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| TREASURE SAE  Evaluation Report  C:\Users\Steph\Pictures\Microsoft Clip Organizer\j0387802.jpg |
| Purple Team:  Melanie Blackman, Stephanie Hulsey, Sharon Laidlaw, Danielle Travis, Matthew Whittlesey  April 22, 2018 |

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# Introduction and Background

In all 50 states, middle- and high-school students take classes in agricultural literacy. In addition to traditional classroom learning, these agricultural literacy courses also include hands-on, project-based learning called supervised agricultural experiences (SAEs). SAEs take place in collaboration with community partners.

These community partnerships are arranged by the agricultural literacy teachers, and they require teachers to network and create connections throughout their county. Because high school agricultural literacy teachers must devote many hours beyond the school day to cultivating and maintaining these community partnerships, they are paid for 60-hour weeks. Still, despite the increased compensation, these teachers experience burnout—high levels of frustration, fatigue, and disillusionment.

In response to this burnout, a team of professors at the University of Georgia (UGA) in Athens—one of two Georgia institutions that provide professional learning for preservice agriculture teachers—began exploring ways to improve the teachers’ experience of supervising SAEs. Led by Dr. Eric Rubenstein in the Department of Agricultural Leadership, Education, and Communication in the College of Agricultural and Environmental Sciences, this team of researchers received a USDA/National Institute of Food and Agriculture grant to develop an SAE professional development program called “TREASURE,” an online game designed to better prepare agricultural literacy teachers for the work they do to support SAEs.

The goal of the online game is for game players (i.e., preservice agriculture teachers) to collect as many SAE opportunities as possible without reaching burnout, while engaging in short simulations of five different scenarios. Teachers role-play as they learn about their community/county—its history, its main industries, and whether it is rural or suburban. They then use that information to determine networking opportunities and connections within the community. In each of the simulations, the game tells learners if the decisions they make are beneficial or detrimental to the development of community partnerships. Meters displayed as bars in the game interface tell learners how much community credibility they are building, contrasted with how much burnout they are experiencing.

Dr. Lloyd Rieber, the primary developer of the game, used a rapid prototyping model during the design phase. An initial alpha test was conducted, with approximately 30 teachers. This first test resulted in some qualitative feedback:

* Some individuals were able to “win” the game by getting around its requirements, rather than actually learning as they progressed through the levels. Similarly, learners reported that they could make decisions in the game without actually having enough “credibility” to do so, according to the rules.
* Learners requested more feedback throughout the simulation, in order to enhance their understanding of which decisions were beneficial and why.

As a result of alpha testing, some initial adjustments to the game have already been made. This evaluation will help inform future iterations.

# Evaluation Purpose

The main purpose for this evaluation was to provide evaluative detail that will inform future improvements to the game. The evaluation team evaluated the usability and graphic design of the interface, as well as the learning design of the e-learning game.

A secondary purpose was to prepare instruments to evaluate learner responses in the future. The evaluation team did not have access to learners; however, despite the lack of evaluation data from the target audience, the team developed evaluation instruments the client could implement in the future.

The findings from this evaluation will be used to determine next steps in refining the e-learning game.

# Stakeholders

Table 1. Stakeholder Information

|  |  |  |  |
| --- | --- | --- | --- |
| Stakeholders | Importance Level | Perspective of Interest | Role in the Evaluation |
| Dr. Rubenstein and the grant team | Secondary | To ensure the success of this grant-funded project. | To provide our team with any pertinent details involving the grant, learning objectives of the game, goals, and to inform us of the scope of the project. |
| Dr. Rieber | Secondary | To inform future iterations and decisions regarding the future of the game. | To inform our team of any relevant background information about the design and development of the game. |
| Dr. Newberry | Primary | Overall efficacy of the e-Learning game as it pertains to the success of pre-service agriculture teachers | Subject matter expert, to inform our team of the relevant background information needed to complete the evaluation; also will act as liaison to target learners who will participate in the evaluation |
| Pre-service Agriculture Teachers | Secondary | Real life application and transfer of knowledge of game to real life | On the user end of the evaluation; not involved in the planning of it, but feedback will be used to guide future decisions. |
|  |  |  |  |

# Logic Model

Researchers at the University of Georgia have developed an e-learning game in response to the need for professional development for agricultural teachers. In order to accommodate the busy schedules of teachers, the e-learning game is delivered online and in an asynchronous format. To begin the game, teachers must select one of four community profiles (Figure 1). Each profile provides pertinent details that help the teachers make decisions in the game (Figure 2).

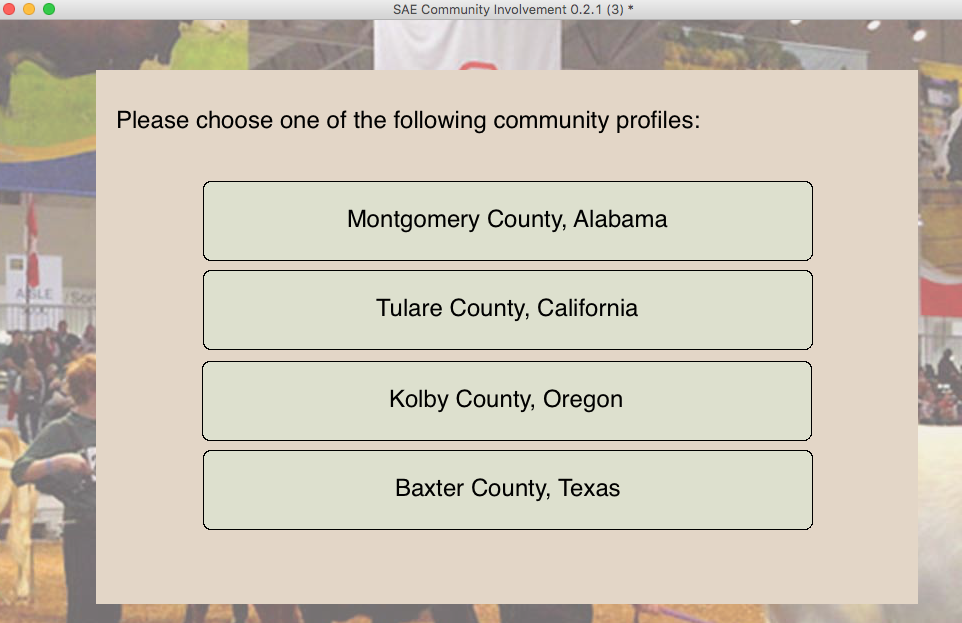


Figure 1. Selection of Community Profile

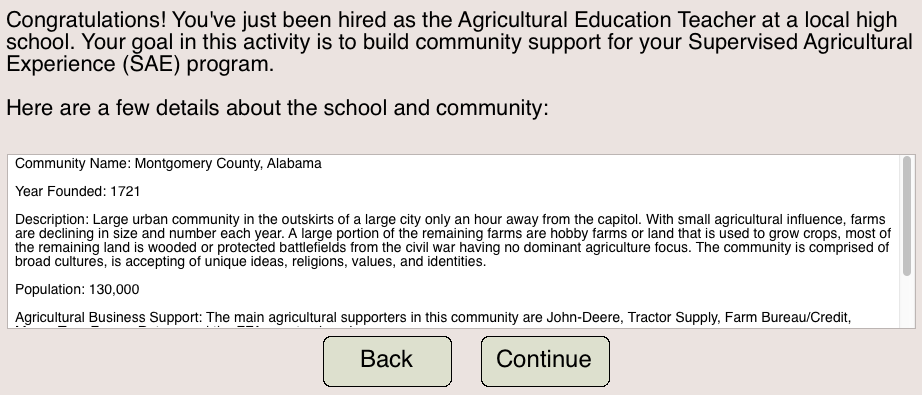


Figure 2. Community Profile Detail

By clicking “Continue,” the teacher navigates to an SAE Community Involvement screen (Figure 3). This screen has three sections (Figure 3). At the top of the screen, the Community Involvement Dashboard keeps track of the teacher’s involvement through an Engagement Meter and SAE Project Timeframe. The Decision Making Dashboard provides community support and multiple-choice responses to the question: “What will you do to build community engagement?” Finally, the Teacher Dashboard at the bottom tracks the teacher quality of life, credibility, and SAE opportunities.



Figure 3. SAE Community Involvement Screen

The goal of the game is for players to collect a certain number of SAE Opportunities by creating engagement in the community. By clicking on the community support button, teachers are provided with information to aid in their decision making process. Teachers are allowed to click this button only three times, so they are advised to use this feature sparingly. If the button is exhausted, it can be refreshed once the user has created SAE opportunities. Teachers must proceed by choosing one of five options provided in answering the question mentioned above. Each option is rated with points attached to it. The higher the points, the more credibility increases, and an SAE opportunity can be awarded. The teacher’s quality of life, engagement meter and community support (if below three) increases. The game is then over once the teacher reaches a time limit of fifteen simulated months. However, if the teacher continuously selects options with low points and depletes community support, the game ends prematurely. This translates to the teacher reaching a point of burn out. At the end of the game, the teacher is provided with a usage summary. It is noted that the game is currently a static application, and it does not seek external data from a database. This may be a factor to consider for the future.

Context

The e-learning game is made available online and asynchronously. Some of the contextual factors that may influence the implementation and effectiveness of the game include: teachers having access to a computer with the Internet to complete the game within the required timeframe, the availability (or lack thereof) of an onsite person of contact for clarification if needed, and teachers having the time in their busy schedules to participate in the game.

Population and Needs

The target population for the e-learning game is middle- and high-school agriculture teachers in Georgia. The game attempts to address the need for knowledge retention for SAE participants, self-efficacy in supervising SAE experiences, and decreasing burnout.

Age and Phase

The development stage of the e-learning game prototype began in the spring of 2017. A pilot test was done in the fall of 2017, and this resulted in a revised prototype. The beta version will be further revised. Therefore, although the game has undergone some alpha testing, it is in the middle of development. The implementation phase is expected to occur in fall of 2018.

Table 2. Logic Model

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resources/ Inputs | Activities | Outputs | Short-Term Outcomes | Long-Term Outcomes |
| Grant provided by USDA/NIFA for the development and implementation of TREASURE SAE Program  Project team members with necessary expertise:  Agricultural education, teacher education, e-learning design, instructional design  Computers with internet and programming software access | Collaboration between the TREASURE SAE team and middle- and high-school agricultural teachers to discuss the problem and a possible solution  Research by stakeholders on multiple communities for SAE programs, effective methods of content presentation, and best available resources to assist teachers  The use of instructional design process model and learning theories in the development, evaluation, and revision of the e-learning game | E-learning game prototype developed to meet the needs of TREASURE SAE Program  Agriculture teachers’ SAE game play | Increase in agriculture teachers’ knowledge retention and self-efficacy in supervising an SAE project  Effective usability of the game in terms of the functionality, aesthetics, engagement, and support for needed assistance  Decrease in burnout among agriculture teachers | Grant results dissemination  Increase in the ability of agriculture teachers to independently establish and maintain community partnerships, without experiencing burnout |
|  |  |  |  |  |

# Evaluation Questions

Armed with a full understanding of the time and resource challenges faced by agricultural literacy teachers throughout the country, this evaluation focused on improving the TREASURE SAE game by studying the visual design and general attractiveness, the potential for knowledge retention and transfer to the performance context, and the self-efficacy of the learners after having played the game. This is a formative evaluation that focuses on aspects directly affecting the user experience, while also addressing the overall educational effectiveness. The following overarching questions composed the framework for the evaluation instruments, data gathering, and, ultimately, data analysis.

Questions of Efficacy:

Is the game relevant to the target learners’ professional responsibilities? (Learn & Apply)

Do the target learners find immediate value in the teaching points?

Do the target learners find new value when playing the game repeatedly?

Do the game provide varied scenarios? Were there too few or too many?

Are scenarios practical and relevant?

Does the game build the self-efficacy of the TL in creating SAE opportunities in their respective communities?

Questions of Usability: (Playing the Game)

Is the game designed well?

Is the game interface intuitive to allow game players focus on the content?

Are reasonable and applicable explanations provided?

Do the aesthetics add or detract from the experience?

Does the overall “look & feel” foster a sense of professional trust?

Are gaming instructions and directions easy to follow?

Questions of Technical Stability: (Programming)

Is the game well put together?

Is the game stable from a technical standpoint?

Is the game accessible via multiple platforms (Mac, PC, Mobile)?

Is the game 508 compliant?

Is the game easy to acquire/install/update?

Is there a technical support system available to users?

Open-Ended Questions:

What would make the game a more valuable experience?

What aspects of the game are specifically enjoyable or useful?

Table 3. Focus Areas, Questions, Design, and Rationale of the Evaluation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Stakeholders | Stakeholder Needs | Evaluation Focus Areas | Evaluation  Questions | Evaluation Design | Evaluation Design Rationale |
| Dr. Rubenstein and the grant team | The efficacy of the e-learning game as it relates to the goals of the grant | Implementation and outcomes | Does the TL find immediate value in the teaching points? Does the TL find new value when playing the game repeatedly? Does the game build the confidences of the TL enough to successfully re-create SAE opportunities in their respective communities? | Mixed methods | Learner interviews will be combined with quantitative data collection tools to provide a descriptive report on the usability and effectiveness of the game. Such qualitative data may be used in publicity, grant reporting, or future grant applications. |
| Dr. Rieber | Data that inform revisions regarding the technical development and overall usability | Context and implementation | Is the game intuitive enough to focus on the content?  Is the game accessible via multiple platforms (Mac, PC, Mobile)?  Is the game 508 compliant? | Quantitative | Data regarding the technical development and usability will be collected using a checklist with scales that measure both severity and extensiveness, in order to facilitate analysis that will enable prioritization of revisions |
| Dr. Newberry | The usability and efficacy of the game; as subject matter expert, subject-specific areas for improvement | Implementation and outcomes | Does the game provide varied scenarios; too few or too many? Are scenarios practical and relevant? Does the game build the confidences of the TL enough to successfully re-create SAE opportunities in their respective communities? | Mixed methods | Learner interviews will be combined with quantitative data collection tools to provide a descriptive report on the usability and effectiveness of the game. Such qualitative data may be used in publicity, grant reporting, or future grant applications. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Stakeholders | Stakeholder Needs | Evaluation Focus Areas | 3-5 Evaluation Questions | Evaluation Design | Evaluation Design Rationale |
| Pre-service Agriculture Teachers | The usability and effectiveness of the game | Implementation and outcomes | What would make the game a more valuable experience?  What aspects of the game are specifically enjoyable or useful?  What aspects of the game increase your confidence in supervising SAEs? | Mixed methods | Learner interviews will provide the grant team and Dr. Newberry with descriptive data, which will capture the full range and subtleties of the learners’ experience. |
|  |  |  |  |  |  |

# Logistics and Timeline

The evaluation team began working with the client in mid-February, with the first meeting on client needs occurring February 22. Following the establishment of the client’s needs and interests, the evaluation team developed a general plan to prepare for the project evaluation. Table 4 and Table 5 indicate the resulting task list, identification of team member responsibility, and delivery dates.

Table 4. Client Needs Assessment

|  |  |  |
| --- | --- | --- |
| **Task to be completed** | **Team Member Responsible** | **Date Due** |
| Schedule Initial Client Meeting | Danielle | Feb. 20 |
| Client Interview Question Development | Matt | Feb. 21 |
| Team Client Interview | Matt, Melanie, Danielle | Feb. 22 |

Table 5. Evaluation Planning

|  |  |  |
| --- | --- | --- |
| **Task to be completed** | **Team Member Responsible** | **Date Due** |
| Intro & Background | Sharon | February 28 |
| Evaluation Purpose | Danielle | February 28 |
| Stakeholders | Danielle | February 28 |
| Logic Model | Melanie | February 28 |
| Evaluation Questions | Matt and Sharon | February 28 |
| Expert Review Data Collection & Analysis Plan | Matt and Sharon | February 28 |
| Learner Survey Data Collection & Analysis Plan | Melanie | February 28 |
| Learner Interview Data Collection & Analysis Plan | Danielle | February 28 |
| Logistics & Timeline | Stephanie | March 1 |
| Evaluation Budget | Stephanie | March 1 |
| Total Plan Review & Formatting | Sharon | March 4 |

Upon creation of the plan, the team set to work creating instruments for each area of the evaluation. The three-tiered evaluation implementation plan is outlined in Table 6.

Table 6. Evaluation Implementation Plan

|  |  |  |
| --- | --- | --- |
| **Expert Review:** | | |
| Develop Expert Review Instrument | Matt and Sharon | March 15 |
| Perform Evaluation | Matt and Sharon | March 25 |
| Write up Results | Matt and Sharon | April 16 |
| **Learner Survey:** | | |
| Develop Learner Survey Form | Melanie and Stephanie | March 15 |
| Write up Procedure | Melanie and Stephanie | March 15 |
| **Learner Interview:** | | |
| Develop Learner Interview Instrument | Danielle | March 15 |
| Write up Procedure | Danielle | March 15 |

The final evaluation report delivery date to the client is May 1.

# Limitations

The TREASURE SAE Game evaluation was constrained by several limitations:

1. Although the evaluation plan included a learner survey and interview, the team was not granted access to a sample group of the target audience. The inability to implement a learner evaluation limited the team’s ability to comprehensively test the game for learning results and true universal design. In general, this restricted the ability to gather and interpret stronger quantitative data for a comprehensive evaluation.
2. The evaluation team noted concerns with both the lack of instructions and limited screen labeling that would have been more accurately assessed had these issues been tested with a screen-reader system such as JAWS.
3. Independent and unbiased evaluation is a key component of product improvement. However, in this instance the evaluation was hampered by the evaluation team’s collective lack of agriculture experience. Having access to an unbiased subject-matter expert might have affected several aspects of both the visual and instructional design review. A subject matter expert with significant experience in agricultural education should review the evaluation recommendations before implementing the suggested revisions.

# Data Collection and Analysis

The evaluation team employed a mixed methods approach to acquire varied quantitative and qualitative data, which informed a comprehensive and informative evaluation report. This approach allowed for the overlap of questions to ensure the evaluation was thorough and comprehensive, used both opinions and metrics derived from experts, via multiple data collection instruments and methods.

Expert Review

Three industry experts in the fields of instructional design, visual design, and technical review/quality control were identified for completing the expert evaluations. Two of these experts are graduate students with the Learning, Design, and Technology Program at the University of Georgia and possess either advanced degrees or significant industry experience in their fields. Sharon Laidlaw served as expert in the area of instructional design. She is the Lead Technology Design Coach for the Austin Independent School District and has 25 years of experience as a teacher, teacher trainer, instructional coach, technology specialist, and instructional designer. Matthew Whittlesey served as the visual design expert. His education and experience include a Fine Arts degree from the University of Georgia, and he has spent over two decades designing and developing custom online training products specializing in user-interface design, static and animated content graphics, and digital illustration. He has extensive experience refining the visual aspect of products focusing on the end-users experience. The technical reviewer/quality control specialist was Steven Schretzmann. His experience includes over 20 years in multimedia online production, digital multimedia online learning design, and instructional technology.

Heuristic principles, based on the work of Dr. Thomas Reeves (Appendix A), were adapted as Google Forms to guide the experts’ assessments. Representing ordinal scales of measurement, the forms aligned questions to specific principles with a corresponding principle explanation. These questions are included below. In addition to providing the ordinal rankings on both severity and extensiveness of each issue, the experts provided specific written or oral commentary for each criterion.

The experts received access to the TREASURE SAE game and the instruments of review and were asked to complete the evaluation and provide their recommendations. The results were sent via email and retrieved from the survey results.

To increase inter-rater reliability, a separate member of the evaluation team reviewed each expert reviewer’s survey for consistency across similar items. The team member also compiled the results, which kept each evaluators’ responses separate (one reviewer could not be influenced by another).

Learner Surveys

The team designed instruments to capture information related to both usability and self-efficacy. Learners will be identified by the TREASURE SAE stakeholders and will be typical of the target audience of agricultural literacy teachers at the middle- and high-school levels. The client will then implement the online survey with the target audience.

The learners will be provided a Google Form online survey (Appendix B) to complete as they progress through the game. (A link to the survey can also be found [here](https://docs.google.com/forms/d/e/1FAIpQLSf5Fs_WvJPYPd2SOAYa_YcnHjrzd_0rsbf-xRhDLFRsh1dwAg/viewform?usp=sf_link).) The survey was adapted from Kim, et. al, (2017). This survey provides the opportunity for the collection of both qualitative and quantitative data, allowing for scored numerical data to identify trends as well as opinion-based analysis to be compared to the expert analysis.

Learner Interviews

Although access to the learners was not available during the time of this evaluation, interview questions were created to be used at a later date by the game development team. The learner interview questions can be found in Appendix C. Focusing exclusively on qualitative data, these interviews will collect personal opinions. Suggestions for improvements will be consolidated for comparison with data collected in the expert review.

These interviews will be conducted over the phone or via an internet-based video teleconference. The interviewers will utilize a set of questions to guide the interview; however, the interviewer will not be required to cover all topic areas. The interviewer should intuitively move through the interview in response to the learners’ expressed areas of interest, as areas of focus are uncovered during the course of the interview. This will facilitate the most constructive and thoughtful opinions.

Recording interviews and having two different evaluators review and code the data will increase the validity of the evaluation. Comparing all evaluators’ coding of the data will ensure inter-rater reliability.

Table 7. Mixed Methods Matrix

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Is the game relevant to the Target Learners’ professional responsibilities? (Learn & Apply) | Is the game designed well? | Is the game well put together? | What would make the game a more valuable experience? | What aspects of the game are specifically enjoyable or useful? |
| Expert Reviews |  | X | X | X |  |
| Learner Surveys | X | X | X | X | X |
| Learner Interviews |  |  |  | X | X |

Table 8. Evaluation Data Collection and Analysis Plan

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **3-5 Evaluation Questions** | **Data Collection Method** | **Data Source** | **Activities** | **Data Analysis** |
| Is the game intuitive enough to focus on the content?  Is the game accessible via multiple platforms (Mac, PC, Mobile)?  Is the game 508 compliant? | Expert Survey | Google Forms | Sharon Laidlaw developed the protocols for expert evaluation.  Matthew Whittlesey completed the expert evaluation of visual design.  Sharon Laidlaw completed the expert evaluation of instructional design.  Steven Schretzmann completed the expert technical evaluation.  Stephanie Hulsey compiled and cleaned data in a spreadsheet. | Stephanie Hulsey checked both survey responses for internal consistency and used spreadsheet formulae to analyze the data for presentation to stakeholders. |
| How effective the learner can navigate around the game for task completion?  To what extent learners are allowed to interact with the website?  Can the user complete the task without technical difficulties?  To what degree are the teaching points valuable to you? Are there too few or too many scenarios provided? To what degree do you find the scenarios practical and relevant? | Learner Survey | Google Forms | Melanie Blackman and Stephanie Hulsey prepared learner survey questions, and created a form for dissemination to future learners. | Dr. Newberry will complete at a future date. |
| What would make the game a more valuable experience?  What aspects of the game are specifically enjoyable or useful?  What aspects of the game increase your confidence in supervising SAEs? | Learner Interview | Interview Protocol | Danielle Travis developed an appropriate interview protocol and drafted learner interview questions. Learner interviews to be completed at a later date by Dr. Newberry. | Dr. Newberry will complete at a later date. |
|  |  |  |  |  |

# Results

Upon completion of the expert evaluations, each scoresheet was compiled by a separate team member, who did not serve as an expert evaluator. The averages of each experts’ scores are given in the chart below. Please note the scoring system, which demonstrates that a lower score indicates fewer and less severe problems.

**Severity:**

0 = not a problem

1 = cosmetic only ( not fixed unless time available)

2 = minor usability problem (low priority)

3 = major usability problem (high priority)

4 = usability catastrophe (imperative)

**Extensiveness:**

0 = not a problem

1 = single case

2 = occurs in several places in the program

3 = widespread throughout the program

Table 9. Compiled Results from Expert Evaluations

|  |  |  |
| --- | --- | --- |
| **Criteria:** | **Severity** | **Extensiveness** |
| Learning Design | 4 | 3 |
| Feedback | 3.67 | 3 |
| Resources | 3.5 | 3 |
| Performance Support Tools | 3.5 | 3 |
| Aesthetic & Minimalist Design | 3 | 3 |
| Recognize & Recover from Errors | 3 | 2.67 |
| Message Design | 2.67 | 3 |
| Visibility of Status | 2.67 | 2.67 |
| User Control & Freedom | 2.67 | 2.67 |
| Help & Documentation | 2.67 | 1.33 |
| Recognition | 2.5 | 3 |
| Matches Real World | 2 | 2.33 |
| Learning Management | 2 | 2 |
| Media Integration | 2 | 1.5 |
| Consistency & Standards | 1.67 | 1.67 |
| Error Prevention | 1.67 | 1.33 |
| Interactivity | 1.67 | 1 |
| Assessment | 1.5 | 1.5 |
| Flexibility & Efficiency | 1.33 | 1 |

Notice the strengths of the game are located at the bottom of the chart and include flexibility, efficiency, and the inclusion of an assessment component. The game mostly functions well according to standards for programming functionality, and there are not many ways a user can make input errors when using the game.

Design Aesthetics Expert Review:

A review of the design aesthetics—including the color palate, use of typography, effectiveness of the graphical elements and the overall success of the user interface (UI)—yielded the following results:

* The color palette is limited and subdued, missing an opportunity to both create a sense of overall confidence and utilize color cues to convey specific information.
* Typography is restricted, not utilizing enough variety in style or size to assist the game-player in prioritizing information (hierarchy of information).
* The graphic elements (icons, buttons, photography) lack visual interest or cohesiveness to promote a high fidelity product.
* Though attempting a grid-based layout design, the lack of overall success in UI can be tied to the layout design as well as the color palette, typography, and use of graphical elements.

Usability Expert Review:

A review of usability—including product credibility, desirability, and accessibility—yielded the following results:

* Product credibility is lessened initially on the basis of an unsatisfying first impression.
* Product desirability is low due in large part to the under-designed UI and the lack of a reward-based system implemented when winning the game.
* Accessibility issues prevent the largest possible audience reach.

Instructional Design Review:

A review of the learning experience yielded the following results:

* Objectives were clearly stated and aligned to both the learning activities and assessment.
* The instructional materials simulate real-world application in a context that is fully interactive and relevant to the target audience.
* Required input is clear throughout the interface, and there is little opportunity for input error.
* Entry skills and knowledge are not clearly specified.
* Considering no instructional content is provided in the e-learning game, the game may be part of a learning unit. Nonetheless, there needs to be an intro that connects this game to a larger unit if that is the case.
* Learners are unable to navigate back into the experience to review previous sections.
* No feedback is provided to the learner regarding the choices they make in the simulation.
* No resources are provided to support remediation or allow the learner to self-correct.

Technical Standards Review:

A review of the technical and multimedia standards yielded the following results:

* Overall the app worked in Mac OS, but did not adapt well (ill-fitting windows, skewed scales within game). Further testing in another operating system may yield different results.
* Lack of contrast on title page does not appear to meet 508 compliance standards. Lack of sound and placement of text could raise accessibility issues.
* Lack of consistency in names and titles of the game.
* Lack of consistency in scoring algorithm.

# Discussion

Design Aesthetics Discussion:

**Color Palette**

The color palette could be enhanced and is missing opportunities to both create a sense of overall confidence and utilize color cues to convey specific information. Color may also help to visually separate the focal content question from the surrounding dashboard, supporting a rigid 2-plane UI that anchors the dashboards to the screen and allows for the content questions to change as directed by the game player. A lack of well-planned accent colors limits the ability of the game player to understand the cues in the hierarchy of information. Choosing bolder colors that coalesce with—and provide contrast to—a carefully selected overall palette will help to drive the game players eyes towards changes in the ‘Teacher Quality of Life Gauge’ or other critical input-related elements when necessary. This would diminish the extraneous cognitive load but still present timely and relevant information.

**Typography**

The typography and font choice options are limited to a single font, using only the regular and bold styles, and although this may have been done purposefully in an effort to reduce the use of elements that do not support the instructional goal in observance of the Coherence Principle, additional visual interest would be helpful. This simplicity of one font does stress the importance of varying the size, placement, and styles representative of the relative value of the text. For example, the word “Month” is the largest font size displayed onscreen, yet the “Teacher Quality of Life” gauge and corresponding steps are the smallest onscreen fonts. Accessibility issues notwithstanding, in terms of onscreen importance, this visually inverts the importance of the information most critical to the game player.

The presentation of words and bodies of text should also be improved (Figure 4). The answer choices presented for the game player to choose from are center- and top-justified, often with “widows” or single words at the beginning of an answer or at the end. Care should be given to adjust the character tracking to prevent this happening to create more visually pleasing bodies of text. Finally, a continuity of approach should be undertaken in dealing with words that have capital letters, as the use of these capital letters within the answer blocks seems arbitrary.



Figure 4. Presentation of Words and Bodies of Text

**Graphic Elements**

The individual graphic elements lack visual interest and a sense of uniqueness. The icons, while always helpful where informational text or instruction is limited, are nearly all stylistically different (Figure 5). The “Community Involvement Dashboard” icon is a flat, illustration style and is scaled physically to be too small for the amount of information contained within that rectangle whereas the “SAE Opportunities” icon is a gradient-based 3D image, and the “Teacher Dashboard” icon is a black-and-white “clip-art” style. The blue, circular “Month” indicator is not technically an icon. However it also reflects a different style and color approach by using a bolder flat color. Additionally, since the content of the icons is inconsistent as well, it is difficult to determine if the icon is decorative in nature or serves a purpose relevant to game.



Figure 5. Stylistic Differences in Graphic Elements

The buttons are simplistic in design, albeit sized differently. The “Community Profile” button is nearly hidden by an icon that is more than double its size and is also significantly smaller in physical size than the “Ask for Community Support” button. The size variation presents a hierarchy of information question, and though the design is semi-reflective of traditional buttons—utilizing slightly rounded corners—it is not entirely clear that these are clickable points of engagement nor what duty they perform.

**User Interface**

The interface is creatively unimaginative and lacks a true sense of order. It is center-heavy, broken in non-symmetrical thirds, with icons in every corner. A sense of balance was attempted; however, the results are not successful. Though the existing UI is grid-based in its original design with the three distinct horizontal sections, the weighting of these sections are neither proportional nor symmetrical. The dashboards are positioned at the top and bottom of the screen in a nod towards balance, however they are not equal in size with the “Teacher Dashboard” being approximately 88% of the height of the “Community Involvement Dashboard” (Figure 6). If this disparity in size is intentional, then the larger of these two dashboards should be positioned at the bottom of the screen as a visual anchor; the current configuration appears top-heavy by having this positioning reversed.

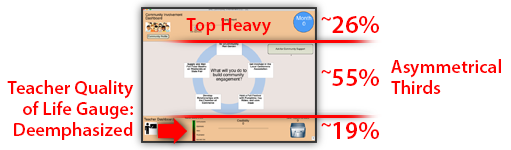


Figure 6. User Interface Dashboard Size

It is difficult to discern a hierarchy of information, therefore increasing the cognitive load. Fonts are largely weighted the same with minimal variation, as previously noted. Colors are mostly muted with the “Teacher Quality of Life” the single and notable exception. Information is clustered in an inconsistent manner. The central questions’ placement at the center of the screen and its size relative to the total user interface—occupying nearly 61% of the screen—indicate that this is the focal point of game; however, as the game is designed to prevent teacher burnout, it seems more appropriate that the response to the question and in particular the effect upon the “Teacher Quality of Life” gauge would be the actual focal point of the game and therefore the most important visual component. This is not evident in the current iteration of the UI design.

Secondary information is spread throughout the screen, leading the eye to jump from corner to corner and icon to icon, in search of an indicator of importance. Game players are left to determine on their own what is important and why, and this additional cognitive processing detracts from the simplicity of the game and reduces the focus on the goal.

Screen-to-screen navigation is not a critical component of this UI; however, navigational concerns are still apparent. The lack of game instructions and informational labeling—whether permanent or accessed via rollover or clicking—again overload the cognitive processes by forcing the game player to interpret the individual components of the dashboards and their use.

Usability Discussion:

**Credibility**

Online or software credibility is built almost immediately when a new user initially accesses a site or product. This trust is both strengthened and eroded primarily by the initial impression of the visuals. The landing page or title page of the SAE game is the initial impression and uses a photo that does not connect with the game player on an emotional level and employs a dated, photo-editing treatment using blurring and affected transparency techniques. This screen includes little more than a title paired with the photo, offering limited information or instructions. Finally, it does not preview a continuity of effective graphic design decisions, as the actual game UI is completely different than the landing page. This is another instance where color choice and design matter. The lack of cohesive design between the landing page and the game miss an opportunity to lay the foundation for a professionalism that will help to build an immediate trust, defining this as a well-designed brand wrapped around a well-designed product.

**Desirability**

Desirability is the concept that an attractive design and associated professionalism will improve usability by relaxing the brain, reducing extraneous design-related cognitive load and enabling better focus for an enjoyable experience (UXPin, 2015). There are two significant factors working against this game from a desirability standpoint. First, from an aesthetics perspective, the SAE game presents an unimaginative UI that lacks a discernible design motif or style, falling back on a dated, basic computer system look. Second, at its core, the goal of the game is “not to lose” or to avoid burnout. This lack of game-based reward or experiential reward reduces the overall desirability of the game and detracts from the experience.

**Accessibility**

An important component of usability testing focuses on accessibility and universal design, ensuring that a product is usable by as many people as possible. A lack of included audio or narration reduces the ability for a sight-impaired individual to fully access the course. A screen reader may be able to address this deficiency; because of a lack of access to this type of equipment, this test was not performed for the benefit of this evaluation. This point—that narration may improve access to the content for some— is speculative and unverified.

Visual components would also benefit from a focus on accessibility. Fonts associated with the “Engagement” slider and “Teacher Quality of Life” gauge are too small and can be difficult to read. It is commonly recommended that fonts be a minimum of 16pt. and also be scalable as the screen scales. Text-based labels are not always clear, and this has cognitive impacts; as the screen may possibly be read by a screen reader, it is important to hierarchically label information for presence and comprehension. For example, both the “Engagement” and “Credibility” sliders lack any context that would explain their function or reason for being. Text clarity for both readability and game-play should be addressed.

Finally, the low color contrast between the two buttons and their respective backgrounds could potentially impact low-vision or color-blind individuals, making it difficult to determine that this is a point of engagement. Though not advocating for a total reliance on color contrast, a simple way to determine whether there is enough contrast to be helpful is to view a product in grayscale (Figure 7).

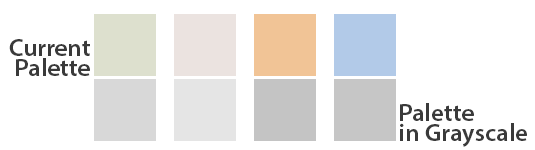


Figure 7. Color Palette, Current and in Grayscale

Instructional Design Discussion:

Expert reviewers were unable to access design documentation which might have illuminated some of the instructional design choices. Regardless, learning objectives are clear and the target audience (preservice agricultural teachers) will understand the game objectives, the broader, unstated goal of increasing retention and efficacy, and the simulated contexts within the game. The game is fully interactive, requiring the behavioral engagement of the participants at all times, and the simple interface leaves no room for input error.

Despite these strengths of the program, several key opportunities for improvement of the learning design exist. First, it is unclear what background knowledge or skills are a prerequisite for success in the game, and no instructional content is provided to allow learners to acquire the necessary knowledge and skills. This prevents learners from being able to assess readiness for participation in the game or calibrate their preparation by reviewing the content being applied.

Relatedly, learners are unable to review previous phases of the game and explore the results of different choices. If learners leave a community scenario and reopen the program, they start from the beginning, and the options presented are new. Therefore, there is no way for them to compare the results of different options. This prevents learners from testing the schema that evolves as they play the game and making adjustments to approach the targeted behavior (i.e., maximizing credibility while minimizing burnout).

Most importantly, no feedback is provided to learners that makes clear which knowledge and skills they are demonstrating or not demonstrating when making particular choices within the simulation. When a learner makes a choice of action, the game simply informs them whether the choice is good, poor, or merely not the most effective choice; no elaboration is provided regarding what, exactly, about the choice is ineffective. This lack of feedback reduces the likelihood that learners will develop new knowledge or skills as a result of playing the game.

Finally, no instructional resources are included in or linked to the game, which would allow learners to further their understanding of relevant topics.

Technical Standards Discussion:

Expert review of the technical components of the game found the technical components to be in generally good working order, but lack adaptability. For example, the game appeared complete and professional in the PC environment, but had misplaced items when used with Apple Mac OS. Also, the game is not available in a mobile or tablet format.

The game does not utilize tools such as hover-overs to demonstrate clickable areas. There are a number of clickable buttons within the game that have no directions, so the player does not know how to interact.

While not technical, there is some confusion about the title of the game, and the consistency of the title across each screen of the game. The landing page of the app opens with “Are you with me?” (Figure 8), while later titles include “SAE Community Development Simulation” and later “SAE Community Involvement.”

Figure 8. Landing Page

There are a number of issues that negatively impact the accessibility of the game. The lack of contrast of text against the photo on the title slide could be problematic. The scrolling text which appears after selecting a region may be missed by screen readers, and within the game dashboard, the text is not arranged and spaced in a way that could be used smoothly by screen readers. The game does not include sound at all. An audible signal after each community engagement choice would be a helpful signal to players.

# Recommendations

Design Aesthetics Recommendations:

**Color Palette**

The target audience for this SAE game work an abundance of hours and suffer high rates of burnout. Picking a pleasing palette with attention to accent colors that will create a virtual environment contradicting this real-world experience would be a well-thought-out step towards keeping the game player engaged by the game. Emphasis on a well-planned, cohesive palette will create a “feeling” promoting a fun, safe place to practice decision-making skills that guard against a serious concern, career burnout.

**Typography**

Typography, though not a significant detriment to this game, would benefit from the addition of a second font family. Varying fonts, sizes, and styles based upon the importance of information can help to create a more interesting product. Additionally, the creative use of fonts will often support the graphic elements designed into a product, reinforcing the sense of professionalism in a product. Finally, though technically outside of the scope of typography, utilizing a quality control professional to review the game for consistent and appropriate character word usage is recommended

**Graphic Elements**

All graphic elements should have a design plan. All icons that represent a key piece of information should have a similar art style and color system to provide visual cues and help reduce the overall cognitive load of the interface. Likewise, buttons or points of user engagement should also be apparent and consistent in their presentation. Though often mundane, well-designed and interesting buttons, particularly in a game, provide an opportunity to introduce a fun feature, which can improve the desirability of the game.

**User Interface**

Refining and improving the UI is probably the most critical design component to undertake, as it will include many design elements and the impact on game desirability will likely be significant. Embracing traditional graphic design theory and layout theory will support a grid-based system defined by measurements that supports the golden ratio, a design principle that creates beauty through harmony and proportion.

Additionally, considering the hierarchy of information when re-imagining the UI would ease the cognitive load on the game player by visually validating the “Teacher Quality of Life” gauge, which appears to be the single most important piece of information to the player. Finally, improving onscreen labeling and instructions is a simple correction that will provide significant value.

Usability Recommendations:

**Credibility**

Building creditability combines excellent design choices, color theory, typography, and interface design to create a high-level of trust and game-playing desirability. An effective way of building product credibility is to borrow design ideas or styles from successful efforts. In this case, picking a design style such as the “flat design” popularized by both Apple and Microsoft products could be effective, as this is a wide-reaching theme that has a pre-established credibility. Alternate options may be the darker photo-illustration style embraced by most of the top video games currently on the market or potentially catering to the agriculture community by embracing a design style that is familiar to this demographic.

**Desirability**

Improving the desirability will likely involve design aesthetics and usability changes. However, they will need to be considered along with instructional design recommendations (below) for feedback mechanisms. The evaluation team recommends target audience surveys and interviews for guidance regarding desirability changes.

**Accessibility**

Embracing universal design philosophies ensures that a product is well designed and accessible to everyone. With this game, improving font sizes, labeling and instructions, color contrast and potentially audio are significant and encouraged steps towards a more accessible product.

Instructional Design Recommendations:

In the expert review of the e-learning game, the heuristic “Learning Design” scored the highest in terms of the extensiveness and severity of problems, combined. The next three highest-scoring heuristics—“Feedback,” “Resources,” and “Performance Support Tools”—are related, and together suggest some clear priorities for revision of the instructional design.

First, including a pretest would allow learners to self-assess and determine readiness for proceeding with the learning experience. Items on the pretest could be matched with more specific attitudinal or learning objectives that could, in turn, be linked to relevant, Internet-based learning resources and performance support tools. This would allow learners to review or preview the necessary content prior to playing the game. In general, resources to support remediation or correct ineffective choices are necessary, especially for a self-paced learning experience that is not facilitated by an instructor.

The most critical area for revision is in the need for feedback. Each action should have corrective feedback that describes why the option is not a good choice for that context. A specific "credibility gained" and/or "burnout acquired" score could be assigned to each action. Feedback should also be given when there is not enough credibility for community support. Specificity could also be added to indicate how much engagement is enough to earn community support and/or credibility for particular actions. Recommendations for integrating feedback can be drawn from literature on both case-based learning and cognitive apprenticeship.

**Recommendations Based on Case-Based Learning Theory**

The e-learning game is an example of case-based learning, and includes two characteristics of effective case-based learning: 1) cases that tell a story and focus on an issue that arouses interest, and 2) content that is closely aligned with the overall instructional goals and objectives.

Blackman, Choi, and Hong (2001) specify additional key components of case-based learning that would strengthen the learning design of the TREASURE SAE e-learning game and would be predicted to result in increased learning gains:

* Use a narrative text for the county scenarios, including characters, direct quotes, a clear conflict that is enhanced by providing conflicting points of view, and a challenge that is clearly stated and elaborated within the description. Narrative that reflects scenarios with which the target audience would be familiar would also increase the desirability of the e-learning game.
* To create continuity in the case narrative and further enhance the narrative structure, feedback on learner choices might be written to include results for the same characters, points of view, and conflict. In other words, the feedback would describe the outcomes of learner choices in a narrative format that picked up the thread of the original case or scenario—as if in a "choose your own adventure" story.
* Text that provides an analysis of alternative solutions is another key feature of case-based learning. For the TREASURE SAE game, one option for including this analysis would be to integrate it into the feedback for each learner choice; the narrative text feedback described above could include a section beginning, “If you had…” that would illustrate the results of other choices. Another option would be to allow learners to gain more credibility and earn back some of their lost burnout points by following a “Make Another Choice” path that would allow them to try other options and read the analysis for each of those choices.

In a synchronous or partially-synchronous application, face-to-face or virtual discussions of this analysis of their choices could deepen learners' understanding of the implications of the various choices presented. Students in an online course could be assigned a specific county scenario in a given week, play the game, and be required to post to a discussion thread with an explanation of their choices in the game, the results, and an explanation of what they would do differently in the future. As they progressed through different scenarios over the weeks of the course, they could be asked to reflect on their results over time, noting thinking patterns, recurring assumptions, and growth. Social constructivist theory would also support analysis and reflection in pairs or groups.

**Recommendations Based on Cognitive Apprenticeship Theory**

In addition to using research on case-based learning, instructional designers working on revisions to the TREASURE SAE game could also rely on principles of cognitive apprenticeship. According to Brill, Kim, and Galloway (2001), “cognitive apprenticeship seeks to engage learners in real-world scenarios in which they act and interact to achieve useful outcomes” (203). Like case-based learning, cognitive apprenticeship situates learners in a real-world context, but with the addition of the support of a coach or mentor. Cognitive modeling makes the problem-solving process transparent for learners. For the TREASURE SAE game, this modeling could be provided by a professor in a synchronous setting or, for asynchronous applications, through the inclusion of a “virtual coach” or mentor in the narrative of the game design.

A virtual coach would provide the four key components of cognitive apprenticeship: feedback, scaffolding, reminders, and hints. Based on these principles as outlined by Brill, Kim, and Galloway (2001), revisions to consider include:

* Developers should include feedback that simulates modeling of certain skills by more advanced individuals and the virtual coaching by mentors toward higher levels of knowledge and practice. Characters that function in the role of mentors or experienced teachers could be built into the game design, and the narrative could be written to include descriptions of their effective choices and the rationale for each.
* The narrative guidance provided by a virtual coach should include the typical concerns, behaviors, and fears of preservice teachers at the outset of learning, so that the model demonstrates growth and resilience and impacts attitudinal objectives.
* Deeper revisions to the e-learning game could add levels in order to include scaffolding and gradual release of responsibility, in which learners have a chance to practice making choices or observing models and explanation of choices, before proceeding toward increasing independence in the game.
* One important feature of effective scaffolding is the immediate availability of help. With this in mind, the interface should include resources and other performance support tools that provide reminders and hints that are responsive to learner choices.

Technical Recommendations:

Revisions to the game to make it more adaptable to Mac OS should be considered. In addition, a video or audible experience could provide entertainment and engagement, while helping to combat accessibility issues. The dashboard arrangement should include scales for each meter. There are a number of ways that multimedia could be used to add value to the game. Consider using video to introduce geographic regions, music during the game, and sounds to signify correct and incorrect responses.

# References

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Appendix A: Heuristic Expert Evaluation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Topic** | **Question** | **Indicator** | **Standards** | **Data Collection** | **Timeline** |
| Visibility of system status | The e-learning program keeps the learner informed about what is happening, through appropriate feedback within reasonable time. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Match between system and the real world | The e-learning program’s interface employs words, phrases and concepts familiar to the learner, rather than system-oriented terms. Wherever possible, the e-learning program utilizes real-world conventions that make information appear in a natural and logical order. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| User control and freedom | The e-learning program allows the learner to recover from input mistakes and provides a clearly marked “emergency exit” to leave an unwanted state without having to go through an extended dialogue. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Consistency and standards | The e-learning program is consistent in its use of different words, situations, or actions and it adheres to general software and platform conventions. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Error prevention | The e-learning program is carefully designed to prevent common problems from occurring in the first place. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Recognition rather than recall | The e-learning program makes objects, actions, and options visible so that the user does not have to remember information from one part of the program to another. Instructions for use of the program are visible or easily retrievable. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Flexibility and efficiency of use | The e-learning program is designed to speed up interactions for the experienced learner, but also cater to the needs of the inexperienced learner. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Aesthetic and minimalist design | Screen displays do not contain information that is irrelevant, and “bells and whistles” are not gratuitously added to the e-learning program. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Help users recognize, diagnose, and recover from errors | The e-learning program expresses error messages in plain language (without programmer codes), precisely indicates the problem, and constructively suggests a solution. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Help and documentation | When it is absolutely necessary to provide help and documentation, the e-learning program provides any such information in a manner that is easy to search. Any help provided is focused on the learner's task, lists concrete steps to be carried out, and is not be too large. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Interactivity | The e-learning program provides content-related interactions and tasks that support meaningful learning. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Message Design | The e-learning program presents information in accord with sound principles of information-processing theory. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Learning Design | The interactions in the e-learning program have been designed in accord with sound principles of learning theory. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Assessment | The e-learning program provides assessment opportunities that are aligned with the program objectives and content. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Media Integration | The inclusion of media in the e-learning program serves clear pedagogical and/or motivational purposes. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Resources | The e-learning program provides access to all the resources necessary to support effective learning. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Performance Support Tools | The e-learning program provides access to performance support tools that are relevant to the content and objectives. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Learning Management | The e-learning program enables learners to monitor their progress through the material. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Feedback | The e-learning program provides feedback that is contextual and relevant to the problem or task in which the learner is engaged. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
| Content | The content of the e-learning program is organized in a manner than is clear to the learner. | 0 - 4 Scale (from "This is not a problem" to "Usability catastrophe; imperative to fix before this product is released") | Sliding scale allows for the client to determine urgency/ prioritization of revisions | Google Forms | Post-Survey |
|  |  |  |  |  |  |

Appendix B: Learner Survey

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Topic** | **Question** | **Indicator** | **Standards** | **Data Collection** | **Timeline** |
| Navigation | There is always a clear link to the homepage. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Navigation | I can easily find what I'm looking for. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Navigation | The buttons have clear labels. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Navigation | All links in the site are working. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Navigation | The site allowed me to easily move whenever I wanted to go. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Navigation | Icons and images fully represented what they were supposed to do. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Visual Clarity | The layout is clear. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Visual Clarity | Texts are easy to read (both font style and size). | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Visual Clarity | There is adequate text-to-background contrast. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Content | The major headings are clear and descriptive. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Content | The use of terminology and vocabulary were appropriate for intended users. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Interactivity | The site contained factors to attract my attention. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Interactivity | The site well showed what's new or important on visible places. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Attractiveness | The site reflected recent trends in terms of its' design. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Attractiveness | The site's design well represented what it suppose to provide. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Attractiveness | The site has unique attributes compared to other sites for a similar purpose. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| User Support | I was able to get adequate support when having trouble with using the site. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Helpfulness | The site seemed to fully function as intended. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Helpfulness | I got enough information I needed. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Learnability | I could easily get familiar with functions and structures of the site. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Technical Function | There was no technical problem while surfing on the site. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Technical Function | There was no delay when trying to load pages. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Exchange- ability | I could easily download files. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| Non Redundancy | Menus, categories, information, or pages didn't overlap with others. | 1 - 5 Scale (from "Strongly Disagree" to "Strongly Agree") | 80% respond "Agree" or "Strongly Agree" | Google Forms | Post-Survey |
| General | Was there something missing you were expecting to see? If there was, what was it? | Long Answer | 80% active responding | Google Forms | Post-Survey |
|  |  |  |  |  |  |

Appendix C: Learner Interview

**Evaluation Question: What would make the game a more valuable experience?**

Learner Interview Questions:

1. What aspects of the game were meaningless or felt like a waste of time?
2. What aspects of the game felt the most valuable to you?
   1. Why?
3. What could be added to the game in order to make it more accurately resemble real life?
4. Would you recommend this game to others in order to enhance their real life experiences?
5. Did you feel like the creators of the game understood the real life experience of a agriculture teacher and were able to translate that into the game?
6. How would you rate this game’s overall effectiveness?
7. How accurately did this game reflect your real life experience?

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**Evaluation Question: What aspects of the game are specifically enjoyable or useful?**

Learner Interview Questions:

1. What was your favorite part of the game?
   1. Why?
2. When classifying a part of the game as useful, how was it useful? (i.e. Did it make you think about something you had never thought about before, or was it applicable to your real life?)
3. Would you recommend this game to others?
4. Were there any parts of the game that were specifically un-enjoyable or frustrating to use?

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**Evaluation Question: What aspects of the game increase your confidence in supervising SAE’s?**

Learner Interview Questions:

1. Do you believe that this game has improved upon your ability to supervise SAE’s?
2. Can you describe two elements of the game that specifically contributed to your improvement?
3. Were there any aspects of the game that took away from your skillset or made you doubt/question any of your skills?
4. What new skills or tricks did you learn within the game that you’ll be able to apply when you’re supervising SAE’s?

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**Evaluation Question: Additional thoughts/comments?**

Learner Interview Questions:

1. Are there any other comments or suggestions you would like to include in order to improve upon this game?