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THE IMPACTS OF INTERACTIVITY AND ENGAGEMENT FOR THE DIGITAL LEARNER

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In an Introduction to Digital Practices course, university students were unable to apply their newfound software program knowledge to design intricate art projects. A digital guide called a Tool Lab was created so that students could be pre-introduced to the tools and functionality of targeted software programs. Designed with the concepts of Bloom's Taxonomy, the Tool Lab eLearning guide was built in PowerPoint and consisted of YouTube video tutorials. At the end of the Tool Lab modules, students were required to complete a quiz in Survey Monkey. In the end, students only used the Tool Lab modules after they had been introduced to the software programs in a lecture. Failure includes a lack of structure in Tool Lab design, an influx of unnecessary material, a loss of student engagement, and minimal incentive to complete follow-up quizzes.

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INTRODUCTION

Our ever-growing economy demands digital literacy amongst those in the workforce. To be competitive, one must be technologically innovative, as well as a subject matter expert in their field. Bergson-Shilcock (2020) explains in the article Boosting Digital Literacy in the Workplace: How Rapid Prototyping Is Helping Businesses to Upskill Workers and What Policymakers Can Do to Help, that even non-technology-based companies such as KeyBank, are implementing programs so that general banking employees can train in subjects such as robotics and data analytics. Universities such as The University at Buffalo (SUNY) offer art and emerging technology courses so that students in all majors can be well-rounded.

Introduction to Digital Practices

In 2018, one such course included Introduction to Digital Practices, which offers an exploration of commercial art and computer science software. The goal of the course was to provide a basic understanding of the programs Adobe Illustrator, Adobe Photoshop, the audio editing program Audacity, and the computer programming software Processing.

It was also essential for students to convey certain artistic concepts in final compositions. In introductory lectures, poignant ideas such as shape and color invoking meaning, or sound containing texture, were discussed in tandem with software programs. Students were required to implement meaningful artistic ideas in final pieces that also implicated technical skills.

Meeting twice a week, students worked in a computer lab to access software programs and develop projects. In a four-week project timeline students were expected to:

1. Learn the basics of a software program after an introductory lecture.
2. Generate a small project from a software tutorial to demonstrate knowledge and understanding.

3. Create a final art piece that conveys an understanding of artistic design concepts and proficient comprehension of the software program.
4. Present the final art piece in a classroom critique.

For example, when focusing on the program Adobe Photoshop, students were given a short guide to software tools and a lecture on how photomontage can be an active component of storytelling. The students completed a tutorial to further improve their Adobe Photoshop understanding. They were then allowed to explore the program while creating a photo montage. At the end of the Adobe Photoshop section, the students were required to present their final photomontage in an artistic critique.

While the students were not expected to be experts in the software programs, they were supposed to obtain enough skill to create complex designs with intricate symbolic meanings. However, it became evident that some students were having trouble connecting their newly found software knowledge to their own conceptual art projects.

Common issues included the underutilization of design tools, improper use of tools, and an inability to display intricate design and artistic concepts. It became common for students to produce thoughtful assignments with minimal software tool usage. In contrast, other students would produce highly stylistic projects with little to no conceptual thought. It was later discovered that the students who created projects with complexity had obtained training in various software programs prior to the start of the course.

As an instructor, it became obvious that students enrolled in the course needed more time to learn how to operate software programs. However, there was a conflict between the knowledge that needed to be learned and the amount of time allowed to learn it. Thus, interactive modules called Tool Labs were designed.

DESIGN PROCESS FOR INTERACTIVE TOOL LABS

After analyzing how the difficult time constraints negatively impacted the students enrolled in the course, I generated ideas that eliminated knowledge gaps in software understanding. It was concluded that students should be pre-introduced to the tools of software programs prior to commencing a new section. If students had a general understanding of certain mechanisms of the software programs, then the students could more masterfully utilize tools and have an easier experience when creating artistic projects.

An outcome was expected with the result that students would create artistic pieces that utilized 5-6 software tools. Furthermore, each project would evoke artistic themes discussed in the course. In the end, students were expected to have a greater understanding of the functionality of the

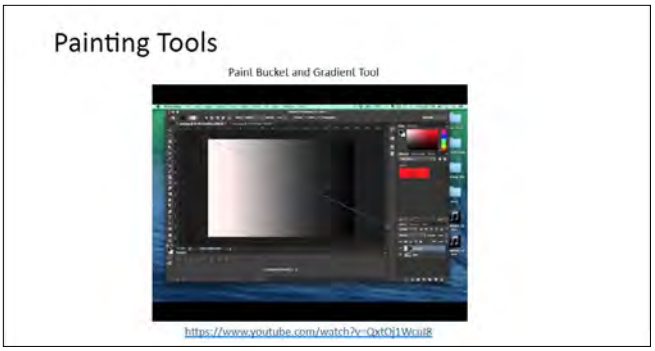

FIGURE 1. An example of a Tool Lab slide. Students can play a video in presentation mode in PowerPoint.

specific software program and would be able to perform basic functions with ease.

Designed to be online-based and self-directed, the Tool Labs were conceptually created with distinct parameters. For example, it was imperative that students work on Tool Labs asynchronously, so that artistic projects could be the focus during in-person classes. Therefore, students would need to have full access to the format of the Tool Lab outside of designated computer labs. Also, because students only had access to software programs in a computer lab, the software used to build the Tool Lab modules had to be free and compatible with multiple devices.

It was necessary that Tool Lab modules contain interactive elements and ways to test student knowledge. The article *Effects of Interactivity in Educational Games: A Mediating Role of Social Presence on Learning Outcomes* discusses how interactivity makes the course material more coherent for the student and increases learner engagement. If a general understanding was to quickly be reached about the functions of targeted software programs, students had to relate to the material and have an interest.

Students were not expected to automatically know how to operate software programs after using the Tool Lab modules. Consequently, it was unlikely that the Tool Lab modules would heavily utilize the use of software programs. Therefore, student interactivity would have to be implemented through alternative means.

Also, quizzes had to be utilized to test student knowledge. It was crucial to capture student growth and understanding on a measurable scale. As an instructor, it would be possible to gauge if students were skipping module sections and retaining module information. Furthermore, in Introduction to Digital Practices, students needed a stimulus to increase their learning.

Ruscio (2001) discusses the need for knowledge checks in the article *Administering Quizzes at Random to Increase Students' Reading*. Ruscio performed an experiment where students were randomly assigned quizzes after scholarly

readings. A higher level of learner retention was visible, and students were more motivated because there was an incentive at the end of reading assignments.

The Tool Lab modules utilized concepts from Bloom's Taxonomy as students were (a) remembering tools from previous programs, (b) understanding how tools worked from different videos, (c) visually seeing in videos how these tools can be applied to their art projects, (d) internally analyzing how these projects can be applied to their own artwork, (e) evaluated on learned concepts in quizzes, and (f) encouraged to create ideas for their final projects.

Bearing in mind these factors, the Tool Lab modules consisted of a presentation in PowerPoint, integrated videos (see Figure 1), and quizzes after each video with a survey hosting software called Survey Monkey. The students were given access to the PowerPoint a week prior to a new software program being introduced. The students were given a list of program tools that they had to learn and were instructed to watch how-to videos that corresponded to each tool. Afterward, students clicked a link within the PowerPoint presentation that led to a quiz in the program Survey Monkey, which recorded their responses.

PowerPoint & Structure

The program Microsoft PowerPoint is ubiquitous in all educational settings. While typically utilized to present expansive lectures, the presentation program also has other immersive features. In connection with the Tool Lab modules, the video embedding feature was utilized. Students could open the PowerPoint presentation and display it in the presentation format. Students could then navigate between slides and view integrated videos.

The program Microsoft PowerPoint was also introduced as the hosting format for the Tool Lab modules because it is accessible for multiple computer operating systems. Because most students in the Introduction to Digital Practices course were not art majors, many typically cut costs by getting Google Chrome books, or even tablets. These devices only stream the internet and generally do not allow the downloading of other programs. Also, Microsoft PowerPoint is compatible with other 3rd party software programs such as Google Slides. In this way, students did not have to download the program Microsoft PowerPoint or purchase a subscription to the program.

Integrated Videos

The embedded video tutorials were from the video hosting site YouTube. The video tutorials lasted from approximately 3-10 minutes and contained a tutorial for specific tools (see Figure 2). The video hosting site YouTube was specifically chosen because of its versatility and usage.

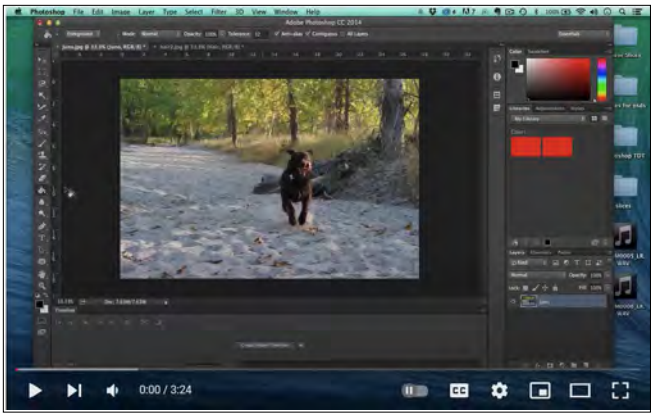

FIGURE 2. An example of a video included in a Tool Lab module. This includes a discussion surrounding the Paint Bucket and Gradient tool in Photoshop. It is approximately 3 minutes long. (Lewis J., 2015).

Access to YouTube is of no cost and can be played on multiple devices. Furthermore, because YouTube is its own website, students could create their own profiles and copy the links to the videos from the PowerPoint. They could then create their own library of tutorials that resonated with them. Also, through the YouTube algorithm, students could be introduced to similar videos that could assist them with future projects.

Embedded videos were also selected by those created by working professionals. In this way, students could be at ease because they did not have to analyze scholarly vernacular. Furthermore, students could expand their learning of different careers in artistic and technical industries.

Survey Monkey

The usage of online survey site Survey Monkey was utilized because the site generated data from its answers as well as allowed for versatile survey questions. Making use of a 3rd party survey system was controversial because there was the availability of the learning management system Blackboard. While Blackboard would allow for certain data analysis for quizzes, it should be noted that the features of Blackboard were limited for faculty and staff and were not commonly used in the art department.

As an instructor, it presented little difficulty to generate a SurveyMonkey account. A quiz was generated for each tool and was compiled with of an overview of questions from each video. Students were able to attach quizzes to their names so individual data could be generated.

Other Design Additions

After the initial Tool Lab module, subsequent Tool Lab modules contained a comparison list that juxtaposed tools from previous software programs to the one that was being introduced. This was especially impactful for programs that

had the same creator such as Adobe Photoshop and Adobe Illustrator. Students could immediately understand the functionality of new tools and further develop their understanding of the targeted software programs.

OUTCOMES

Students generally enjoyed the Tool Lab modules; however, they used them as more of an additional resource after introductory lectures. From a general perspective, student data in Survey Monkey, exposed that the students watched approximately half the video tutorials, and then skimmed the rest in the PowerPoint presentation. Moreover, throughout the semester, students stopped completing the quizzes.

Student feedback included an inability to understand video tutorials because of the limited context. Because certain software programs were being introduced prior to the start of a new section, the videos were seen as intimidating to students. Furthermore, because the students could not fully follow the video tutorials, they had little interest and engagement was lost.

When presented with a general question in a class session, many students could give a general definition of a tool but could not fully identify it by name or missed some of the key features. For example, if asked the question "What is the Quick Selection tool in Adobe Photoshop?" A student could say "It can select items more quickly than the other tools" but could not give any more specific reasoning. If asked something more pointed such as "What must you do to make sure your selection has smoothed edges," students could say something like "You have to make sure of the Feather Selection," but could not explain the process to complete the task.

FAILURE IN THE INITIAL DESIGN

The first interaction of the Tool Lab modules was highly stylistic in design. Created using the platform Intuiface, the interactive tutorials were created to be a downloadable virtual experience. The concept behind the functionality of the tutorial would be to have students simulate using specific software tools. They would also watch video tutorials and complete interactive assignments.

After creating a test product, students were sent a link to the Intuiface program. It was found that the students were unable to access the Intuiface platform. The link required downloading an executable file extension that was incompatible with many student devices. Furthermore, students were prompted to create an Intuiface account and then were bombarded with various pricing options.

After consulting with students and examining the various accessibility issues, it was found that a simplified design was necessary. The students required a familiar platform that could be compatible with multiple devices. This would eliminate intimidation and increase student participation.

FAILURE IN SUBSEQUENT DESIGN

The failures of the second iteration of the Tool Lab modules are also the responsibility of the designer. The lack of success of the tutorials is holistically determined by an insufficient amount of student engagement and progress. In an informal class survey, the efficiency of the Tool Labs was examined.

Questions asked involved included:

1. Do you think these Tool Labs are helpful?
2. Do you better understand how to use the tools within various software programs?
3. Are the videos in the Tool Lab helpful in learning different design techniques?

While the Tool Labs were received positively, they were not effective for the intended use. The interactive tutorials failed to assist in greater user understanding. Furthermore, the students did not welcome the rigidity of the PowerPoint structure or the length of the integrated videos. Also, after reviewing the data, it was later revealed that the Survey Monkey quizzes were not an ideal way to measure student growth.

User Understanding

The Tool Lab modules were not utilized for their original purpose. It was later learned in the informal classroom survey that the interactive tutorials were used as reference guides outside of classroom hours. While the Tool Lab modules explained the function of each tool, students had a difficult time connecting professional artistic pieces to their own projects.

Typically, in-class software tutorials were utilizing several tools to create a composite image. This artistic process of using different techniques to create a single composite image was reflective of the students' process. The representation of how each software tool could come together to symbolize necessary themes was vital for student knowledge growth.

In the Tool Lab students were shown videos that highlighted the function of software tools but did not convey similar artistic concepts and themes. These videos also showed professionals that created highly stylistic artistic pieces that students found to be intimidating. Also, while each video showed the function of each software tool, each artist had their own way of utilizing the software tool. Sometimes the functionality presented by instructors differed from the usage of professional artists which resulted in confusion among students.

PowerPoint Structure

The PowerPoint format was revealed to be rigid and unnecessary. First, it was not explained to students that each Tool Lab must be displayed in presentation mode. When a student went to play a video, they were unable to select embedded hyperlinks because they were in editing mode.

The students quickly lost interest in watching a series of videos. Interactivity was limited to pressing a button and watching a video. While the integrated videos were immersive, students typically lost interest because hands-on engagement ended too quickly.

PowerPoints were found to be an unfriendly user interface for mobile devices. Many students enjoyed watching videos on their phones outside of classroom hours. The PowerPoint formatting resulted in large files that students found incompatible with many phone applications.

Furthermore, the links in the videos resulted in the opening of the YouTube application. This resulted in the opening of several windows on their mobile devices. Ultimately, it became difficult to take notes, and navigate between the videos and the PowerPoint.

Integrated Videos

First and foremost, it was determined that the length of the integrated videos was often too long and too varied in length. While the videos were selected to run for less than 10 minutes, some videos contained information that was not applicable to the course's learning objectives. Occasionally, an integrated video would give extraneous information regarding an artist's background, themes from other artistic movements, or information regarding other software tools. This resulted in student confusion and an overall decrease in student engagement.

Furthermore, videos that were approximately 8-10 minutes in length would give brief explanations, in order to incorporate more software tools. This caused students to be lost and miss full explanations of tool functionality. This resulted in either prematurely ending videos or performing poorly on quizzes.

Survey Monkey Quizzes

Students ceased to complete the survey monkey quizzes after the first two units. There was no incentive created in the design that would ensure that students would complete the quizzes. Therefore, the students assumed completing the quizzes was not mandatory. As a result, accurate data could not be generated to understand changes in student growth.

Regarding quizzes that contained completed answers, it was revealed during the informal class survey that students had a difficult time recalling knowledge from the integrated videos. There were no parameters in the design that directed students to answer quizzes after the integrated videos. Because of this, students could complete the quizzes days after watching the integrated video tutorials.

CONCLUSION

The Tool Labs did not result in students utilizing more tools nor did it influence students to create more stylistic artist projects. Other failures included various oversights by the designer. For example, there was little consideration of how much time students had outside of classroom hours to complete the Tool Labs. There was also minimal consideration for student accessibility and device resources.

Furthermore, the comparison between students who created more complex projects versus those who created projects with limited detail was inaccurate. There was little consideration for how much exposure was had by those who had more confidence operating software programs. Also, while the course was for non-art majors, students who majored in art also participated in the course.

However, while the Tool Lab project was unsuccessful for its original purpose, it resulted in being a useful review resource for students. Students were able to remember the names of certain tools during call and response times in face-to-face classes. Also, after completing their projects, many students referred to the integrated videos to discover how to create stylistic endeavors.

FINAL THOUGHTS

The format of the Tool Labs was overwhelmingly incorrect. Unbeknownst to me at the time, there were other integrative software programs that could have been more user-friendly and impactful. One program that would have been available in 2017 is the integrative framework in H5P.

H5P allows for the creation of digital modules. Course developers can add presentations, videos, and interactive games, into a navigated interactive lesson. The interactive lesson can be embedded into a learning management system. H5P also allows students to submit their assessments at the end of the lesson so that feedback can be evaluated by instructors.

All issues that came from the design of the Tool Labs including a rigid and unfriendly user interface, the lack of interactivity and student engagement, and the lack of accurate assessment and usable feedback could have been eliminated with the tool H5P. As the designer, it would have been more prudent to:

- Create separate interactive modules for each software program in H5P.
- Integrating shorter instructional YouTube videos in one section of the interactive lesson.

- Creating some sort of game or engaging quiz to reiterate the short-form YouTube videos.
- Embedded these lessons into Blackboard for students to access.

In the end, students could have had a singular location to access their software tutorials. Furthermore, they could have obtained higher levels of understanding with various interactive features and easy-to-follow navigation. In the end, the students of Introduction to Digital Practices could have understood how to use software programs more efficiently.

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