Evaluation of Vinyl Cutter Training Modules

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IST 622: Assessment and Evaluation

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Table of Contents

Section I

Introduction

The prototype used for this evaluation is a three-module portion of my capstone project. The efforts of the capstone are directed at creation of a safe and effective vinyl cutter "Level 1 Badge" course for the Monterey Bay Aquarium's (MBA) Innovation Lab. Acquisition of a "Level 1 Badge" permits the learner to use the vinyl cutter with supervision. The three-module prototype, created with Articulate 360 Storyline software, was made available to learners via upload to a personal GitHub account.

Eight learners supported evaluation of the prototype, six of whom were observed. The effects of the training on learning were analyzed via pre-course and post-course tests (see Appendix A). Learners were instructed to complete the modules with a critical eye, preparing them to provide requested feedback. Six learners were observed with the aid of an observation checklist (see Appendix B). A usability survey (see Appendix C) allowed all participants to provide requested feedback. Observed learners were presented with interview questions (see Appendix E) at the conclusion of data collection to gather any feedback that may have been missed in the observation and usability survey.

Section II

Methodology

Prototype

A series of three modules, comprising sections 4 – 6 of the planned 13-module capstone course, make up the prototype. Please also see Appendix I for links:

- Module 4: Vinyl Cutter Parts and Their Purposes
- Module 5: Materials You Can Use with the Vinyl Cutter

- Module 6: Vinyl Cutter Safety

It is anticipated that these modules will be accessed by the target audience via computer with either their personal hardware or laptops in the Innovation Lab. Currently, it is anticipated that most participants will complete modules in the Innovation Lab, but course design provides the opportunity for asynchronous completion by learners in any setting.

Modular layout and look are consistent. All three begin with an introductory slide followed by a YouTube training video. The video is followed by review slides, understanding check-in questions, and a final "References" slide with linked access to resources. Voiceover audio for orientation is present in the first, third, and second-to-last slides. Graphics were drawn from the vinyl cutter user's manual (Roland DG Corporation, 2015), Adobe Stock images, Monterey Bay Aquarium assets provided by subject matter experts (SMEs), and photographs taken in the Innovation Lab. Fonts, colors, and logos align with the Monterey Bay Aquarium's brand look requirements. See Appendix G for prototype look and design examples.

Module 4 has five integrated understanding check-in questions, Module 5 has three, and Module 6 has seven. Question types include drag-and-drop (see Appendix G, Image 8), hot-spot clickable questions (see Appendix G, Image 7), one-correct-answer multiple choice questions (see Appendix G, Image 4), and multiple-correct-answer multiple choice questions (see Appendix G, Images 5 and 6). These understanding check-in questions are designed to elicit active engagement and to provide the opportunity for provision of corrective or confirming feedback. If a question is answered incorrectly, the learner is prompted to try again and has unlimited attempts to do so. Per SME direction, understanding check-ins are intended to be engaging, fun, and are not punitive in nature.

Learners

The course's target audience is 11- to 65-year-old Innovation Lab participants. The Lab hosts school field trips, summer programs, and teacher training courses in which participants learn to use a variety of tools. The age range is wide, and participants come from a variety of backgrounds. It is possible that some learners may have prior knowledge of vinyl cutter use, but training materials aim to meet the needs of novices, instructing to the lowest level of understanding. Basic familiarity with computer navigation is assumed, including the skills of clicking to select, dragging-and-dropping elements, and answering quiz questions in an online format. In its current iteration, the course serves an English-speaking audience, though translation efforts are eventually intended.

Learners supporting this evaluation included four Innovation Lab program assistants, who completed the course through Monterey Bay Aquarium's current learning management system (LMS) Thinkific. Prior to completing the modules, Thinkific learners were provided with a navigation note accompanied by supportive images (see Appendix H for images), which notified them when to select "Next" and when to select "Complete and Continue," an option which is integrated into every Thinkific section. While Thinkific is the current LMS, SMEs have communicated a possible LMS change soon. The four other volunteer participants, who did not have MBA Thinkific access, were sent links to each of the three modules and were provided with directions via either email or verbal communication.

All learners were between the ages of 11- to 65-years-old, meeting the target audience criterion. The Innovation Lab hosts learners from a wide variety of backgrounds and experience levels – no additional criteria were necessary to determine the appropriateness of participation.

Expected Outcomes

The objectives of the "Level 1 Badge" vinyl cutter course in its entirety are both declarative and procedural. The three prototype modules' objectives are primarily declarative. It is expected that learners will experience an increase in understanding of the vinyl cutter parts and the purposes of those parts, what materials are appropriate to use with the vinyl cutter, and basic vinyl cutter safety protocols. Objectives include:

1) Given access to a visual job aid, Innovation Lab participants will be able to identify the purposes of the vinyl cutter's major parts with 100% accuracy on presented test items.
2) From memory, Innovation Lab participants will be able to identify appropriate materials to use with the vinyl cutter with 100% accuracy on presented test items.
3) From memory, Innovation Lab participants will be able to accurately identify basic safety guidelines with 100% accuracy on presented test items.

Tryout Process

The evaluation tryout process was comprised of four parts: 1) Pre-course and post-course tests to measure learning gains, 2) an observation checklist, 3) a usability survey to measure reaction, and 4) a post-observation interview to gather any recommendations or concerns not identified in the usability survey or observation. The tests and survey were created in Google Forms and shared with Innovation Lab program assistant learners via linear integration into the MBA's LMS, Thinkific. Learners completing the course outside of Thinkific were first emailed the pre-course test. Once notification of completion was provided, they were then emailed the three modules and instructed to complete them while evaluating content provision (audio, graphics, pacing, ease of navigation, ease of understanding, etc.). After notification of modules' completion was provided, remote learners were then sent the post-course test and usability survey.

Pre- and post-course tests were linked to learners' emails, allowing a paired t-test statistical analysis to be completed. Usability survey responses were kept anonymous. All eight learners completed the pre-course test, post-course test, and usability survey in the prescribed linear fashion. The six observed learners were interviewed after all other elements were completed.

Pre-Course and Post-Course Tests

Paired pre-course and post-course tests provided a measurable way to evaluate learning gains (see Appendix A). Pre-course and post-course questions were identical. To minimize test anxiety, pre-course test learners were greeted with an introductory message informing them of the expectation that they will not know the answers to presented questions.

All test questions were multiple choice with one correct answer. As all quiz questions were comparably difficult, they were each assigned a one-point value. Care was taken to ensure incorrect answers were plausible distractors. Multiple questions were framed within probable scenarios. Images with basic vinyl cutter parts labeled were provided as a reference.

After training completion, users were directed to complete the post-test, which precisely mimicked the pre-test.

Training

The three Articulate 360 Storyline-created modules were linearly integrated into the LMS Thinkific for Innovation Lab program assistants' completion. Remote users were provided links to each module by email. All modules were made available via a personal GitHub account. As anticipated, the three modules took learners between 15 – 30 minutes to complete. See Appendix I for module links.

Observation with Checklist

Six of the eight learners were observed. An observation checklist (see Appendix B) informed notes made during the observation. All observed learners were notified of my intention to observe them to ascertain the usability of the modules. Observation checklist items included such questions as, “Are all interactive elements of the module completed?”, “Does the learner encounter any problems that require assistance to continue?”, and “Does the learner express confusion at any point?” Learners were instructed to verbalize questions or concerns aloud, but to anticipate minimal intervention.

Usability Survey

Before initiating the tryout process, all learners were notified to anticipate a final usability survey (see Appendix C). They were encouraged to complete the course with a critical eye, facilitating provision of their thoughts on design, organization, ease of use, ease of understanding, and the degree to which multimedia did or did not support their learning. The usability survey, created in Google Forms, was integrated into the Thinkific course for program assistants’ completion and was emailed upon notification of course completion to remote learners. The first seven questions requested that learners rate their agreement with statements on a scale of one to five from “strongly disagree” to “strongly agree.” Example statements included, “The graphics in this course supported my understanding,” “The pace of instructional videos supported my learning,” and “The organization of information in this course was clear.” The final four questions were free-response. Learners were required to complete all but the last of the usability survey questions. Examples of free-response questions included, “What elements in this course did you like? What supported your learning?” and “What suggestions do you have for course improvement? How might your learning be enhanced?” See Appendix C for usability survey questions. See Appendix D for usability survey responses.

Interview

The six observed learners were asked final interview questions to gather any additional data not collected by the observation or usability survey. See Appendix E.

Tryout Conditions

The purpose of this capstone course is to facilitate efficient asynchronous course completion, which may take place in the Innovation Lab or remotely. While coursework culminates in hands-on vinyl cutter use in the Lab, the intention of creating the first sections of the training is to facilitate their completion at any time and in any place that accommodates the learner.

The four observed program assistants completed the modules in the MBA Innovation Lab with Innovation Lab laptops. The four remote learners completed the training on either a personal laptop or desktop computer. The tryout conditions of all eight learners were compliant with intended module completion conditions.

Section III

Results

Entry Conditions

All volunteer participants were between the ages of 11- to 65-years-old. The Innovation Lab welcomes participants between these ages from all backgrounds and experience levels. Intended entry conditions of the audience were thus met by all eight learners.

The four Innovation Lab program assistants were actively preparing to use the vinyl cutter in the Lab, aligning perfectly with intended entry conditions. Katy Scott, the SME supporting these Innovation Lab participants, reviewed and deemed the modules appropriate for this purpose prior to program assistants' completion. The four remote learners, while not

planning to participate in an Innovation Lab program currently, met the conditions of potential participants.

Instruction and Observation

All learners, both observed and not, were provided with instructions at the outset. Learners were notified of all components to expect. It was requested that learners evaluate the modules-under-construction to facilitate provision of their feedback upon completion.

One Innovation Lab program assistant experienced trouble with audio on the first slide. The Innovation Lab SME and I were able to troubleshoot this laptop technical difficulty, allowing course completion to proceed. Aside from this intervention, all six observed learners were able to complete the three modules without intervention. All learners completed the modules within the anticipated 15 – 30-minute time frame.

It was observed that four out of six observed learners did not select "Submit" on drag-and-drop and/or multiple-correct-answer questions, instead selecting "Next." This resulted in learner confusion at the lower-than-expected score they received upon completion of modular understanding check-in questions.

After watching the video on the second slide, one user verbalized aloud, "Am I supposed to exit out to watch the next video?" before they noticed the option to select "Next" within the module (see Appendix G, Image 2). One other user was observed to hesitate after the first video's completion before they proceeded with selecting the "Next" button. Interventional instruction was not required for either of these learners.

Upon reaching the first post-video review slide, one learner commented that they initially perceived the bulleted information in this slide to be a quiz question, believing that they were

meant to click-select one of the bubble bullets (see Appendix G, Image 3). This learner quickly realized the purpose of this slide and accommodated to the module format without intervention.

Outcomes

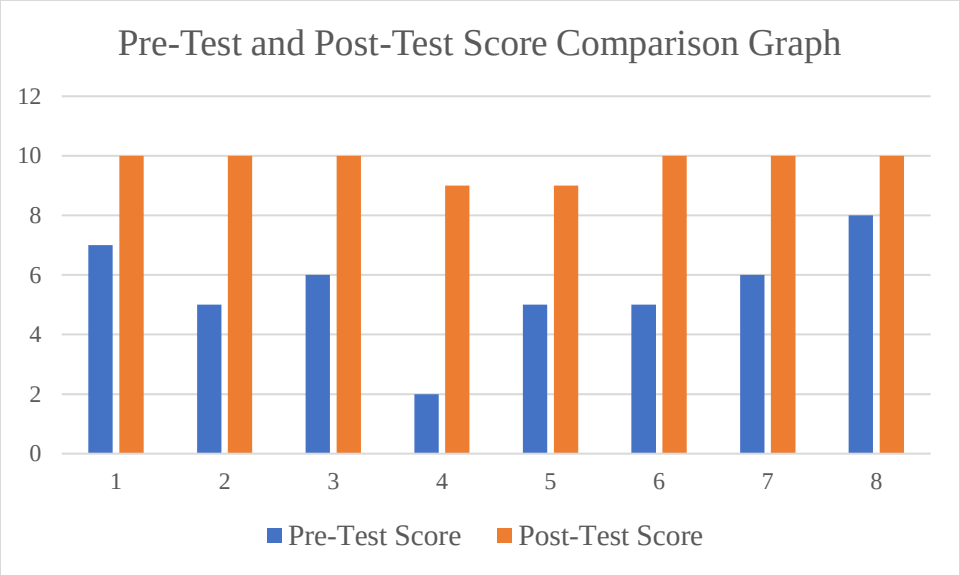
Learning Gains

Individual pre- and post-course paired test scores were gathered from Google Forms and transferred to an Excel spreadsheet. Table 1 below provides the scores of the eight learners. Table 2 below provides a visual histogram comparing pre- and post-course test results for each of the eight learners.

Table 1. Summary of Collected Data

	Pre-Test Score	**Post-Test Score**
Learner 1	7	10
Learner 2	5	10
Learner 3	6	10
Learner 4	2	9
Learner 5	5	9
Learner 6	5	10
Learner 7	6	10
Learner 8	8	10

Table 2. Histogram of Pre- and Post-Test Mean Scores



The ten questions in the pre-course test were repeated in the post-course test. As illustrated in the preceding tables, all learners scored higher on the post-test, with a mean pre-course test score of 55% and a mean post-course test score of 97.5%. See Appendix F, Tables 2 and 3, for pre- and post-course test descriptive statistics.

A paired t-test data analysis with a degree of freedom of seven was conducted in Excel to evaluate the research hypothesis that completion of the three modules would result in a statistically significant increase in test scores. The null hypothesis was that the training would have no effect, resulting in no statistical difference between the pre-course and post-course test scores. Because the research hypothesis was directional, the one-tail results of the paired t-test analysis were utilized. See Appendix F, Table 1.

Statistical significance was demonstrated between the mean pre-course and mean post-course test scores because the absolute value of the one-tail t-test statistic – 8.08 – was greater than the one-tail t-critical value of 1.89. Statistical significance was additionally demonstrated by a one-tail p-value of 0.000043, which is less than the conventional alpha level of 0.05. These statistically significant results are indicative of an increase in learning due to completion of the

three training modules. The null hypothesis was rejected, and the research hypothesis was accepted.

Given the statistical significance of results, further analysis was conducted to determine the magnitude of practical significance. With a pre-course test standard deviation (SD) of 1.77 and a post-course test SD of 0.46, the pooled SD was calculated to be 1.12. The pooled SD of 1.12, the mean pre-course test score of 5.5, and the mean post-course test score of 9.75 were utilized to calculate the effect size with Cohen's d formula. As the Cohen's d result of 3.79 is greater than 0.8, the magnitude of practical significance was determined to be great.

Paired t-test and effect size analyses demonstrate statistical significance and great practical significance, respectively, indicating that completion of the three-module training is a significant factor in improving post-course test scores.

Learner Reactions

Seven linear scale usability survey questions requested that learners indicate the degree to which they agreed, disagreed, or were neutral on presented statements. The final four questions were free-response. See Appendix C for usability survey questions. See Appendix D for usability survey responses.

The statements most commonly "strongly agreed" with were, "The graphics in this course supported my understanding," and "Audio in this course was easy to understand," with 87.5% of users selecting "strongly agree" and the remaining 12.5% selecting "agree."

Seventy-five percent of users strongly agreed with the statements, "This course was easy to navigate" and "After completing these modules, I feel better prepared to use the vinyl cutter in the Innovation Lab," while the remaining 25% selected that they "agreed" with these statements.

Sixty-two and a half percent of users “strongly agreed” with the statements that “The amount of information in each of the modules felt appropriate” and “The organization of information in this course was clear,” while the remaining 37.5% selected that they “agree” with these statements.

Thirty-seven and a half percent of users “strongly agreed” with the statement that “The pace of instructional videos supported my learning,” while the remaining 62.5% indicated that they “agreed” with this statement.

Linear scale question responses demonstrated the most positive learner response to audio and graphics. While support of learning was indicated by learners, the pace of instructional videos received the least enthusiastic support.

On the free response usability survey questions, 37.5% of learners independently expressed that their learning was supported by the clarity of content delivery, 25% expressed appreciation for the active learning facilitated via integrated questions, and 25% noted that the repetition of concepts via multiple media formats (audio, graphics, video, and text) supported their learning. One individual felt that seeing the vinyl cutter in the setting in which they would eventually be using it was helpful. Another commented that the review slide presentation was enjoyable, and one learner expressed an appreciation for the provided product examples. Additional notes provided at the end of the survey included, “I genuinely enjoyed doing this course. I was attentive the whole time,” and “I think it was really wonderfully done, the acting and especially the voice-overs were very clear and beautiful.”

When asked if they experienced any difficulty with understanding or navigation in the course, 87.5% learners communicated that they experienced no difficulty with navigation or understanding, with one user stating, “I think it was very accessible and easy to understand” and

another writing in, “It was super clear!” One user provided feedback that “I forgot I had to go to Next after one of the videos.”

By far the most common course improvement suggestion – from 62.5% of learners – was to be provided with a visual example of a vinyl cutting project from start to finish. The second most common improvement suggestion – from 25% of learners – was to demonstrate expected errors or difficulties and how to handle them. A course improvement suggestion from one learner was to reduce overstatement of information, while another requested to receive feedback on incorrect answers.

The two primary course improvement suggestions support the current course creation plan, which incorporates these requests (Module 10: Basic Vinyl Cutter Use Demonstration Video and Module 12: Troubleshooting Tips/Frequently Asked Questions). While one user expressed that concepts were over-iterated, multiple users communicated appreciation for the clarity of information provision and the multiple methods utilized; this concern will be taken into consideration as course creation work continues, balancing ease of understanding and attention maintenance goals. As the questions integrated into the course provide immediate confirming or corrective feedback, it is assumed that the request to receive incorrect answer feedback applies to the pre- and post-course tests, which were only intended for delivery to this specific learner population for the purposes of this evaluation.

In addition to collecting observation and usability survey data, observed participants were interviewed as a final part of the evaluation. Users were asked to provide feedback on any issues with understanding, navigation, audio, visuals, ordering of elements, pacing, or confusion, and to provide any general thoughts not addressed by these questions (see Appendix E). Interview question responses provided both new information and clarification of usability survey

responses. New information gathered from two users was that they missed the need to select more than one answer on the multiple-correct-answer questions, despite the inclusion of instruction in these questions to do so (see Appendix G, Images 5 and 6). In the observation, four learners were noted to not select "Submit" after completing the drag-and-drop and/or multiple-correct-answer questions (see Appendix G, Image 8), navigating directly to "Next" on those questions; this concern was discussed, and clarification was provided to learners confused by their understanding check-in scores. One user provided clarification on their assumed usability survey response that requested a reduction in overstatement of concepts, suggesting either brevity or "at least acknowledgement that things have been said before and that they are simple, but important." It is assumed that this clarifying feedback requesting either conciseness or acknowledgement of the need for reiteration is connected to the usability survey response reporting the same concern, as anonymity was retained in the surveys. Three out of six interviewed learners provided positive feedback for clear and pleasant audio. Five out of six interviewed learners expressed that the course was generally enjoyable and engaging.

Recommendations

Add Signaling Cues

A primary recommendation from this assessment is to incorporate additional signaling cues. In multiple-correct-answer questions, the word "two" will be boldened. See Appendix G, Images 5 and 6 for current presentation. On drag-and-drop and multiple-correct-answer questions, clear visual or textual direction to select "Submit" instead of "Next" before continuing will be integrated. To create consistent question format, it is possible that all questions will be altered to require that the user select "Submit" before they receive feedback, creating predictable

interactivity for the user and minimizing the need to provide directions catered to individual questions.

Another signaling cue will be incorporated to provide clear direction to select "Next" after video completion. This signaling will be accomplished either via voiceover audio preceding the video that directs the learner to watch the video and then select "Next," or an arrow pointing to the "Next" button accompanied by textual direction to select once the video has been watched.

Bullet-Point Appearance Modification

A minor modification to the modules' design will be filling in the bullet points on the review slides to avoid the appearance of multiple-choice bubble selection. See Appendix G, Image 3, for bullet-point review slide example. See Appendix G, Image 4, for multiple-choice bubble selection example.

Notification to Learner to Anticipate Review

Another modification to consider is the possible addition of a notification on the initial review slides that primes the learner for information reiteration, perhaps including a brief notification of study results that indicate increased learning gains via repetition in multiple formats. Inclusion of repetitive elements will be regularly evaluated to ensure that engagement and learning gains are optimized with helpful graphics, enjoyable videos, clear audio, and concise text.

Vinyl Cutter Project Start-to-Finish Video and How to Address Common Difficulties

Recommendations that relate to future module development support the current design plan. Multiple users indicated that they would benefit from seeing a vinyl cutter project from start to finish and from being shown common mistakes and difficulties alongside guidance on

how to address those concerns. Plans to include these elements in the final course deliverables will be retained.

Clear Instruction and Multimedia Use

Elements that received positive feedback will continue to be incorporated into future modules. Clear instructions alongside helpful graphics, crisp audio, and text will be incorporated. Active engagement will be elicited via questions that provide confirming or corrective feedback. Multiple information delivery formats will be utilized, including video, text, still graphics, and voiceover audio.

Summary

The research hypothesis that completion of the three-module "Level 1 Badge" vinyl cutter training improves post-course test scores as compared to pre-course test scores was supported by the results of the paired t-test statistical analysis. Effect size analysis with Cohen's d formula demonstrated great practical significance. These statistical analyses support the implementation of these training modules in the Innovation Lab to significantly increase learning gains for participants who would like to use the vinyl cutter with supervision. The usability survey and interview question responses demonstrated positive reactions to ease of use, navigation, and understanding, as well as learner appreciation for multimedia use, clear audio, informational graphics, and clear course design.

As work on the final 13-module "Level 1 Badge" vinyl cutter course continues, results and feedback from this protype assessment will be integrated into the three-module prototype and will be applied to future modules to optimize learning outcomes. Module improvement recommendations – including the addition of signaling cues, and course look and notification improvements – will be implemented. Modules intended for creation, including a start-to-finish

vinyl cutter project demonstration and a “Troubleshooting Tips/Frequently Asked Questions” module, will be made, supporting learner requests.

Appendices

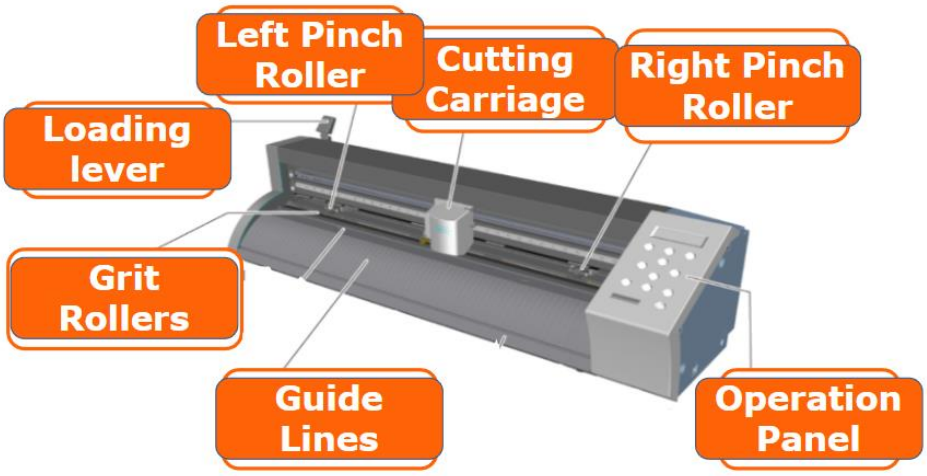
Appendix A. Pre-Course and Post-Course Vinyl Cutter Test

Correct answers are underlined for the purposes of this report.

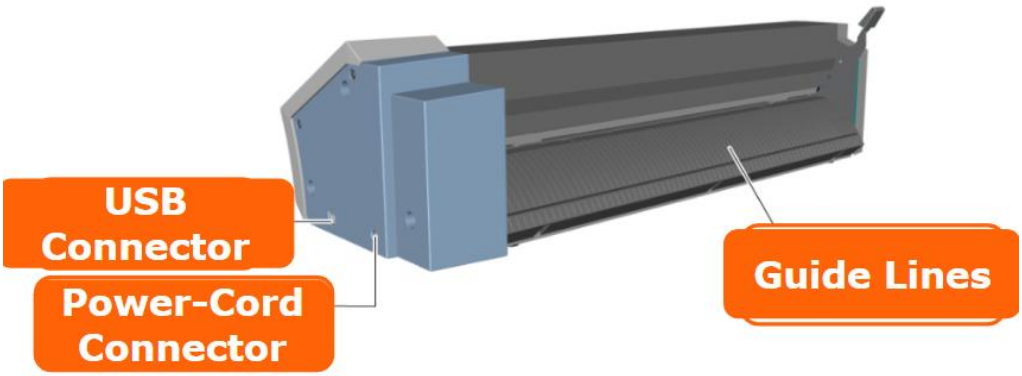
Pre-Course Test Introduction: It is expected that you will NOT know the answers to these questions yet. Think of this "quiz" as a preview of what you will be learning. Thank you for your participation!

Post-Course Test Introduction: Thank you for taking the time to complete the course! Let's revisit the questions you were presented with before you took the course.

Vinyl Cutter Parts: Please use as a reference if needed.



Vinyl Cutter Parts (continued): Please use as a reference if needed.



1) Which type of cut should you perform before starting a large project to ensure the vinyl cutter is operating as desired?

a) Test
b) Freeform
c) Force
d) Origin

2) Which one of these non-vinyl materials CANNOT be cut by the vinyl cutter?

a) Paper
b) Thin cardboard
c) Hard plastic
d) Fabric

3) You told the vinyl cutter to cut a sandcastle design. The vinyl cutter is cutting, but (oh no!) you notice that the vinyl isn't in the right place. What should you do?

a) Select the "Pause" button. Once you are certain the blade has stopped moving, make the needed adjustments. Ask an Innovation Lab staff member for help if needed.
b) When the cutting carriage is far away from the point that needs to be fixed, carefully adjust the vinyl into the right location.
c) Select the "Force Key." This will allow you to make force adjustments that fix the vinyl's placement. Ask an Innovation Lab staff member for help if needed.
d) Select the "Origin Key." This will take the blade back to the origin, allowing adjustments to be made. Ask an Innovation Lab staff member for help if needed.

4) Raising which piece of the vinyl cutter clamps the vinyl into place?

a) The right pinch roller
b) The loading lever

c) The grit rollers
d) The left pinch roller

5) The USB connector is an important part of the vinyl cutter because:

a) The USB connector allows you to provide design information to the vinyl cutter from your computer. It lets you tell the vinyl cutter what you want it to cut.
b) The USB connector allows you to charge the vinyl cutter. It lets you power your machine.
c) The USB connector lets you update the settings on the vinyl cutter. You'll need to perform this action every time you use the vinyl cutter.

6) Which part of the vinyl cutter holds the blade?

a) The grit rollers
b) The loading lever
c) The cutting carriage
d) The pinch rollers

7) You'll know you've found the glossy, waterproof vinyl when you see this number on the backing:

a) 631
b) 600
c) 651
d) 000

8) You notice that the blade isn't cutting all the way through your vinyl. What should you do?

a) Notify an Innovation Lab staff member. They will be able to make force adjustments to fix this problem.
b) Read the manual and then adjust the blade force as directed.
c) After pausing cutting you can use the pen force slider to adjust the force.

9) You want to cut a shark shape out of green, glossy vinyl to attach to your water bottle. Where should you look first?

a) The cupboard (below the vinyl cutter) where the rolls of glossy vinyl are stored
b) The remnants box
c) The location for ready-to-use vinyl changes frequently. Ask an Innovation Lab staff member to show you the current location.

10) Setting the vinyl cutter up to begin cutting in which corner of the material helps to minimize waste?

a) Upper left corner
b) Lower left corner
c) Upper right corner
d) Lower right corner

Appendix B. Observation Checklist

Question	**Y**	**N**	**Notes**
Is the learner able to start the modules without difficulty?	5	1	One user initially experienced inability to hear audio through the Innovation Lab laptop. The SME and I were able to resolve the issue, allowing the learner to begin the modules. Apart from this technical difficult, no trouble initiating modules was noted.
Does the learner ignore any functions of the modules?	4	2	Four out of six learners failed to select "Submit" after filling out drag-and-drop and/or multiple-correct-answer questions, ignoring the "Submit" button and clicking on "Next."
Are all interactive elements of the module completed?	2	4	Please see above concern regarding the need to select "Submit" after the drag-and-drop and multiple-correct-answer questions. All other interactive elements were completed by all six learners.
Is the learner able to navigate the modules without difficulty?	4	2	One learner asked if they should select exit out of a module after the first video's completion, but correctly selected "Next" without intervention. Another used was observed to hesitate and appeared confused by post-video navigation, but correctly selected "Next" as well. While "difficulty" was noted, both were able to navigate the modules without intervention.
Does the learner encounter any problem that they are able to solve on their own?	6	0	No problems encountered.
Does the learner encounter any problems that require assistance to continue?	0	6	No intervention required to allow module navigation to commence.

Does the learner express confusion at any point?	5	1	One learner verbalized confusion, asking if they should exit the module after video completion, but correctly identified the need to instead select "Next." Four other learners expressed confusion at receiving a final score on the integrated understanding check-in questions that were lower-than-expected (lower scores were due to failure to select "Submit" on drag-and-drop and/or multiple-correct-answer questions)

Appendix C. Usability Survey Questions

Usability Survey Introduction: Thank you for taking the time to complete these modules and for providing us with your feedback!

1) This course was easy to navigate.
   Please select one.
- 1: Strongly Disagree
- 2: Disagree
- 3: Neutral
- 4: Agree
- 5: Strongly Agree

2) The graphics used in this course supported my understanding.
   Please select one.
- 1: Strongly Disagree
- 2: Disagree
- 3: Neutral
- 4: Agree
- 5: Strongly Agree

3) The amount of information in each of the modules felt appropriate.
   Please select one.
- 1: Strongly Disagree
- 2: Disagree

- 3: Neutral
- 4: Agree
- 5: Strongly Agree

4) The organization of information in this course was clear.
Please select one.

- 1: Strongly Disagree
- 2: Disagree
- 3: Neutral
- 4: Agree
- 5: Strongly Agree

5) The pace of instructional videos supported my learning.
Please select one.

- 1: Strongly Disagree
- 2: Disagree
- 3: Neutral
- 4: Agree
- 5: Strongly Agree

6) Audio in this course was easy to understand.
Please select one.

- 1: Strongly Disagree
- 2: Disagree
- 3: Neutral
- 4: Agree
- 5: Strongly Agree

7) After completing these modules, I feel better prepared to use the vinyl cutter in the Innovation Lab.
Please select one.

- 1: Strongly Disagree
- 2: Disagree
- 3: Neutral
- 4: Agree
- 5: Strongly Agree

8) What elements in this course did you like? What supported your learning?

_____

9) What suggestions do you have for course improvement? How might your learning be enhanced?

_____

10) Did you experience difficulty with understanding or navigation at any point in this course? If so, please let us know where difficulty was encountered.

_____

11) Do you have any additional notes you would like to share?

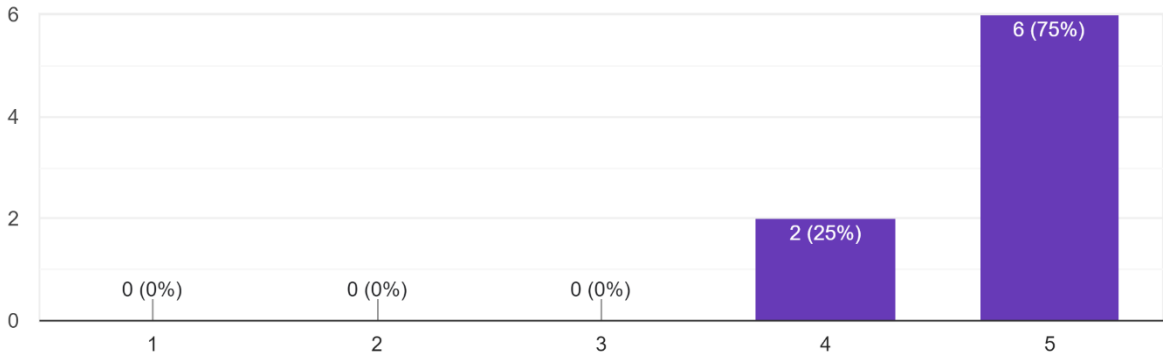
_____

Appendix D. Usability Survey Results

Usability Survey Question 1 Responses:

This course was easy to navigate. Please select one. 1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

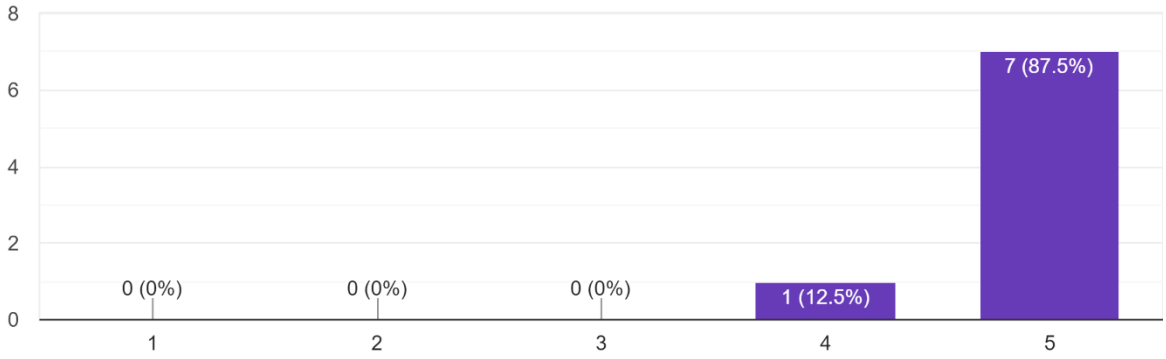
8 responses



Usability Survey Question 2 Responses:

The graphics used in this course supported my understanding. Please select one. 1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

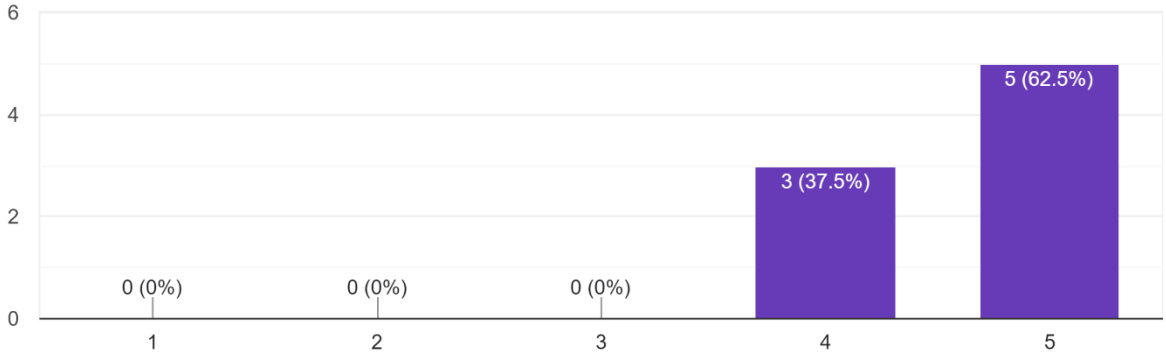
8 responses



Usability Question 3 Responses:

The amount of information in each of the modules felt appropriate. Please select one. 1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

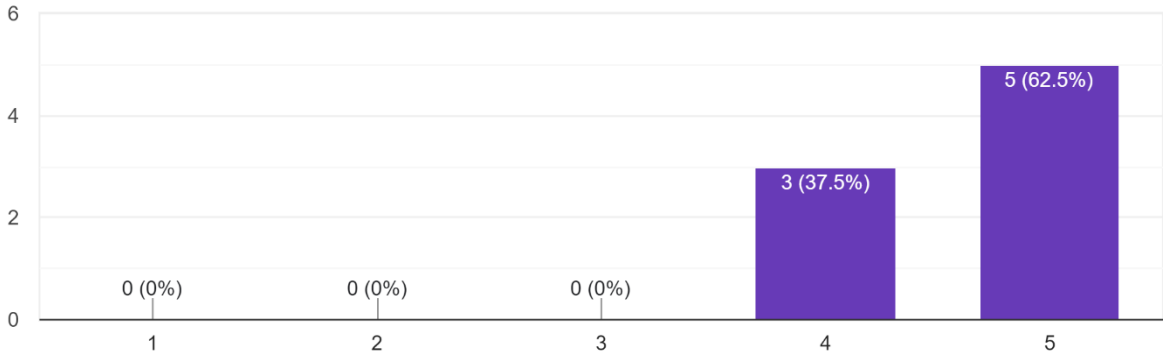
8 responses



Usability Survey Question 4 Responses:

The organization of information in this course was clear. Please select one. 1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

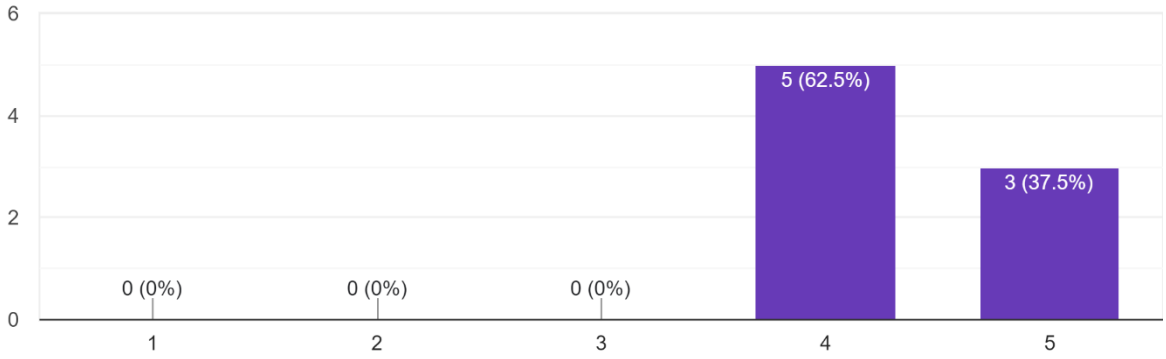
8 responses



Usability Survey Question 5 Responses:

The pace of instructional videos supported my learning. Please select one. 1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

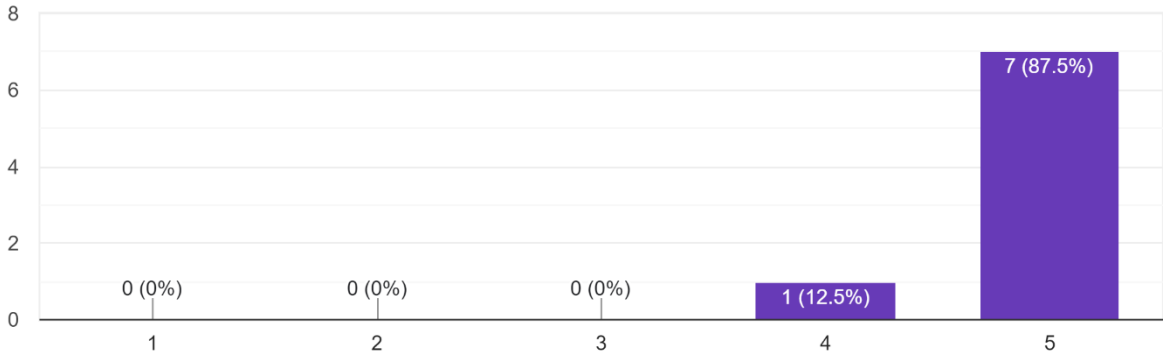
8 responses



Usability Question 6 Responses:

Audio in this course was easy to understand. Please select one. 1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

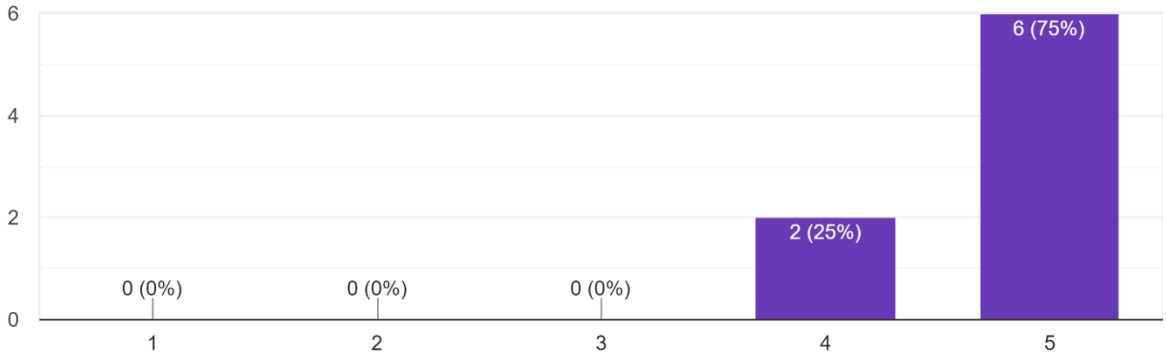
8 responses



Usability Question 7 Responses:

After completing these modules, I feel better prepared to use the vinyl cutter in the Innovation Lab. Please select one. 1 = Strongly Disagree 2 = ...sagree 3 = Neutral 4 = Agree 5 = Strongly Agree

8 responses



Usability Question 8 Responses:

What elements in this course did you like? What supported your learning?

I liked how clear everything was

I feel as though the follow up questions to the video was a good way to cement my understanding. It gave me a chance to think about what I was doing versus just listening to what I am supposed to do.

I liked the diagrams and videos, as I was able to have a visual understanding of the vinyl cutter and how it is supposed to be used.
I enjoyed your simple and clear explanation of the parts and what each's function was to do. The review slides were also enjoyable.

I enjoyed the quiz questions and how interactive they were. The name game and actually clicking on the vinyl cutter helped my understanding.

The format was very clear and easy to follow and understand. It was easy to rememer the information after watching the video. I appreciated the graphics, pictures, and seeing the vinyl cutter in the room where I would be using it. I appreciated that there were multiple ways the material was presented to me, I was able to hear it explained to me and also read it/see pictures of the vinyl cutter.

Seeing products from machine

the repetition of concepts through hearing, seeing, and reading

Usability Question 9 Responses:

What suggestions do you have for course improvement? How might your learning be enhanced?

Some things were over-stated, they sort of made me feel like I was dumb by reemphasizing very straightforward information. I would benefit from having examples of the cutting process, to include finished products and errors or difficulties that I might avoid from spending time with this learning module

I think it was a solid course but maybe you can include a list of materials unfit for the vinyl cutter.

My learning would be enhanced if I was able to review my incorrect answers so that I know what I need to remember or go over again.

Seeing a video of actual footage of the machine cutting might be helpful to understand the process.

Possibly by showing an example of someone cutting something and the procedure.

Showing examples of what you can make, watching someone make something, watching someone deal with some possible mistakes

Seeing how to make something start to finish.

None, it was excellent.

Usability Question 10 Responses:

Did you experience difficulty with understanding or navigation at any point in this course? If so, please let us know where difficulty was encountered.

I don't think I did. It was super clear!

I think it was very accessible and easy to understand.

No (4x)

Not really

I forgot I had to go to Next after one of the videos

Usability Question 11 Responses:

Do you have any additional notes you would like to share?

I think it was really wonderfully done, the acting and especially the voice-overs were very clear and beautiful. I enjoyed it very much, thank you

Great job on your capstone!

I genuinely enjoyed doing this course. I was attentive the whole time.

Great job!!

Appendix E. Interview Questions

Do you have any general feedback you would like to provide?

Did you experience any issues with understanding?

Did you experience any issues with navigation?

Were there any audio or visual concerns?

Do you have any concerns regarding the order in which elements were presented?

Did you experience any content understanding issues?

Was the pacing of videos and modules helpful for your learning?

Appendix F. Statistics Results

Table 1.

t-Test: Paired Two Sample for Means

	Pre-Test Score	*Post-Test Score*
Mean	5.5	9.75
Variance	3.142857143	0.214285714
Observations	8	8
Pearson Correlation	0.696310624	
Hypothesized Mean Difference	0	
df	7	
t Stat	-8.078246376	
P(T<=t) one-tail	4.28262E-05	
t Critical one-tail	1.894578605	
P(T<=t) two-tail	8.56523E-05	
t Critical two-tail	2.364624252	

Table 2.

Pre-Test Score Descriptive Statistics	
Mean	5.5
Standard Error	0.626783171
Median	5.5
Mode	5
Standard Deviation	1.772810521
Sample Variance	3.142857143
Kurtosis	1.851239669
Skewness	-0.820474291
Range	6
Minimum	2
Maximum	8

Sum	44
Count	8

Table 3.

Post-Test Score Descriptive Statistics	
Mean	9.75
Standard Error	0.163663418
Median	10
Mode	10
Standard Deviation	0.46291005
Sample Variance	0.214285714
Kurtosis	0
Skewness	-1.4401646
Range	1
Minimum	9
Maximum	10
Sum	78
Count	8

Appendix G. Prototype Look and Design Examples

Image 1.

Image 2.

Image 3.

Image 4.

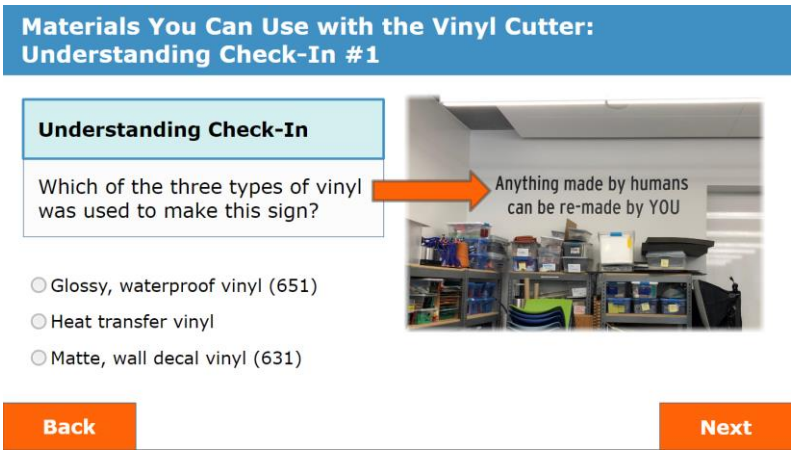


Image 5.

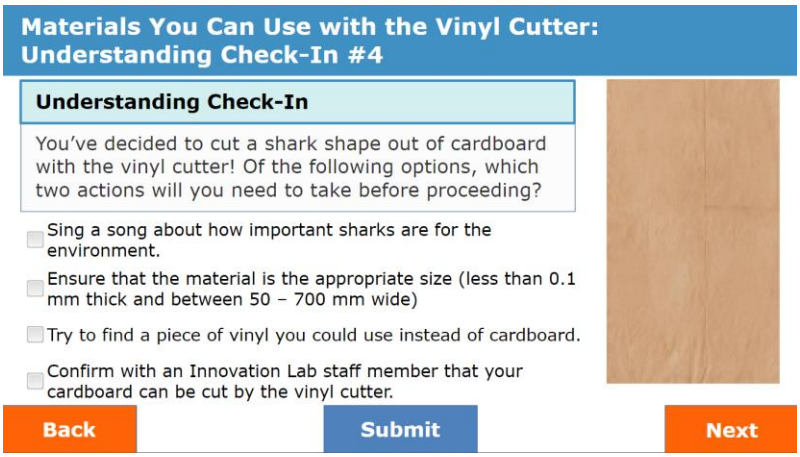


Image 6.

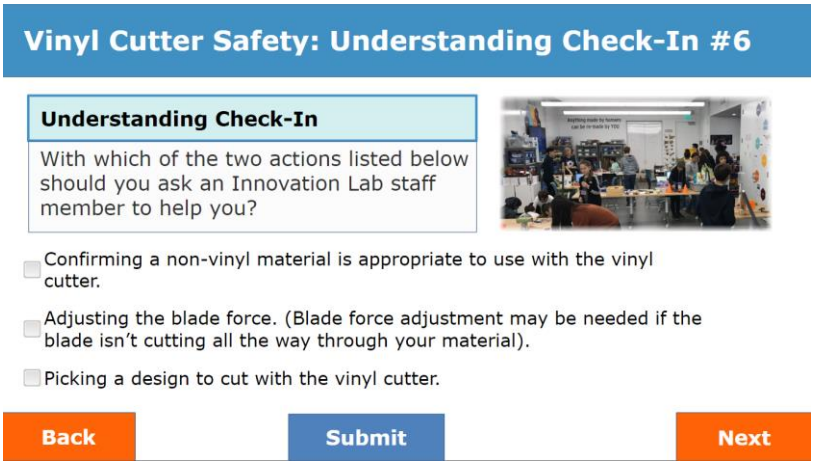
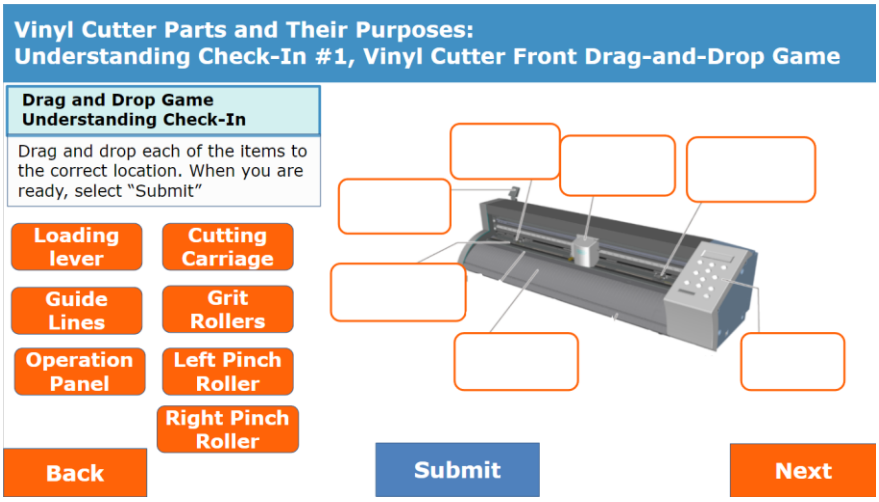


Image 7.

Image 8.



Appendix H. Thinkific Navigation Note Images

Image 1.

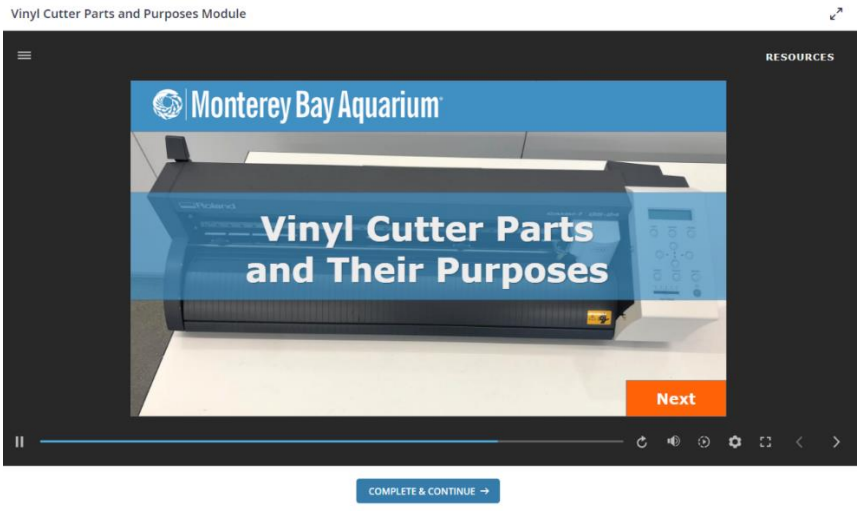
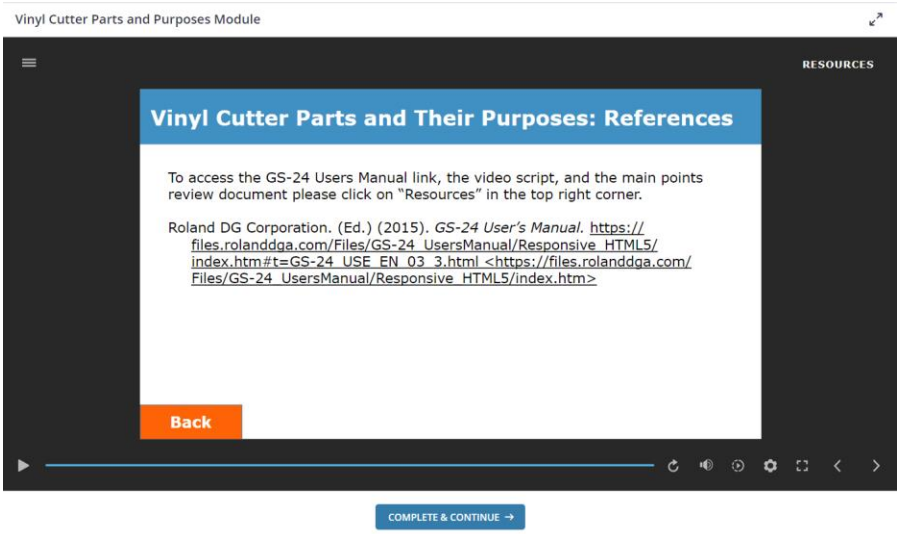


Image 2.



Appendix I: Prototype Module Links

Module 4: Vinyl Cutter Parts and Their Purposes

Module 5: Materials You Can Use with the Vinyl Cutter

Module 6: Vinyl Cutter Safety

References

Roland DG Corporation. (Ed.) (2015). *GS-24 User's Manual.* https://files.rolanddga.com/Files/GS-24_UsersManual/Responsive_HTML5/index.htm#t=GS-24_USE_EN_03_3.html