Educator's Toolkit

Principles, Techniques and Tools that Promote Successful eLearning

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During the COVID-19 pandemic, eLearning ? learning that occurs through electronic means ? increased exponentially. Many optometric educators found themselves teaching online classes for the first time in their careers. We were thrust into learning new instructional delivery techniques and new technologies in a very short time. We experimented with learning management systems and figured out how to use electronic teaching aids that we had not found time to learn in the past. Now that we have cleared the initial hurdles of adapting to modified teaching platforms, we can focus on maximizing their effectiveness as teaching tools so our students are successful eLearners.

First Things First

Figure 1. Click to enlarge

Compared with traditional instruction, eLearning has many advantages. It is customizable and more broadly accessible. It is self-paced for students, and both they and their teachers can benefit from learning analytics. However, an eLearning course must do more than look good. It must be effective.

When considering the design of an eLearning course, one must answer several foundational questions. For example, it is important to consider your audience and the learning goals, which will inform the delivery system. The Learning Rooms recommends five questions to ask yourself when developing an eLearning course **(Figure 1)**.

Incorporation of eLearning Principles

Design and delivery of effective eLearning encompass a variety of strategies, including the application of eLearning principles, such as those developed by Mayer **(Table 1)**. According to Mayer's Cognitive Theory of Multimedia Learning (eLearning is a form of multimedia learning), there are dual channels (auditory and visual) for processing words and pictures, and people have a limited capacity to actively process the information in the channels.[1] Application of eLearning principles reduces the cognitive load, which frees the working memory to be used for learning and helps to ensure the instruction aligns with cognitive learning processes.

I wonder how many optometric educators are familiar with eLearning principles, such as the redundancy principle, the coherence principle or behavioral vs. psychological engagement? Based on your teaching experience, how would you respond to the following questions?

- Do you believe adding elements such as pictures, graphics, sounds or music to a lesson to make the presentation “pop” engages students and facilitates learning? I would have responded yes. In fact, as Harp and Mayer found, extraneous pictures can interfere with learning.[2]
- Do you think students learn principles more effectively by playing a game in which they apply the principles or by using a slide presentation? My guess would have been a game, but in a study by Adams et al., students who learned with games performed worse than students who learned with slideshows on several parameters, including retention and post-test scores.[3] Interestingly, this finding aligns with the idea that psychological engagement and not behavioral engagement is the driver of cognitive learning.[1]
- In a narrated animation, do you think having the narrated text on-screen simultaneously reinforces what students are learning? Again, I would have said yes. However, several researchers, including Austin[4] and Moreno and Mayer,[5] found that students performed better when they did not have on-screen text to accompany the narrated animation.

Andrew DeBell, a training consultant with Water Bear Learning, has written an informative and well-illustrated article on how to apply Mayer’s 12 Principles of Multimedia Learning. Other experts in eLearning have also created helpful resources, including websites and podcasts, for faculty **(Table 2)**.

Table 1. Click to enlarge

Table 2. Click to enlarge

eLearning Authoring Tools

For help creating eLearning courses, educators can use an eLearning authoring tool. An eLearning authoring tool is software used for developing digital content. A variety of authoring tools, which are cloud-based or desktop-based and different in complexity and price, are available. They range from something as simple as the ability to add hotspots to an image (click an area on an image and an action happens), to stand-alone course authoring software, to a learning management system with built-in authoring software. Many eLearning authoring tools, including these, offer a free trial:

Adobe Captivate

- Desktop-based course authoring software
- 30-day free trial available
- Student and teacher price: approximately $400 one-time fee or $34/month subscription

Articulate 360

- Family of eLearning course authoring tools that includes desktop and web-based applications
- Includes Storyline 360 and Rise 360
- 60-day free trial available
- Academic price: approximately $500/year/user on a personal plan; $650/year/user on a team plan

Gomo

- Cloud-based eLearning software
- 21-day free trial available
- Pricing: approximately $1,000/year/user; $3000/year for a team up to four

Adapt

- Open-source web-based course authoring tool

- Price: free

Camtasia

- Screen capture and video editing software suite
- Used in conjunction with eLearning authoring software
- 30-day free trial available
- Education pricing: approximately $170 one-time fee

The Cardinal Rule

While an array of technologies can be incorporated into eLearning courses and used in creating them, it's important to remember they are the means, not the end. If not used properly, technology does not support learning. The key to successful eLearning and teaching, as Krippel et al. state in their paper "Multimedia use in Higher Education: Promises and Pitfalls," is that pedagogy must drive education technology, not the other way around.[6] It is vital to understand and implement this concept as we continue to explore instructional approaches for online settings.

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