacher training

When multimedia was first being established, Gotsick (1995) acknowledged the obstacles that arise when implementing this new method of learning in the classroom; time, money, and the steep learning curve that teachers endure upon the adoption of new technology. This sentiment was reiterated by Parrish (2004) and Nesbit (2006) many years later, and continued to be acknowledged as an obstacle by the students in the study by Vagg (2020).

When learning a new teaching method within schools, it can take considerable time and expense to organise and plan the training for teachers, many of which already have filled schedules. Once the teachers have received their training more time is taken up as they assemble or develop their multimedia presentations. Gotsick (1995) discusses these time constraints as considerable problems, and Parrish (2004) highlights the resistance by teachers to take on this considerable workload as they reported that the training was not specific enough to their course content meaning they would need additional time to develop the training around their content, they also felt that the training was already out of date by the time it got to them.

d. A National College of Art & Design survey

A survey was conducted from a number of tutors at the National College of Art & Design to understand if these limitations also affected them. As a duty of care for all respondents, participants were made aware that their responses would be anonymised and kept in a password protected folder, and that their responses could

be withdrawn at any time. The results showed that all tutors that participated in the survey used multimedia presentations in their classrooms, and that 75% of which used these presentations daily. Even though multimedia learning was shown to be used by all participants, interestingly only 50% reported receiving training by NCAD on presentation design. While these results cannot conclude that the lack of training is due to time restraints, the software that was reported to be used by the respondents, shows the costliness of multimedia learning, with 100% of respondents using a paid software programme to develop their multimedia presentations at least some of the time.

It's difficult to understand fully how often multimedia presentations are used incorrectly in the classroom but the importance and prevalence of teacher training in this area helps to indicate how knowledgeable teachers are with this learning tool. With the prevailing obstacles of time and cost to educational establishments, as well as the continuous effort to keep up to date with the newest technological advancements, the studies by Parrish (2004) and the survey conducted at the National College of Art & Design, show that training in this area is still not deemed an essential aspect of learning in the classroom even though it is a learning tool that is used daily. This lack of teacher training is impeding teachers in using multimedia correctly and optimally in the classroom.

3. Why multimedia learning will never take over the role of the teacher.

a. The impact of COVID-19

Multimedia can provide teachers with beneficial learning tools that humans can not achieve alone, but there are also limitations to multimedia learning. This chapter is going to address what multimedia learning can not do for students, that teachers can by examining the effects of COVID-19 on the classroom, and reflecting back to the studies of Mayer, that breaks down the importance of social presence while learning.

When COVID-19 hit and classrooms around the World had to shift all of their content online, it changed the way most teachers provided information to their students significantly. Schools had to adapt to digital teaching and depend on the uses of multimedia learning to deliver their content. This extreme change in environment and dependence on technology created a microcosm for future study on the effects of learning through multimedia.

b. Self regulated multimedia learning

Yu (2022) looked at the students role of self regulated learning during COVID-19 and their control of attention, which Yu calls 'mind-unwandered'. The study concluded that students found it more difficult to focus during online learning and reported becoming distracted more frequently from external interferences. This was especially significant for students that lacked self regulation. When asked about self regulated learning, students reflected on ways they tried to optimise their learning themselves, noting the impact of their environment and their mood, among others. These reflections were backed by the results from the questionnaire conducted by Yu (2022) which showed attention, or mind-unwandered, was positively related to mood adjustment and environmental structure. While Yu (2022) reports the positive effects that show students understand what learning environment suits them best, the study negates to address that

students often do not have much control of these external factors during learning. One role of both classroom and teacher, is that they create a consistent environment away from external interferences for all students.

Another study on the impact of online learning during COVID-19 was conducted by Lorenza (2021), this time focusing on the motivation of students and the presence of teachers. Many students reported a negative impact on learning due to a lack of engagement by teachers online. While this lack of engagement may be attributed to the shift for teachers to digital platforms, it also highlights that the presence of teachers holds a social purpose during learning. The study found that social connection was important to students and that students reported their motivation decreasing throughout the year, while studying online only (Lorenza, 2021).

c. The presence of the teacher

The two studies (Lorenza, 2021; Yu, 2022) looked at so far were both reports from the opinions of students during their time studying online during COVID-19. While first hand opinion is imperative, it doesn't fully delve into the cognitive reasoning of why the absence of teacher and classroom was so impactful. Mayer (2023) set out a series of multimedia principles, that may help us to understand the importance of a teachers presence further. Looking at the effect of human narration and gesturing through multimedia learning, Mayer (2023) explains how students benefit from these actions, and without them, less 'deep learning' occurs.

Through a series of experiments conducted by Mayer (2023), students showed a deeper learning during multimedia presentations, when they were narrated in a conversational tone. This indicated that students felt a sense of social presence during their learning. The absence of narration or the inclusion of a formal narration, did not produce the same level of deep learning, highlighting the importance of a teacher being present to discuss the learning in multimedia presentations, and giving students the feeling of a

social connection to the content. The study further discussed the need for a human voice over a machine-like voice, emphasising the social impact of having a teacher present (Mayer, 2023).

Narration with a human voice during multimedia learning isn't the only human centered feature needed for deeper learning. Human-like gestures, such as eye contact and facial expressions, benefited students as well (Mayer, 2023). This further explains the need for a sense of social presence while learning. These expressions and gestures can help to prompt or guide students, and engage them further with their learning. Although similar prompts can be made through multimedia engagement, these studies show that students need to feel a connection with the learning material, that they get much easier from a human guiding them than from their own self regulated guidance using multimedia alone.

4. Evolving with technology.

a. The changing role of multimedia

In the previous chapters, the benefits of multimedia learning and the need for teachers in the classroom have been addressed. It is now time to look at ways both may be able to work together to aid each other, and how both can continue to drive the future of learning. Through the studies of Young (2009), and Vagg (2020), a view of what a multimedia classroom may begin to look like in the future starts to unfold.

“Moving to PowerPoint from transparencies was the easy part of upgrading teaching for the digital age. Now that an entire infrastructure for instant online delivery is widely in place, all that’s left is the hard part of changing what happens in the classroom.” (Young, 2009)

b. Moving on from text heavy multimedia presentations

To help understand the importance of technology in the classroom, Young (2009) looked toward Southern Methodist University, where tutors were foregoing the use of standard PowerPoint presentations as a method of teaching, stating that the standard ‘slide-display’ programme was being used as a crutch to teaching rather than being used as a creative tool to engage students in an active learning environment. The tutors began using movie clips to trigger classroom discussion, interacting with video games that gave students the autonomy to sort and group information of their choosing, and producing podcasts of content for students to listen to out of classroom time. This ‘inverted classroom’ approach to using multimedia learning helps to hold the attention of the students and subdue boredom, which results in better test scores (Young, 2009).

Interestingly, the new creative techniques that the tutors implemented, all continued to keep some form of multimedia technology within them, but there was a shift away

from using multimedia as a mechanism to deliver factual information, towards using multimedia as a tool for creating discussion. Or to look at it in another light, the tutors shifted the students from passive learners towards actively engaging learners. This preference of using multimedia as a starting point for discussion was echoed in the student survey conducted by Apperson (2006).

c. Implementing the latest multimedia technology

To be able to understand the evolving nature of multimedia within learning, the best place to look is at healthcare education, where they are pioneering the link between traditional teaching methods and the use of new technology, such as animation, virtual reality, and augmented reality, to enhance student learning. Vagg (2020) conducted a survey on medical and healthcare students to help understand their opinion on the use of complex multimedia technologies in aiding their learning. The results of the study showed that students appreciated the inclusion of multimedia learning but didn't want it to replace traditional teaching methods, instead preferring a combination of both for an optimal learning environment.

Results from the Vagg (2020) survey show that students still prefer traditional teaching methods over exclusively being taught through multimedia learning in the classroom, but often seek out multimedia as an additional tool to further their learning after a class, reporting to look for animations and videos on a topic covered in class to help them understand the content. Understanding this could help teachers shift their classroom multimedia presentations to multimedia content that engages discussion within the classroom and also links to additional multimedia content that can be accessed by students when the class is over.

d. The adaptability of multimedia learning

While the comparison between Vagg (2020) and Young (2009) show either ends of the scale for multimedia use, with Young (2009) attempting alternative ways to

lessen multimedia use during classroom learning, and Vagg (2020) encouraging the implementation of the newest technology to enhance classroom multimedia learning, both studies show the dynamic adaptability of multimedia use within a classroom setting and that there is no one size fits all for which method of multimedia learning is the most optimal in a classroom setting. The teachers of these classrooms, understood the needs of their students and were able to adapt their multimedia use to keep the students engaged, not based off of implementing the newest technology but by understanding what new technology could work for their classroom.

Multimedia learning in the classroom has been proven to be successful, however text and image heavy multimedia presentations have also been shown to become boring and overly relied on by teachers and students alike, as shown in the studies of Apperson (2006), Young (2009), and Vagg (2020). The beauty of multimedia presentations is in its adaptability and it's the teachers in the studies of Young (2009) and Vagg (2020) who show that when teachers take time to understand the newest technology, they can easily link this new technology into the classroom through the use of multimedia presentations, ensuring that it meets their students needs and keeps up with the evolving World around us. It's this adaptability in multimedia presentations that keeps multimedia learning at the forefront of technology in the classroom, and the knowledge from teachers to adapt for their students needs, that together drives the future of learning.

Conclusion

Multimedia learning has long been recognised as a useful tool for learning within the classroom. As a well established method of learning, scholars such as Mayer (1997), Holzl (1997), Rello (2017), and Olurinola (2015) have established key design principles for multimedia presentations in the classroom that when applied correctly, can optimise learning outcomes. However, despite the well documented benefits of multimedia learning, many obstacles hinder the correct implementation of its full potential in the classroom.

The primary obstacle in implementing multimedia learning is the lack of teacher training. Educational institutes are impeded by factors like cost, money, and resistance to continually evolving technology. As a result, multimedia learning can be inconsistent and ineffective due to its misuse in the classroom. Understanding this, one might assume the removal of the teacher in the classroom would be beneficial, however the impact of COVID-19 showed that students don't do well when independently learning through multimedia, and that they greatly benefit from the presence of a teacher. This shows us that multimedia learning cannot replace the teacher and is only successful in the classroom when being used by a teacher to compliment their own teaching practice.

This insight into the role of multimedia in the classroom allows us to look more critically at the evolution of technology and schools attempts to keep up to date with it, and that while the newest multimedia technology may be beneficial for some subjects of study, it is not beneficial for all and it is the opinion and practice of the teacher that helps to determine the success of new multimedia learning in the classroom. Finally, the adaptability of multimedia presentations in the classroom is one of its greatest strengths as it allows teachers to mould the medium to suit their teachings and the needs of their students. However, while multimedia technology continues to evolve and the classroom

adapts with it, the well established design principles should always remain the same. Educational institutes would greatly benefit by recognising the importance of teacher training regarding these key design principals in multimedia learning.

The adaptability of multimedia has allowed it to change with the times and with the teachers, which is one of the main reasons that it has stuck around so long and why it will continue to remain an important feature in classrooms around the World today.

Research Questions

1. Is there a right way to present information through multimedia learning?

Objective

Identify if and which elements in a multimedia presentation enhance students cognitive learning, and if there are how-to's available, why they are not present in most teachers multimedia presentations.

2. What is the teachers role in multimedia learning?

Objective

Determine how much of student learning comes from multimedia stimuli with or without a teacher present.

3. How can multimedia presentations adapt and grow in the age of information?

Objective

Discover ways in which multimedia presentations are evolving to fit into today's society.

Appendix

Survey Questions

1. Has NCAD ever provided presentation design tutorials?
2. Have you ever participated in giving a presentation design tutorial?
3. How often do you use presentations in the classroom?
4. How often do you include images and or sound in your presentations?
5. What software do you use to create your presentations?
6. When using multi-media presentations in the classroom, are they used during a teacher-centered learning segment of the class, or during student-centered learning tool to implement discussion?
7. How much thought is put into the colours chosen in your presentation design?
8. In what way do you consider SEN student's needs when designing a multimedia presentation?
9. Do you make a presentation accessible to view for students before class has begun?
10. How do you account for student note-taking based on your presentation?
11. Do you add intentional humour into your multi-media presentations?

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