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# Creating More Engaging Course Lectures

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Modern students expect a lot out of their college experience. With increasing economic uncertainty, they are also evaluating the value that a college education can provide beyond many of the free, professional-quality resources available across the internet. This means post-secondary educators need to adapt to the learning expectations of their students and create more engaging course presentations that can capture and retain their students' attention. Common lecture formats remain effective in efficiently presenting new ideas and concepts to large groups, but visual aids used alongside a lecture are usually uninspiring. Even worse, the design of many PowerPoint slide decks used during a lecture can cause cognitive overloading, sensory conflict and hinder effective communication. In this paper, I will discuss how to make PowerPoint presentations more visually appealing and more effective when used in a classroom lecture. Additionally, I will discuss the techniques and tools available when developing an effective PowerPoint presentation.

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Modern learners have come to expect a lot out of their educational experiences. The age range of traditional post-secondary students, from freshman through senior, places them in “Generation Z.” This generation has lived their entire life in a connected society with access to high-speed internet and mobile devices, putting them on a “track to be the best-educated generation yet” (Parker & Igielnik, 2020). This ease of access also introduces a competition to attract and retain their attention during traditional classroom experiences. Cell phones, tablets, and laptop computers are an inviting distraction, and professional quality online content offers a compelling substitute for traditional education techniques. Additionally, early data showed Generation Z was hit particularly hard due to the COVID-19 pandemic through job losses and pay cuts (Parker & Igielnik, 2020). This may lead many Gen Zers to re-evaluate the value of higher education weighed against the benefits of taking more expeditious routes into the job market. Modern educators must adapt to the expectations of this generation and modify teaching styles to keep students interested in and continue to provide value to traditional classroom experiences.

This paper will explore methods that can be implemented by course instructors to develop more engaging and effective presentations. Throughout this paper, when specific instructions are given, it is specific to Microsoft PowerPoint. Similar functionality may be available in other software but is not discussed in this paper. Suggestions are also provided for software or content sources, but I have no affiliation with any of the listed companies. They are simply the resources I have used and am familiar with personally.

### **Visualizing a New Teaching Style**

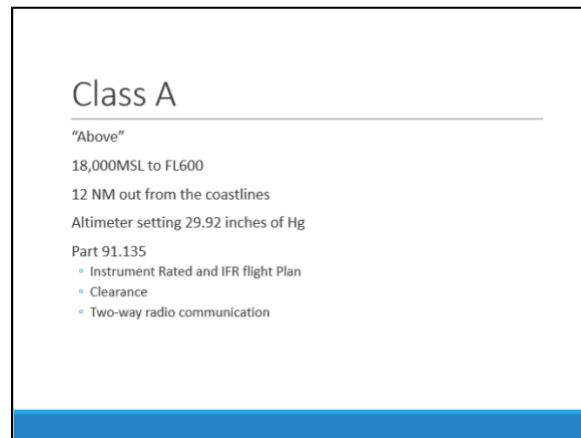
The teaching technique used in most collegiate courses continues to be the lecture method. This is largely due to its effectiveness in conveying new information to large groups in a time-efficient manner (U.S. Department of Transportation, Federal Aviation Administration, 2020). A commonly used visual aid accompanying a classroom lecture is a “slide deck” given through either Microsoft PowerPoint, Apple Keynote, or other similar software. However, these visual aids are commonly developed in a way that is contrary to effective human communication techniques. The root of the problem can be tied to limited instructor training for visual aid creation but also in the displayed guidance given to course developers when building out new slide decks. As an example, try building out a new presentation in PowerPoint, and the placeholder text of any new slide instructs you to “Click to add text.” This instruction is usually taken literally, resulting in numerous bullet points, full sentences, or even paragraphs being added and presented to a learner during the lesson.

Why this method is not effective in communicating with a learner relates back to the basic elements of communication as outlined in the Aviation Instructor’s Handbook (U.S. Department of Transportation, Federal Aviation Administration, 2020). All communication (including classroom lectures) involves three distinct elements: the source, the symbol, and the

receiver. In classroom settings, the “source” is the teacher/lecturer/instructor/professor, and the “receiver” is the student/learner. The “symbol” is the bridge that connects the source to the receiver and includes anything that is used to convey the ideas of the lesson, like language, images, text, mock-ups, or physical items the learner can examine and manipulate.

The symbols used in communication are further divided down into one of three channels, representing how the receiver processes them: visual, auditory, and kinesthetic (U.S. Department of Transportation, Federal Aviation Administration, 2020). The overall learning process can be improved when more than one channel is engaged. For example, verbally presenting a lecture while displaying an image of the topic being discussed engages both the auditory and visual channels, leading to better retention than if only one of the methods was used. However, care must be taken not to overlap multiple symbols through the same channel. This concept has been explored by Chandler and Sweller (1991), with their research indicating instruction was hindered when learners were required to “integrate disparate sources of mutually referring information” (Chandler & Sweller, 1991).

As an example, figure 1 shows a sample slide from my own PowerPoint slide deck discussing airspace, which was presented to a private pilot ground school course. During the course lecture, this slide would be displayed via projector while I spoke to each bullet point regarding class A airspace, adding additional information and context as required.



*Figure 1.* Sample lecture slide for class A airspace

One may assume that this lecture format is adhering to the multiple-channel concept discussed above: the visual channel is being engaged via the PowerPoint slide, while the auditory channel is being engaged via my explanation. In reality, this setup has forced an overlap and conflict of the auditory channel. At a foundational level, it is true that the student “views” the slide, thereby experiencing it through the visual channel. However, the true content of the slide (the textual descriptions of class A airspace) is processed in the brain through the auditory channel as the text is “read” internally by the learner.

To demonstrate this concept, figure 2 provides a sample training slide for a topic outside the familiar aviation domain: woodworking. By using non-aviation content, I hope to remove any previous knowledge and bias in the example. In this slide, the elements of a common woodworking joint known as a bridle joint are discussed. Imagine trying to read through the

content of this slide while a presenter talks over the top of it, verbalizing the basic description and presenting additional details as necessary. If that's difficult to imagine, you can also simulate this by trying to read through the slide while listening to your favorite podcast instead. This example represents the presentation technique used in many lecture environments.

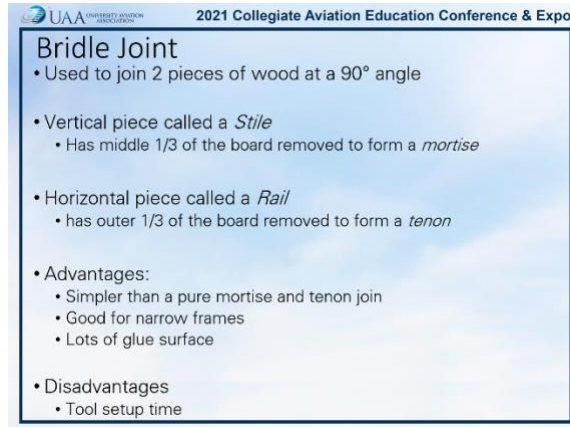


Figure 2. Bridle joint training example

In the above example, would it have been difficult to focus on reading and listening to a presenter at the same time? Which symbol would you have ignored in favor of the other? If a learner chooses to ignore the slides and focus on the verbal message from the presenter, the time spent developing the visual aid was time wasted. Instead, if a learner chooses to ignore the presenter and read the contents of the slide, then the presenter has made themselves obsolete, and the student can learn simply by reading content on their own. Instructor obsolescence is also a major problem if the presenter chooses to read the slides word for word; they are not providing any additional value to the presentation. If the above demonstration was difficult to fully simulate, the same results could be achieved by attempting to read a newspaper while listening to a podcast or listening to a spouse while reading an email. In these examples, one or both tasks will suffer because they overlap through the auditory channel.

So how can traditional lecture presentations be enhanced to take advantage of multi-channel processing and avoid overlapping content through a single channel? At a basic level, avoid the temptation presented by PowerPoint to “Click to add text.” Rather than conveying information through textual bullet points on a slide, represent concepts through simple images or diagrams instead, and provide a more specific description through a verbal lecture. Utilization of this technique has been shown to improve learner interest in the lesson as well as information retention (Napper, 2014).

To illustrate this concept back in the aviation domain, figures 3 and 4 depict other sample slides from my ground school courses related to motion sickness symptoms (figure 3) and methods to overcome them (figure 4). The “before” image on the left is how the slides were presented for numerous semesters, while the “after” image on the right is how they are currently presented to students.

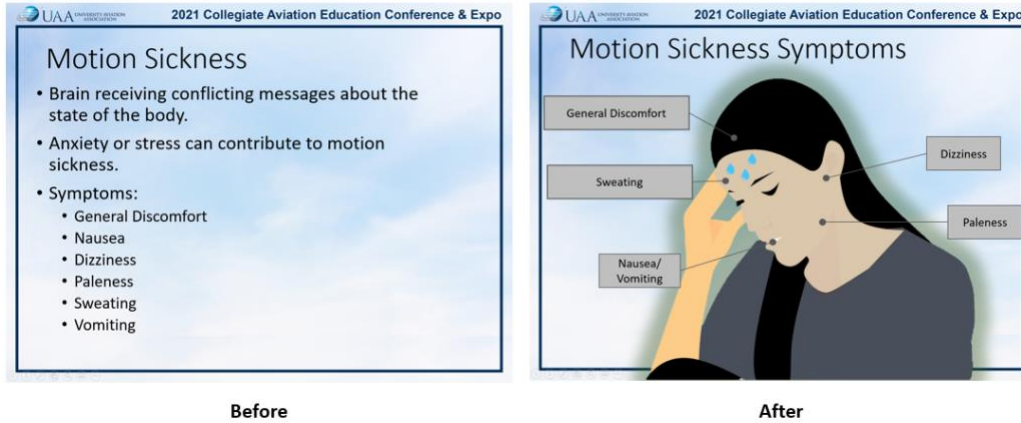


Figure 3. Before and after of a motion sickness symptom slide (Pinclipart, 2019)

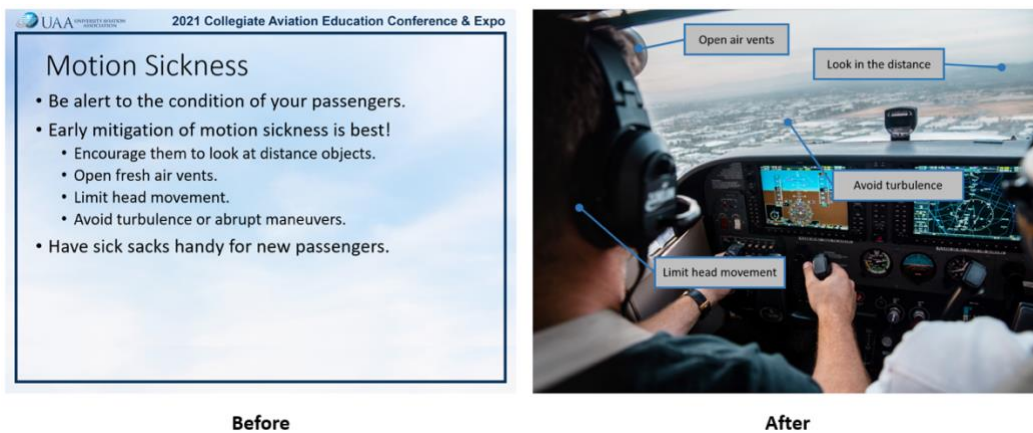


Figure 4. Before and after of a slide to illustrate methods of overcoming motion sickness (Allison, 2017)

While the text is still presented in the slides, it's significantly less than the "before" example, allowing learners to quickly read the labels and return to focusing on the content I provide verbally. Additional PowerPoint animation functionality is also utilized in the presentation to display and hide each label individually, allowing me to focus the learner's attention on one element at a time while it's being discussed. Specific guidance for creating these PowerPoint animations would not be conveyed well in this paper, but an excellent resource is the Bright Carbon YouTube channel, found at [www.youtube.com/c/Brightcarbon](http://www.youtube.com/c/Brightcarbon).

Occasionally, bullet points must be used as the best way to present information to a learner. In these instances, PowerPoint animations can also be utilized to present each bullet one at a time. This helps to retain the learner's focus and prevents them from moving ahead with the content before you are ready to discuss it. However, generally with animations, subtle is more effective than exciting. Text that flies in or spins into place can be distracting and detract from the professionalism of the presentation. I personally prefer a simple "fade in" and "fade out" animation in almost all instances.

## **Speaker Notes and Note Pages**

Arguments in favor of text-heavy presentations can still be made from both an instructor and student perspective. In my own experience lecturing, displaying text-heavy PowerPoint presentations served as presentation notes for what needed to be discussed during the lesson. From a learner's perspective, text-heavy slides, especially those provided digitally for use outside of class, serve as a study tool to later review the concepts discussed during the lesson. Thankfully, these advantages of text-heavy presentations can be retained while still visually presenting lesson concepts as discussed above.

When developing your presentation, rather than placing the key points of the topic textually in the slide itself, they should instead be added to the "Speaker Notes" section. This section is commonly found just below the slide image, but if not, clicking the "Notes" button on the bottom toolbar or in the "View" ribbon menu will make it visible. Any text entered here is not displayed to a learner during a slideshow presentation. However, it can be set to display for the instructor when presenting. This is done by selecting the "Use Presenter View" option on the "Slide Show" ribbon menu.

The speaker notes can also be provided to students for later review through the creation of a note page. To access the note page, select the "View" ribbon menu, and in the upper left corner, select "Notes Page." The default layout for the notes page is a visual depiction of the slide on the top half, with the speaker notes presented below. These pages can be customized and even branded for the institution or course, then provided to students digitally or via physical copies. Once again, specific instructions to do this are best suited for online video tutorials, and numerous offerings are available online, including a well-done presentation on Bright Carbon's YouTube channel ([www.youtube.com/c/Brightcarbon](http://www.youtube.com/c/Brightcarbon)).

A debate can also be had about whether the note pages should be provided prior to a lesson to help a student take notes or at the conclusion of a lesson as a means of lesson review. Advantages and disadvantages exist for both methods, so instructors should determine which works best for the instructional style of the class.

## **Finding and Capturing Images**

Once a commitment has been made to depict lesson concepts visually rather than textually, the hard work of finding effective images begins. A common source for many instructors is through image search functions of internet search engines like Google or Bing. The legal requirements surrounding copyright and fair use won't be discussed in this paper, but care should be taken regarding the source of images retrieved via online sources.

For open-source, professional-quality photos provided under creative commons licenses, [www.pexels.com](http://www.pexels.com), [www.pixabay.com](http://www.pixabay.com), [www.unsplash.com](http://www.unsplash.com), and [commons.wikimedia.org](http://commons.wikimedia.org) are all great resources. For drawings, cartoons, and other miscellaneous images in PNG formats, options include [www.pngtree.com](http://www.pngtree.com) and [www.favpng.com](http://www.favpng.com). These websites offer many free images, with additional paid tiers and unlimited downloads for a small fee. Finally, [www.thenounproject.com](http://www.thenounproject.com)

offers millions of icons to visualize just about any word or concept. This site also contains many free options in addition to paid offerings.

In the aviation domain, there's also access to hundreds of high-quality images available, copyright-free, through familiar FAA handbooks like the Pilot's Handbook of Aeronautical Knowledge, Airplane Flying Handbook, and others. Lesser-known handbooks, especially useful for those teaching aircraft systems, are the Aviation Maintenance Technician Handbooks. This series of handbooks has images for just about any system or component found on an airplane. A full list of current FAA handbooks can be found at [https://www.faa.gov/regulations\\_policies/handbooks\\_manuals/aviation/](https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/).

When utilizing images from FAA handbooks, an additional step of copying, cropping, and pasting the image into a PowerPoint slide is required. Thankfully, both Microsoft Windows and macOS have built-in functionality to achieve this. Windows users can utilize the Snip and Sketch program, which can capture a selected region of the screen and automatically place it on the Windows clipboard. The "Print Screen" key can even be tied to activate the screen snipping tool for quick and easy access. Instructions to do so can be found at <https://pureinfotech.com/set-print-screen-key-screenshot-screen-sketch-windows-10/>. For macOS users, built-in key commands give the ability to capture an entire screen, a selected window, or a portion of the screen. Instructions can be found at <https://support.apple.com/en-us/HT201361>.

The screen snipping options above have the benefit of being free but offer the only limited capability for artistic edits and mark-ups to the captured images. For more robust editing capabilities, TechSmith offers SnagIt with more screen capture options and a more powerful image editing interface, although it does require the purchase of a software license. A similarly capable open-source offering is provided by greenshot.org. Both options are available on Windows and macOS.

### **Optimizing Images**

Even perfectly selected images can sometimes be overwhelming to a learner or simply look out of place on a PowerPoint slide. For example, figure 5 depicts an improved bridle joint training slide from the example presented earlier, but there's still room for improvement. First, the image includes several mark-ups and text callouts that may pull the learner's attention away from the instructor. This may be great for circumstances where the learner is expected to explore concepts on their own, but not in a format where the instructor is attempting to add value to the presentation and direct the learner's focus on key elements. Another minor issue with the image is the white background, especially when inserted over a non-white slide background. This tends to make the image look out of place and pasted into the presentation quickly.

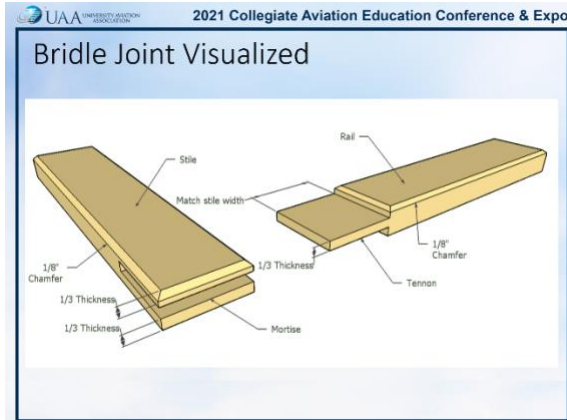


Figure 5. Bridle Joint visualized with text labels

Figure 6 shows an even more simplified depiction of the bridle joint as an improvement from figure 5. First, the image was simplified to remove the text mark-ups and callouts. An instructor could choose to discuss elements verbally or add their own animated PowerPoint callouts instead. Second, the white background of the image has been removed, giving a slightly more professional appearance as though the elements are integrated into the slide itself. Finally, a faint shadow has been added to the image to give more depth to the visual.

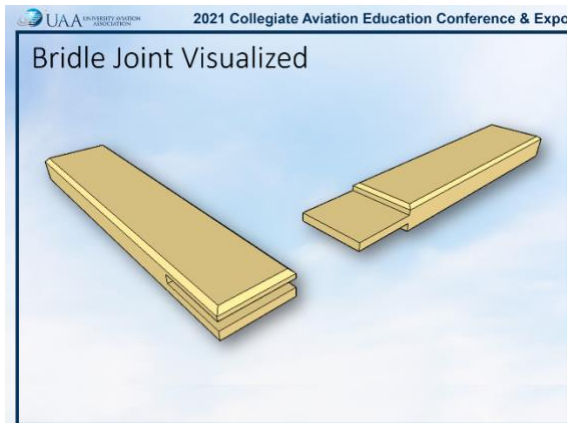


Figure 6. Improved bridle joint visualization without text labels

Depending on the quality of the image, removing the background from images can be a relatively easy task using built-in PowerPoint tools. The easiest method to attempt first is the “set transparent color” tool. This works especially well for high-quality images where the background is a consistent shade. If that method doesn’t work, the “Remove Background” tool allows for specific adjustments to what should be retained or removed from the image. Numerous step-by-step tutorials for either of these tools can be found online by searching “PowerPoint set transparent color” or “PowerPoint remove image background.” If a lower quality image is used, these two methods may not yield acceptable results, and a photo frame effect from the “Picture Format” ribbon menu can be utilized to add some visual interest instead.



## Editing FAA Images

As discussed above, FAA handbooks contain hundreds of high-quality images, all copyright-free. But in many cases, they can still be cluttered with excessive text labels and callouts that detract from the lesson presenter. Thankfully, the PDF versions of most FAA handbooks allow course designers to edit the images and remove unwanted elements. For an example of this technique, the left-hand image of figure 7 shows a diagram of a carburetor from the Pilot's Handbook of Aeronautical Knowledge (U.S. Department of Transportation, Federal Aviation Administration., 2016). The graphical representation of the carburetor is desired, but the numerous callout boxes and textual descriptions are overwhelming and distracting. In the right-hand image, the image in the PDF file has been edited to remove these elements, and the carburetor diagram has been captured via the screenshot techniques described above. Simplified PowerPoint callouts and animations can then be used to focus the learner's attention as the lecture progresses. This example is interesting because it closely mimics experiments done by Chandler and Sweller (1991), which demonstrated learners presented with simplified diagrams required less time to learn the material and scored higher on follow-up evaluations.

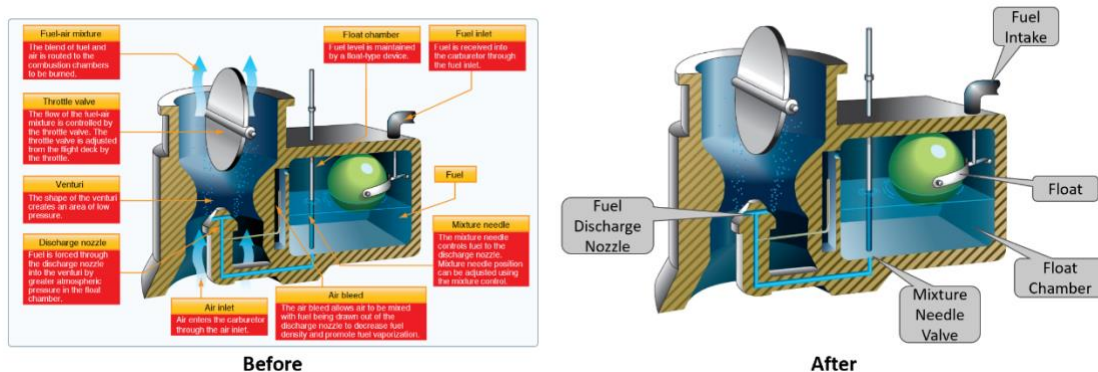


Figure 7. Carburetor diagram before and after. (U.S. Department of Transportation, Federal Aviation Administration., 2016)

This technique is possible if you have an Adobe Acrobat DC software license, which does require a paid subscription. The free version of Adobe Reader will *not* support this functionality. To begin, open the FAA handbook in Adobe Acrobat, find the desired image, then select the “Edit PDF” option. This tool can be found either under a “Tools” tab at the top of the window or in the tools pane on the right side of the window. Once selected, all drawing and text elements in the PDF become editable, allowing them to be adjusted, changed, moved, or deleted from the document entirely (figure 8).

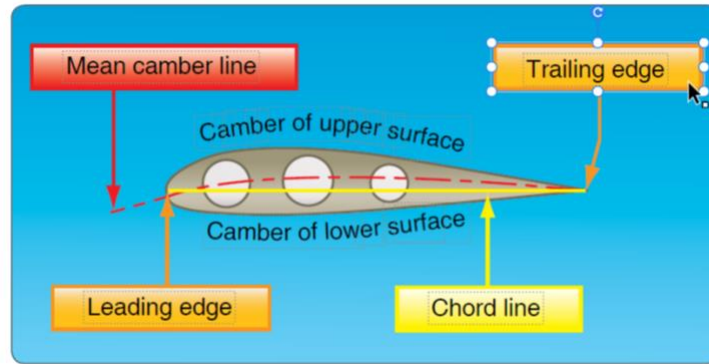


Figure 8. Editing FAA image in Adobe Acrobat. (U.S. Department of Transportation, Federal Aviation Administration., 2016)

Once the edits are complete, selecting “Close” in the upper right-hand corner closes the edit tool, and a screenshot of the modified image can be captured.

An added benefit of the edit tool is that it allows instructors to pare down FAA readings to focus a learners’ effort outside the classroom. For example, on a lesson regarding ATC clearances for IFR operations, you may wish to assign reading from the “Clearances” Section on pages 10-3 through 10-5 of the Instrument Flying Handbook (U.S. Department of Transportation, 2012). Instead of conveying that and hoping the learner selects the appropriate section, the handbook can be edited to extract the desired pages and remove the sections that do not apply. The resulting PDF file can then be uploaded to a learning management system for the student to review.

### Conclusion

Some of the methods discussed in this paper describe a simple yet effective way of incorporating more engaging and visually appealing content into traditional PowerPoint presentations. Yet others admittedly require a more substantial investment in time and creativity to implement effectively but can yield greater results in learner engagement and content retention (Napper, 2014). Another element not discussed in this paper is the creative difficulty in finding ways to represent concepts visually (Napper, 2014), which was a significant personal hurdle when implementing these methods. As with many things in life, I suggest starting your own personal course conversion in small steps. In my own experience, starting out with the intention of re-inventing all course material at once is an overwhelming and impossible endeavor, so focus on small implementations where you can. If you come across one or two slides per presentation that you can easily update to an image-based depiction, start there. Over time, you will become more comfortable with the tools and methods, resulting in a reduced time commitment. You may also find your personal creativity grow with more practice, making those more difficult visual representations easier to achieve.

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