Master's Project Evaluation Plan for a Technology Artifact

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Abstract

Instructional designers are often tasked with evaluating and revising existing eLearning courses. Post-course participant surveys alone are not thorough enough to reveal what parts of the course need the most revision. *The Master's Project Evaluation Plan* presents a more thorough three-step evaluation. To demonstrate this, my previously developed eLearning course, "*Lab Safety: A Guide to Best Practices*" will be evaluated. A subject matter expert will evaluate the learning object for laboratory safety accuracy. Next, a small group of instructional designers will evaluate it based on instructional design principles and learning theory. Finally, a group of high school science students, the target learners, will take the course and evaluate it based on user experience. Once completed, the data will be analyzed and reported. Detailed results will reveal the areas that require the most improvement. All instructional designers can use the three-step eLearning evaluation plan to improve the quality of their existing courses.

Master's Project Evaluation Plan

for a Technology Artifact: *Lab Safety: A Guideline to Best Practices*

Instructional designers are often tasked with evaluating and revising existing eLearning courses. Post-course participant surveys alone are not thorough enough to reveal which parts of the course need the most revision. The first purpose of the *Master's Project Evaluation Plan* is to create a more thorough three-step evaluation. The second purpose is to outline planning for the evaluation process to show mastery for the Master of Education in Instructional Design program at the University of Cincinnati. To demonstrate this, my previously created eLearning module, *Lab Safety: A Guide to Best Practices* was selected. Articulate Storyline 3 was used to create the eLearning course. It was the final project for the "Tools in Online Learning" course completed early in my coursework. After the eLearning course is evaluated and revisions are made, the final iteration will be published to my portfolio at Wix.com.

Audience

The current audience for the evaluation plan is the Master's Project instructor and instructional designers. In the future, the *Lab Safety: A Guide to Best Practices* eLearning course may be offered to middle and high school science teachers to use during their lab safety lesson.

Sources

The evaluation plan was derived from *The Systematic Design of Instruction* (Dick, Carey & Carey, 2009) and *The Kirkpatrick Model* (Kirkpatrick, 2018). The "Design and Conduct Formative Evaluation of Instruction" step of the Dick and Carey Instructional Design model was the focus (Dick et al., 2009). Dick et al. (2009) state, "formative evaluation is the process designers

use to obtain data for revising their instruction to make it more efficient and effective" (p. 258). Unfortunately, some instructional designers forego evaluating their eLearning to expedite completion. Without evaluation data and feedback, eLearning may not deliver the intended results. The three-step evaluation plan is a thorough system to improve chance of success. Dick et al. (2009) state "there are three phases of formative evaluation, first is the one-to-one evaluation. The second phase is the small group evaluation and the third phase is the student field trial" (p. 258).

Doing three types of evaluation versus only a post-module participant survey is a more thorough approach. With this system, more errors may be found for revision resulting in a better quality eLearning course.

In addition, the Kirkpatrick four–step training evaluation model (Kirkpatrick, 2018) will be used as a main guideline for the focus group and field trial evaluations. Level one "Reaction" and level two "Learning" will be implemented. Level three "Apply" and level four "Results" will not be applied for this type of eLearning at this time because those levels require implementation at work or school. Additional guidelines will be utilized for other evaluation features. These evaluation tools will be used together to create a better overall evaluation of the eLearning object. Evaluation questionnaires will be generated from these resources.

Questions To Be Answered

There are questions I would like to be answered in the evaluation process. These questions, among others, will be used to create the evaluation instruments for some or all three phases of evaluation.

Using the Dick and Carey Instructional Design Model as a resource, the first set of questions are listed. First, what will be the impact on the learner through attitudes and achievement? Are students engaged and motivated to complete the course? Second, how feasible will it be for the learners to complete the module? Third, are there any technical errors and will the learners have difficulty with course navigation? Fourth, is the course content directly related to the learning objectives? Fifth, are the course activities and assessments challenging enough for the target audience? Sixth, is the course content relevant to what the target audience would be doing in their school or work environment? Seventh, can the eLearning module be administered in its' intended classroom setting? (Dick et al., 2009).

Utilizing the Kirkpatrick Model as a resource, the following questions center around "learning" and "reaction." (Kirkpatrick, 2018). First, will the participants find the training favorable, engaging and relevant to their actual school environment? Second, will the participants acquire the intended knowledge, skills, attitude, confidence and commitment based on their participation in the training? (Kirkpatrick, 2018).

Once all evaluations are completed and collected, analysis and reporting will begin. The data collected will reveal key areas for improvement. New iterations will be made accordingly.

This evaluation plan contains the evaluation methodology, the evaluation instruments, sampling methodology, analysis procedures and a suggested timeline for deliverables.

Evaluation Methodology

Participants

Three groups will evaluate the eLearning course. First, the one-on-one evaluation will be conducted by the subject matter expert. She is the Biosafety Officer for the University of Cincinnati. Next, a small group of four instructional designers will participate in a focus group and individual evaluation. Finally, a group of 20-30 high school biomedical science students will complete the final evaluation during the field trial.

The subject matter expert is eligible to participate in the eLearning evaluation because of her knowledge of laboratory safety given her occupation. She coaches research personnel on how to stay safe while working in their laboratories. In addition, she has experience working with eLearning using the Articulate authoring tool. She will be recruited to participate in the evaluation because I have worked with her in the past on similar eLearning projects.

The small group of four instructional designers is eligible to participate in the evaluation because they have education and experience in instructional design. The four will be recruited from a mass e-mail of instructional designers from the University of Cincinnati. Four will be selected from those who respond.

The group of high school science students is eligible to participate because they are indicative of the target learners for the eLearning course. The students are in a high school biomedical sciences course. They are required to complete a laboratory safety lesson. They will be recruited by their instructor. He will choose which class will take the eLearning course and

conduct the evaluation. All participants will utilize evaluations backed by credible guidelines in literature.

Evaluations and Guidelines

Baehr (2004) states that when defining the parameters of the evaluation one needs to "choose guidelines to follow to implement the evaluation" (p. 1). The guidelines are included in the context of each type of evaluation.

One-to-one evaluation by subject matter expert. The first phase of the evaluation process will be done by the lab safety subject matter expert (See figure 1.0). This is the "one-to-one" expert evaluation (Dick et al., 2009). The expert will conduct the evaluation independently and report findings to me, the instructional designer. This is the reason for the "one-to-one" evaluation nomenclature. The subject matter expert's evaluations will incorporate three criteria. They are: "clarity, impact and feasibility" (Dick et al., 2009 p. 262). During the "clarity of instruction" phase, the subject matter expert will evaluate the eLearning module on the "message, links and procedures" (p. 263). In the eLearning, the message is the content. The content will be evaluated based on the complexity of the language for high school students. The terminology should be familiar to the students. The links are the examples, illustrations and demonstrations. The procedures are the transitions and the pace. The eLearning will be evaluated using the learning objectives to make sure they are in alignment with the terminal objective. It states: "students will demonstrate best practices to work in a laboratory safely on the first day of class or work." Gutierrez (2015) states, "alignment gives direction to the course and gives the instructional designer ideas on how to design the curriculum, optimize the efficacy of the course and decreases the cognitive load of the learner." If the course is in alignment, it is clear to the learner what the learning objectives are and what they must do to achieve them. The

assessments, activities and content all support each other to funnel the learner to the terminal

objective. This clarity helps reduce cognitive load on the learner (Mayer & Moreno, 2003). The

guideline I will follow to ensure the eLearning course has alignment between the learning

objectives, assessments and activities is Blooms Revised Taxonomy (Krathwohl, 2002).

"Blooms Revised Taxonomy provides a "yardstick" of sorts to use to measure how closely the

learning objectives, assessments and activities match the knowledge domains" (Gutierrez, 2015).

The guidelines listed above work together to create alignment. Alignment can be attained by

following an instructional design model through the development process.

   Lab Safety, a Guide to Best Practices was developed using the "Backward Design"

instructional design model (Wiggins & McTighe, 1998). The first step is to "identify desired

results." What should be learner be able to do upon completion of the eLearning course? This is

based on the terminal learning objective and learning objectives. Next, "determine acceptable

evidence." During this phase, the instructional designer must create the assessments that create

evidence that the desired results have been met. The final step is to "plan learning experiences

and instruction." This is when the activities and content are created. (Wiggins and McTighe,

1998). If each of these steps are completed keeping in mind the main, desired result described in

the terminal objective, there is a good chance the course will be in alignment.

   During the "impact on the learner" phase, the expert will evaluate "attitudes and

achievement" (p.263). The course will be evaluated from a user experience perspective.

Questions pertaining this include course design, graphics, errors and course functionality. For

example, the user should understand how to navigate through all sections of the course

intuitively per course instructions. A guideline that will be used is Articulate's "Post-Course

Evaluation for eLearning Questions" (E-Learning Heroes, 2018). Two others are "The Ultimate

eLearning Course Design Checklist" and "The Basics of Scenario-Based eLearning" (Pappas,

2014).

During the "feasibility" phase, the expert will evaluate the learner and resources. (Dick et

al., 2009, p. 263). For example, the expert will assess the learner's motivation and the equipment

used such as the Articulate authoring tool.

Small group evaluations. Once the expert has completed the one-on-one evaluation, the

small group will begin the second phase of the evaluation process. "The purpose of the small

group is to identify any remaining learning problems learners may have" (Dick et al., 2009, p.

268). "The Kirkpatrick Model" levels one and two: "Reaction" and "Learning" will be applied

(Kirkpatrick, 2018). The learner "Reaction" is "the degree to which the participants find the

training favorable, engaging and relevant for the target learners. "Learning" is the "degree to

which participants acquire the intended knowledge, skills, attitude, confidence and commitment

based on their participation in the training" (Kirkpatrick, 2018).

The small group members will participate in a focus group discussion synchronously via

WebEx and then will complete written evaluations. Dick et al. (2009) state "in-depth debriefings

with some of the evaluators is necessary to obtain learner reactions to the instruction. The

purpose of this type of discussion is to identify weaknesses and strengths in the implementation

of the instructional strategy" (p. 267). The instructional designer (myself) will moderate and post

a presentation throughout the session. The presentation will contain agenda items, goals and

talking points to stay on course. The participants will view the *Lab Safety: A Guide to Best*

Practices eLearning module. Afterward, they will use the talking points on the slides to prompt

discussion. The eLearning content will be divided into two sections.

After the first section is presented, a discussion will follow using the guidelines from Kirkpatrick Level 1 "Reaction" (Kirkpatrick, 2018). Questions they will discuss include: "Was the instruction interesting?" "Did you understand what you were supposed to learn?" Were the materials directly related to the objectives?" "Were sufficient practice exercises included?" "Did you feel confident when answering the questions?" (Dick et al, 2009).

Once this discussion has been completed, they will review the second half of the eLearning module. The presentation talking points will be posted and another discussion will begin using guidelines from the Kirkpatrick Model "Level 2: Learning" (Kirkpatrick, 2018). In addition, the group will discuss some general questions about course design, graphic design and Articulate functions. Questions they will discuss in this session include: "Did the tests measure your knowledge of the learning objectives?" How did the skills practice help resolve the original need?" "Does the authoring tool work properly?" Both group discussions will be recorded, and the moderator will take notes. After the focus group discussions have been completed, the participants will receive a quantitative evaluation survey via e-mail (See Figure 2.0) The Kirkpatrick Model will also be used as a guideline for written evaluations.

Using the evaluations and comments from the expert and the small group, the instructional designer will improve the eLearning module and make a new iteration.

Student field trial. The third phase of the evaluation process is a student group field trial. The definition of a "field trial" is one that is completed by target learners in their natural work environment. There are two general purposes for conducting this type of evaluation. The first purpose is to learn if the eLearning module is in "a context that closely resembles the intended context for the ultimate use of the instructional materials" (Dick et al., 2009, p. 268).

The second purpose is "to locate and eliminate any remaining problems with the instruction" (Dick et al., 2009, p. 269).

The instructional designer will e-mail the course instructor a link containing the eLearning module. School computers or mobile devices will be used during class time to view the eLearning module and evaluate it using the "Field Trial Evaluation" form (See figure 3.0). The class instructor will choose which class will participate and when to administer the evaluation. He will also be present to answer questions during the evaluation period.

The students' evaluation form will contain questions pertaining to three general focus areas. The first focus area is based on John Keller's motivation theory: "Attention, Relevance, Confidence and Satisfaction (ARCS)" (Keller, 2009). If these are used correctly in an eLearning course, students should experience increased motivation to complete the course (Keller, 2009).

The second focus area evaluates the intended learning transfer described in the terminal learning objective. Dick et al. (2009) describe this as "clarity of instruction" and "the impact on the learner" (p. 269). Students should have new knowledge prepare them to work in their school or workplace laboratory. Blooms Taxonomy will be used as the guideline for questions pertaining to learning transfer (Krathwohl, 2002).

The third focus area will be on those key areas that were changed from the first iteration. The goal of the student field trial is to confirm that there is nothing remaining that may hinder learning. In general, the main goal for the field trial is: "students will experience increased motivation and will state that the eLearning object helped them meet the terminal objective."

Setting Standards and Data Collection

The next step of the evaluation methodology is to "set standards and collect evidence" (Baehr, 2004). For this step, Baehr (2004) states, "a scale must be set to describe how the quality

is judged" (p. 1). All written evaluations utilize a Likert five – point ranking system of "1, 2, 3, 4

and 5." (Chyung, Roberts, Swanson, & Hankinson, 2017). The ranking system provides a

standard to test each evaluation item's effectiveness. In addition, data will be generated for

analysis.

After all, evaluations have been completed and verbal feedback has been received, the

data and results will be analyzed. Revisions will be made to create a final iteration.

Decision Making and Final Report

The last phase of the evaluation methodology is "decision making and the final report".

Once the analysis is completed and improvements made, a report will be created that will

graphically depict the improvement areas. The "Analysis Procedures" section will explain this

further. Baehr (2004) states, "check the quality against the standards" (p.1). In this paper, the

standards are the guidelines previously mentioned in the "Evaluations and Guidelines" section.

Conclusion

In conclusion, the evaluation methodology will require three groups of evaluators to

succeed. They are the subject matter expert, the small group of instructional designers and the

student field trial. Once all evaluations have been completed as described in the evaluation

methodology, a revised version of the *Lab Safety: Guidelines to Best Practices* will be created.

The goal is that the eLearning course will be used by a high school science instructor.

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Evaluation Instruments

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Four evaluation instruments will be used by the evaluators in this project. The first three

instruments utilize the Likert five-point scale in which the evaluators choose a ranking number.

(Chyung et al., 2017). The scale lists "1, 2, 3, 4 or 5" where 1 is "No or non-existent. The goal is

not met, (Disagree)." Choosing "2" indicates the item is "Slightly used, (Slightly agree)."

Choosing "3" is "Average use, needs improvement, (Average agreement)." Choosing "4" is "Moderate use, (Moderately agree). Choosing 5 is "Yes, this goal is met, (Completely agree).

The first instrument, the "Subject Matter Expert Evaluation" (see figure 1.0), will allow the evaluator to analyze the learning object based on the structure and functionality of the Articulate eLearning module and the alignment to the learning objectives. As previously mentioned, this evaluation instrument will contain questions pertaining to three main areas: "clarity of instruction, the impact on the learner and feasibility of using the eLearning course" (Dick et al., 2009, p. 263). In the second instrument, "The Small Group Evaluation," (see Figure 2.0.) participants will evaluate the eLearning module for alignment with the learning objectives. Using Kirkpatrick (2018) "learning" and learner "reaction." In addition, they will evaluate the learning object on the elements of Keller's "ARCS" theory (Keller, 2009).

The third evaluation instrument, the "Field Trial Evaluation" (See figure 3.0) will be administered by a high school science teacher. Students will be evaluating the eLearning object for three purposes using the new iteration following revisions. First, they will evaluate how well the eLearning module will prepare them to meet the terminal learning objective. Next, students will identify any remaining technical difficulties with the course. Finally, they will note their satisfaction with the course and will state whether or not it motivated them to complete the course. Once they have completed the field trial, a final iteration will be made.

The fourth evaluation instrument is the "Instructor Observation Form – Field Trial." (See figure 4.0) The instructor will use the form to make observations about the students as they are viewing the eLearning course and completing the evaluation. This form does not contain a ranking system but fulfills the requirements of conducting a field trial. (Dick et al., 2009).

Sampling Methodology

According to Taherdoost (2016), there are six parts to the sampling methodology. First is to "clearly define the entire target population" (p.18). The target population for this eLearning object is high school science students. In addition, the course could be slightly modified for anyone who works in a laboratory setting, such as in a college environment. Next is to "select a sampling frame that is characteristic of the actual population" (Taherdoost, 2016, p.20).

The sampling frame for this evaluation is different for each type of evaluation. For the one-on-one trial, the sample frame (subset) is one individual who is the subject matter expert. She knows the target audience as she works with students who work in laboratories in college. For the focus group, the sample frame is four instructional designers. They do not represent the high school students; however, they are analyzing the eLearning module on their behalf. For the field trial, 20 to 30 high school students will evaluate the eLearning object for their own potential use. They represent the target audience best as they are also high school students. Next, Taherdoost (2016) states to "choose a sampling technique" (p.18). The subject matter expert will be chosen based on a past working relationship. Her expertise in laboratory safety and working with Articulate is known, so this person will be sampled based on an existing relationship. For the focus small group, Dick et al., (2009, p.267) states, "include in your sample at least one representative of each type of subgroup that exists in your population, possibly including the following:

- "Learners who are familiar with a particular procedure (web-based instruction.)

- Learners who are younger or older (adults; ages 25 to 55)

- Various skills and backgrounds (Instructional Designers and a Graduate Student

in Instructional Design).

Although the individuals chosen for the focus group will be instructional designers, not high school students, I will still follow the guidelines from Dick et al., (2009) when choosing evaluators. Next, Taherdoost (2016) states, "determine the sample size" (p.18). The sample size of the subject matter expert is one. The sample size of the focus group is four and the sample size of the field trial will be 20 to 30. These sample sizes meet the requirements stated for each type of evaluation per Dick et al., (2009, p.261-269). Next, Taherdoost (2016) states, "collect the data" and "access the response rate" (p.18). These steps will be completed once I receive the results back from the evaluations containing a rating system.

Challenges

Finally, the last phase of the sampling methodology is to state if problems are anticipated and how they would be mitigated. First, it may be difficult to obtain participants in the designated time frame. To overcome this, more will be invited than the minimum requirement. If there are too few, data will be generated from the existing evaluators. Another issue may be that participants will not return their evaluations on time. To overcome this, the participants will receive frequent reminder e-mails with the schedule posted. Next, the technology may not function properly. To overcome this, the instructional designer will have a secondary presentation available should the website link not function properly. Finally, the evaluations may reveal too many changes to be made for the limited timeframe. Time will have to be scheduled in advance to make the necessary revisions and new iterations. In summary, all challenges can't be predicted, but with some planning, many can be reduced.

Analysis Procedures

For both the quantitative and qualitative data, I will follow the guidelines discussed in *Systematic Design for Instruction*, (Dick et al., 2009). The resource lists recommendations for data summary and analysis for each type of evaluation. An overview is described here. All evaluations utilize a Likert rating system that will be used to generate quantitative data. First, the evaluation line items will be labeled and categorized by the guidelines for that data type. Next, the ranking numbers for each line item will be totaled. All the numbers generated from the line items for each category will be totaled and the category total will be averaged. A bar graph will be produced from the data. The categories with an average rating of "3" or less will be flagged as those that require revision. In addition, a revision table will be created listing the line item, benchmark and revision to be made.

In addition, there is qualitative, descriptive feedback for each evaluation type. This data will be analyzed more holistically. All comments will be read, labeled and categorized. The comments will be compared to benchmarks. Those items that don't meet the benchmark will be revised. A table will be created listing the comment, benchmark and revision.

Types of Data for Analysis

One-to-one, subject matter expert evaluation. Both quantitative and qualitative evaluation will be done by the subject matter expert. The quantitative evaluation will contain 25-line items taken from three main criteria: "clarity of instruction," "impact on learner," and "feasibility." While reviewing the eLearning course, the subject matter expert will rate each line item under these categories. Data will be generated from the rating scale. For the qualitative data, the subject matter expert will review the eLearning course using her knowledge of Articulate Storyline and laboratory safety. She will make general and specific comments about the course

by reporting her findings for each slide in the course. This descriptive data will be analyzed and categorized.

      Small, focus group. Both quantitative and qualitative evaluation will be done by the small focus group. The four instructional designers will first participate in a focus group. Once the discussion has concluded, the instructional designer will collect and analyze the comments. Afterwards, each participant will receive a written evaluation via e-mail using the Google Forms Survey. These evaluations will be used to generate quantitative data. The same rating scale will be used as before. Approximately 25 questions will cover material from the Kirkpatrick model of evaluation, "Reaction" and "Learning" (Kirkpatrick, 2018).

      Field trial of target learners. Quantitative and qualitative data will be used for analysis in the field trial. Students will evaluate the eLearning course using written evaluation instruments. The parameters for this type of evaluation were previously outlined in the "Evaluation Methodology." The rating scale is like those used for other trials. Quantitative data will be generated from them. Descriptive data for qualitative analysis will be collected by the students' instructor in a report. The instructor was asked to record any comments or questions from the students. This will be given to the instructional designer for analysis.

How Analysis Will Be Conducted

      Since the evaluation criteria are different for each phase of evaluation, each evaluation phase will be analyzed separately for both quantitative and qualitative data. To analyze the qualitative data, the descriptive data will be collected, combined and sorted into categories. This will make it easier to compare and identify differences.

      For qualitative data tips, the Wilder Foundation (2009) states, "when analyzing data, look for trends or commonalities deeply- rooted in the results. Interpret the results and draw

conclusions. Summarize and identify the key findings. Consider what the results mean and their implications."

For quantitative data, the evaluation rating instruments will be collected and tallied for each line item. Then, the line items will be sorted into categories by guideline criteria. Once complete, a report will be made from the data generated. Graphical representation will reveal the areas that need the most improvement in each focus category. From this, new iterations can be made.

Timeline

Task: Dates:

Evaluation Plan	March 10
Subject matter expert evaluation And small group evaluations	March 10
Analysis of data and artifact revisions	March 17
Field Trial	March 24
Analysis of data and artifact revisions	March 31st
Evaluation Report	April 7
Pecha Kucha Presentation	April 14
Portfolio completion	April 14
Defense of Master Project	April 15 - 26

Conclusion

The eLearning object, *Lab Safety, A Guide to Best Practices* will be evaluated using a three-step evaluation plan. This includes a subject matter expert evaluation, a small focus group

and a student field trial evaluation. Merely doing post-course survey evaluations alone will not

reveal all improvements that need to be made. Analysis of quantitative and qualitative data and

subsequent reporting will enable the instructional designer to make marked improvements to the

eLearning object. The three-step evaluation system can be used by other instructional designers

to make improvements to their own existing eLearning courses as well. Once the three-step

evaluation is completed and improvements made*,* perhaps *Lab Safety: Guidelines to Best*

Practices can be offered to science teachers for use in their lab safety programs.

Importance of the Steps in Evaluating eLearning

The evaluation methodology is important because it outlines the entire plan for how,

when, whom and why the learning object will be evaluated. The evaluation instruments will be

customized for each evaluator or group containing key areas to focus on. The sampling

methodology is important to consider because the number of individuals who evaluate the

learning object need to be statistically significant or the data won't be valid. The analysis

procedures require careful thought too. It is important to think through in advance how the data

will be analyzed. The timing is critical to make sure all work gets completed on time.

The three-step evaluation system is a more thorough way of evaluating an existing

learning object than just using a post-course participant survey alone. This system generates

quantitative data that can be analyzed and reported. The other system only generates qualitative

feedback which is more subjective. With the report generated from the data, the instructional

designer can easily see what areas of the eLearning course need the most attention.

Improvements and new iterations will follow.

Author's Note

The eLearning object, *Lab Safety, A Guide to Best Practices* was a first attempt at learning Articulate Storyline. When this project was completed, the skill set was at a beginner level, so many improvements will be needed. It will be a great learning experience to go through the evaluation process. I hope to continue to gain more experience with analysis, evaluation and implementation. Evaluation of learning objects will improve the quality of the work and show employers value in what the Instructional Designer can provide.

References

Baehr, M. (2004). *Evaluation Methodology* [PDF] (pp. 1-4). Pacific Crest. Retrieved from
https://www.webpages.uidaho.edu/ele/scholars/practices/Evaluating_Projects/Resources/
Evaluation%20Methodology.pdf

Chyung, S., Roberts, K., Swanson, I., & Hankinson, A. (2017). Evidence-Based Survey Design:
The Use of a Midpoint on the Likert Scale. *Performance Improvement*, *56*(10), 15-23.
doi: 10.1002/pfi.21727.

Dick, W., Carey, L., & Carey, J. (2009). *The systematic design of instruction* (7th ed.).
Columbus: Pearson.

ELearning Heroes. (2018). *Post-Course Evaluations for ELearning: 60+ Questions to Include*.
Retrieved from https://community.articulate.com/articles/post-course-evaluations-for-
eLearning-60-questions-to-include.

Gutierrez, K. (2015). *Alignment Should Always Be Our Watchword in eLearning*. Retrieved from
https://www.shifteLearning.com/blog/alignment-should-always-be-our-watchword-
eLearning

Hattie, J., & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research*,
77(1), 81-112. doi: 10.3102/003465430298487

Higley, M. (2016). Why Meaningful Online Feedback Is Important - eLearning Industry.
Retrieved from https://eLearningindustry.com/meaningful-online-feedback-important

Keller, J. M. (2009). *Motivational design for learning and performance: The ARCS Model Approach.* Springer Science and Business Media.

Kirkpatrick, D. (2007). *Four levels of education*. Alexandria, VA: ASTD. Info Line: Tips, Tools and Intelligence for Trainers. Retrieved from: https://www.safaribooksonline.com/library/view/four-levels-of/9781562864842/cover.xhtml.

Krathwohl, D. (2002). A Revision of Bloom's Taxonomy: An Overview. *Theory Into Practice, 41*(4), 212-218. Retrieved from http://www.jstor.org.proxy.libraries.uc.edu/stable/1477405

Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational psychologist*, *38*(1), 43-52.

Pappas, C. (2014). The Basics of Scenario-Based eLearning - eLearning Industry. Retrieved from https://eLearningindustry.com/the-basics-of-scenario-based-eLearning.

Pappas, C. (2014). The Ultimate eLearning Course Design Checklist - eLearning Industry. Retrieved from https://eLearningindustry.com/the-ultimate-eLearning-course-design-checklist.

Taherdoost, H. (2016). Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. *SSRN Electronic Journal*, *Vol. 5*(No. 2), 18-27. doi: 10.2139/ssrn.3205035.

Wiggins, Grant, and McTighe, Jay. (1998). Backward Design. In *Understanding by Design* (pp. 13-34). ASCD.

Wilder Foundation. (2009). *Analyzing and interpreting data* [PDF] (pp. 1-7). Saint Paul.

    Retrieved from: http://www.evaluatod.org/assets/resources/evaluation-guides/analyzing-

    interpretingdata 8-09.pdf

Appendix A

Subject Matter Expert Evaluation

(Pappas, 2014)

For each question, put an "X" in the box to choose a rating number 1, 2, 3, 4 or 5 from the scale.

1 = No or non-existent. The goal is not met. (Disagree)

2 = Slightly used. (Slightly agree)

3 = Average use, needs improvement. (Average agreement)

4 = Moderate use (Moderately agree).

5 = Yes, this goal is met. (Agree completely)

No.	QUESTION	RATING				
		1	2	3	4	5
1	The eLearning course objectives clear.					
2	The assessments are interactive and engaging and they clearly focus on the objective.					
3	Instructor feedback is consistently provided throughout the course.					
4	The content helps to achieve the desired learning objectives.					
5	The language used is clear and descriptive without being verbose.					
6	The correct spelling, grammar, capitalization and punctuation is used throughout the course.					
7	Content has been properly credited and quoted.					
8	All stats, facts, and dates been checked and referenced.					
9	The body text is in the same font and decorative text only used in the headers.					
10	Font colors are easy to read against their backgrounds.					

11	Photographic and animated images are relevant and are of good quality.					
12	Videos are of good quality and are relevant.					
13	Audio and video can be controlled by the user.					
14	Audio is clear and not distorted.					
15	All images, videos and original content is properly cited and referenced.					
16	The eLearning course is easy to navigate for the learner.					
17	All buttons, links and branching sequences work properly.					
18	The menu is easy to use and contains a table of contents for the course.					
19	There are sufficient references for further information.					
20	The eLearning course aesthetically uniform and consistent in colors, text and appearance.					
21	When viewing each page, at least half the screen consists of white space to keep the look clean and organized.					
22	Backgrounds or patterns that may be distracting for the learner have been avoided.					
23	The content is relevant to the work environment of the learner.					
24	The assessments and branching sequences are somewhat challenging for the learner.					
25	The learner will be able to apply new knowledge gained as a result of taking this course.					

Additional Comments: _____

Appendix B

<u>Small Group Evaluation (Focus Group)</u>

(Pappas, 2014) (Kirkpatrick, 1979)

For each question, put an "X" in the box to choose a rating number 1, 2, 3, 4 or 5 from the scale.

1 = No or non-existent. The goal is not met. (Disagree)

2 = Slightly used. (Slightly agree)

3 = Average use, needs improvement. (Average agreement)

4 = Moderate use (Moderately agree).

5 = Yes, this goal is met. (Agree completely)

<u>No.</u>	<u>QUESTION</u>	<u>RATING</u>				
		1	2	3	4	5
1	The role play and storyline caught my attention.					
2	To what extent were you engaged with the eLearning course?					
3	Instructor feedback (Correct or Incorrect) was sufficient.					
4	The eLearning course content helps to achieve the desired learning objectives.					
5	The language used is clear and descriptive without being verbose.					
6	Learners will be confident in their performance after taking this eLearning course.					
7	Sufficient quantities of practice activities were included.					
8	The content was directly aligned to the learning objectives.					
9	The content is relevant to the work environment of the learner.					

10	The assessments and branching sequences are challenging for the learner.					
11	The learner will be able to apply new knowledge gained as a result of taking this course.					
12	The content and storyline were relevant to the target audience. (High School Science Students.)					
13	I enjoyed taking this eLearning course.					

Small Group Evaluation (Focus Group)- 2

(Pappas, 2014) (Kirkpatrick, 1979)

For each question, put an "X" in the box to choose a rating number 1, 2, 3, 4 or 5 from the scale.

1 = No or non-existent. The goal is not met. (Disagree)

2 = Slightly used. (Slightly agree)

3 = Average use, needs improvement. (Average agreement)

4 = Moderate use (Moderately agree).

5 = Yes, this goal is met. (Agree completely)

No.	QUESTION	RATING				
		1	2	3	4	5
14	Font colors are easy to read against their backgrounds.					
15	Photographic and animated images are relevant and are of good quality					
16	The eLearning course is easy to navigate.					
17	All buttons, links and branching sequences work properly.					
18	The learner can easily find ways to exit or change locations in the course.					
19	There are sufficient references for further information.					
20	The eLearning course aesthetically uniform and consistent in colors, text and appearance.					
21	Backgrounds or patterns that may be distracting for the learner have been avoided.					
22	The correct spelling, grammar, capitalization and punctuation is used throughout the course.					
23	Content has been properly credited and quoted.					
24	The course is visually appealing.					
25	The audio is of good quality.					

Additional Comments: _____

Appendix C

Field Trial Evaluation

For each question, put an "X" in the box to choose a rating number 1, 2, 3, 4 or 5 from the scale.

1 = No or non-existent. The goal is not met. (Disagree)

2 = Slightly used. (Slightly agree)

3 = Average use, needs improvement. (Average agreement)

4 = Moderate use (Moderately agree).

 5 = Yes, this goal is met. (Agree completely)

No.	QUESTION	1	2	3	4	5
1	The role play (Bob) and storyline (sick students) caught my attention.					
2	To what extent were you engaged in taking the eLearning course?					
3	Instructor feedback (Correct or Incorrect) was sufficient.					
4	The eLearning course content helped me to achieve the desired learning objectives posted on the second slide.					
5	The language used is clear and descriptive without being verbose.					
6	How confident are you that you were successful with the course?					
7	Sufficient quantities of practice activities were included.					
8	The content was appropriate for my skill level.					
9	The course content helped me understand how to stay safe while working in a laboratory.					
10	The activities and quizzes were challenging.					
11	The eLearning course navigation was easy.					

12	The laboratory setting was realistic.					
13	I enjoyed taking this eLearning course.					
14	Lab hazards could easily be identified.					
15	More practice questions should be added.					
16	This eLearning course should be used in the future for students to use to study lab safety.					
17	All buttons, links and branching sequences work properly.					
18	I could easily exit the course and change in the course.					
19	There are sufficient references for further information.					
20	The course was missing important content.					
21	Backgrounds, fonts and colors that may be distracting have been avoided.					
22	I need an accessible course due to a learning disability. (Dyslexia, hearing or visually impaired, etc.)					
23	Photographic and animated images are relevant and are of good quality.					
24	The course is visually appealing.					
25	The audio is of good quality in the video and phone call.					

Additional Comments: _____

Appendix D

Instructor Observation Form

Re: Lab Safety eLearning Module

Please observe the students while they evaluate the eLearning Module. Make note of the following.

1. If students had questions about the eLearning module, what were they?

2. Did you notice anyone having problems navigating the course?

(ie, not knowing where to click to advance, not knowing how to exit or where to click to get to another part of the course?)

3. How did the students react when they first entered the eLearning course? (When they got into the role play portion.) Please list some of their comments.

4. Were there any students who needed accessibility in the course for learning disabilities such as dyslexia or visual or auditory impairment?

5. Do you think realistically you would use this eLearning course to supplement your training on Lab Safety in the future? If yes – why? If no – why not?