

Heuristic Evaluation of an Online Perceived Present Control Health Intervention for Patients with Voice Disorders

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Introduction

Heuristic evaluation is one way to assess the usability of an existing site, including what is working well and what could be improved. To evaluate this health intervention module, I compared my experience navigating the health intervention module to Jakob Nielsen's widely recognized group of usability principles, the "10 Usability Heuristics for User Interface Design" (found at <https://www.nngroup.com/articles/ten-usability-heuristics>).

Each section includes a definition of the heuristic principle, my evaluation of the health intervention module's successes and weaknesses, representative visuals from health intervention module, and a heuristic compliance score on a scale of 1 (very ineffective) to 4 (very effective). I have provided a summary of my analyses at the end of the document as well (see Table 1, *Heuristic Evaluation Summary*, page 23).

Throughout the heuristic analysis, I refer to module surveys/sections available in the Survey Queue as main sections. I refer to additional resources linked within survey pages, including voice-related tips and additional information, as additional help sections.

Heuristic 1: Visibility of system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

The health intervention module includes several features that support visibility of system status and give appropriate feedback to users when they need it. To begin with, system status is apparent in the list of programs available in the survey queue. For completed sections, the "Begin survey" button is replaced with a green "Completed" and check mark and the title is in grey, rather than black, font. This effectively shows where the user is within the system and confirms completed section (see Figure 1).

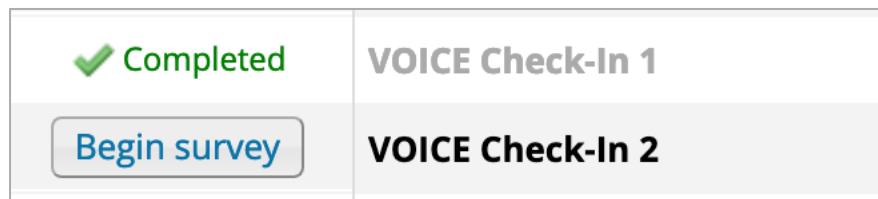


Figure 1. The system status is apparent in the list of completed and remaining survey sections.

Within survey sections, the page count in the upper left corner allows users to see how long the section is and where they are within that section (see Figure 2).

Resize font: Survey Queue

Lions VOICE clinic

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Page 1 of 4

WELCOME BACK!

Please tell us how you've been doing:

How much did your voice problem bother you over the past few days?

Not at all A little bit Somewhat Very much

[reset](#)

Select the choice that indicates how frequently you have had these experiences over the past few days.

	Not at all	A little bit	Somewhat	Often	Very often
My voice problem upsets me.	<input type="radio"/>				
The clarity of my voice is unpredictable.	<input type="radio"/>				
My voice difficulties restrict my personal and social life.	<input type="radio"/>				

[reset](#)

Figure 2. The page number in the upper right corner, circled in red, gives users a sense of how long the section is and where they are within that section.

When the user selects a survey question, the whole bar containing that question is highlighted in green, giving visual feedback as to where the user is within the system and what question they are answering. For open-response questions, the active textbox is highlighted in blue (see Figure 3). Once a user selects an option in response to a multiple-choice survey question, the selected value is shown with a conventional blue dot indicating that the response has been recorded (see Figure 3).

How much did your voice problem bother you over the past few days?

Not at all A little bit Somewhat Very much

[reset](#)

Looking at things you can control, what do you plan to do over the next few days?

[Expand](#)

Figure 3. Top: Active multiple-choice questions are highlighted in green. The conventional blue dot indicates that the response has been recorded. Bottom: Active open-response boxes are highlighted in green and outlined in blue.

At the end of each section, the system provides an ending message confirming that the section is done. When the user closes out of the survey, a page appears confirming that "You may now close this tab/window." Headers throughout the program also confirm completion at key points, such as the end of the first questionnaire or after section completion (see Figure 4). These features allow users to easily understand where they are in the system, which sections are completed, and which sections remain.

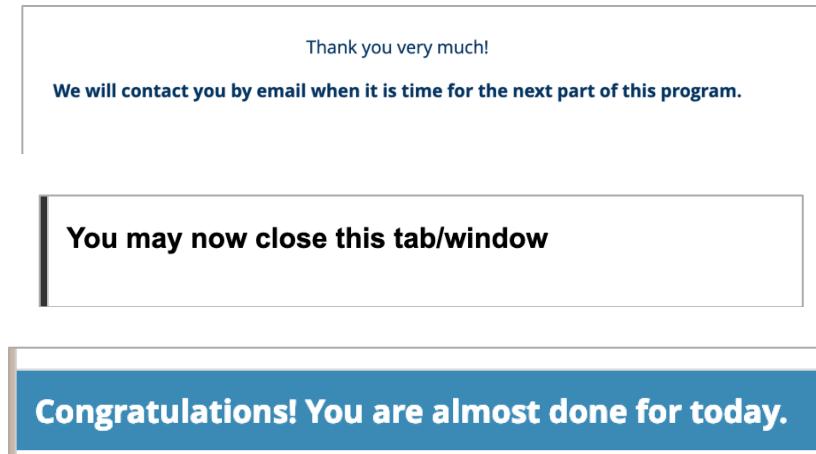


Figure 4. Top: Message confirming that the VOICE check-in section is completed and providing direction for next steps.
Middle: Message confirming that the window can be closed after the survey has been closed.
Bottom: Header confirming completion at the end of a section and indicating status within the system.

However, the additional vocal health tips sections do not indicate system status as clearly. For example, the linked "Strategies for Reducing Vocal Strain" section does not provide a page count, or an overview of what is in the section and where the user is within that section (see Figure 5).



Figure 5. The "Strategies for Reducing Vocal Strain" additional help section does not provide page numbers. None of the additional vocal health tips sections provide an overview of content available in the section or the user's progress in the section.

Rating: 3 - Effective

Heuristic 2: Match between system and the real world

The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

The health intervention module largely follows real-world conventions for survey questions but has several instances in which system-oriented terms and concepts clash with real-world conventions. However, several of the instances in which system-oriented and real-world terms and conventions clash are likely due to constraints from the software or from the methodological requirements of the study being conducted via the health intervention module.

The survey sections have a conventional format. The sections present a series of questions on each page, which are centered on similar topics. Each question has either multiple choice options represented by bubbles, a sliding scale, or a text box (see Figure 3). These are all familiar ways to respond to survey questions. The option to proceed to the next page is displayed at the bottom of the page, a conventional and logical place as users must review all questions before proceeding. Naming and numbering conventions for each survey sections are descriptive and logical: e.g., "VOICE Baseline Questionnaire," followed by "VOICE Check-In 1," "VOICE Check-In 2," and so on, in numerical order until the logically titled "VOICE Final Questionnaire" (see Figure 6).

Survey Queue	
Welcome to the VOICE Education Program! Thank you for your interest and willingness to participate in the study. Below are the modules you will be asked to complete. If you have any questions, please contact us at voice@umn.edu .	
<i>If at any point, you lose this webpage, access your program again by clicking on the link sent to your email.</i>	
VOICE Participant Resources for Coping with Distress VOICE Program References Frequently Asked Questions	
Status	Survey Title
Begin survey	Welcome!
Begin survey	Demographic Questionnaire
Begin survey	VOICE Baseline Questionnaires
Begin survey	VOICE Education Program
Begin survey	VOICE Check-In 1
Begin survey	VOICE Check-In 2
Begin survey	VOICE Check-In 3
Begin survey	VOICE Check-In 4
Begin survey	VOICE Check-In 5
Begin survey	VOICE Check-In 6
Begin survey	VOICE Final Questionnaire
Begin survey	One Month Follow-up Questionnaire

Figure 6. The titles and layout on the survey queue/home page provide a logical orientation to their sequence.

Use of embedded YouTube videos in the introductory sections takes advantage of a familiar platform and control system, matching established conventions.

There were several instances in which the health intervention module functioned in ways that were not consistent with real-world conventions or the concepts on which other websites function. Some of these may be out of scope of the upcoming usability project, such as using terms including “survey,” “survey queue,” “submit” rather than “done” or “continue,” and “close survey” to leave a window, or the inability to leave the page and return without an extended procedure involving a required code and new survey links sent via a separate email (see Figure 7). While this procedure is adequately explained, it is not conventional or natural.

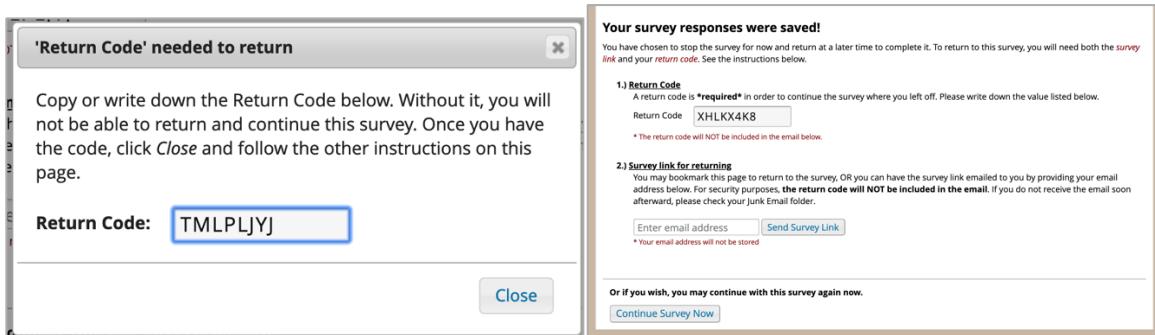


Figure 7. The extended procedure required to leave and return to the same survey section is not conventional or natural but may be out of scope for this project.

Another unconventional, but potentially out-of-scope, feature is the lack of autosave in the survey sections. Autosave features are common on contemporary websites, so the inability to leave with answers automatically saved does not match with real-world conventions.

Additionally, the way in which additional modules open, close, and function did not seem logical or natural. Additional help sections, the FAQ, VOICE program references, and VOICE program videos open in a separate window that lacks a menu or navigation options and must be closed by clicking a button labeled “Close survey” (see Figure 8). I was initially hesitant to click that button, fearing that it would close the whole survey session and lose my progress thus far. This labeling and closing mechanism does not match real-world conventions.

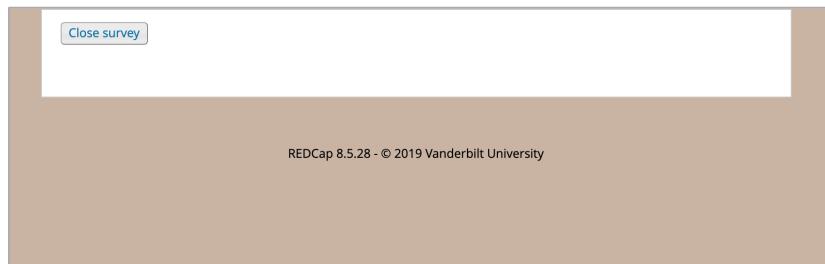


Figure 8. The “Close Survey” button with no further information or navigation options is not logical or consistent with real-world conventions.

The placement of the links to these additional modules is also not consistent with real-world conventions, as the links lead to optional informational features but are spatially grouped with required actions (see Figure 9). A more logical organization could include grouping the action items together and moving the links to these optional, informational sections to an area with other optional features.

If you need any ideas, please check out our list of helpful voice-related tips below.

- [Strategies for Reducing Vocal Strain](#)
- [Strategies for Dealing with Other People's Opinions](#)
- [Strategies for Singers and Other Heavy Voice Users](#)
- [Strategies for Dealing with Physical Symptoms](#)
- [Strategies for Dealing with Emotional Symptoms](#)

If you click on a link, it will bring you to a different page. Please be sure to come back to submit your answers!

PLEASE CONFIRM: You have left some questions on this page blank. You may either go back and answer them or click continue without answering. To continue, select "Ok, continue" below.

* must provide value

Ok, Continue

reset

Participant Resources for Coping with Distress
[Frequently Asked Questions](#)
[VOICE Program References](#)
[VOICE Program Videos](#)

NOTE: By pressing the "Submit" button, your answers will be submitted. You will not be allowed back to change your answers.

[**<< Previous Page**](#)

[**Submit**](#)

[**Save & Return Later**](#)

Figure 9. Linked additional help modules are at the bottom of the page but still within the main section, sandwiched between required actions like "Ok, Continue" and "Save & Return Later."

Rating: 2 - Ineffective

Heuristic 3: User control and freedom

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

User control and freedom features like 'emergency exits' or undo/redo are not prevalent in the health intervention, but these are again places where constraints from software or from the methodological requirements of the study being conducted may constrain the options

for such features. While there are no undo/redo capabilities for navigation, this module is a unique case in which these common functions are undesirable for the site administrators due to the methodological requirements of the study.

The ‘reset’ functional on all survey questions is one effective undo feature, giving users more freedom through easily allowing questions to be reset to blank (see Figure 10).

How much did your voice problem bother you over the past few days?

Not at all A little bit Somewhat Very much

reset

Figure 10. The reset function is an effective undo feature.

User control may be improved in movement between the survey sections and the linked additional help sections (see Figure 11). Despite the text indicating that the “strategy” help links will open in new windows, (see Figure 11), it was not immediately apparent to me that the module has opened in a new window, and a user may believe that they have accidentally exited their survey session. There is no apparent ‘undo’ for these modules, should the new window be an unwanted state. The only apparent exit on the new window is via the “Save & Return Later” button, which took me to a second unwanted state rather than the survey section I had come from (see Figure 12).

If you need any ideas, please check out our list of helpful voice-related tips below.

[Strategies for Reducing Vocal Strain](#)
[- Strategies for Dealing with Other People's Opinions](#)
[- Strategies for Singers and Other Heavy Voice Users](#)
[- Strategies for Dealing with Physical Symptoms](#)
[- Strategies for Dealing with Emotional Symptoms](#)

If you click on a link, it will bring you to a different page. Please be sure to come back to submit your answers!

PLEASE CONFIRM: You have left some questions on this page blank. You may either go back and answer them or click continue without answering. To continue, select "Ok, continue" below.

* must provide value

Ok, Continue

reset

[Participant Resources for Coping with Distress](#)
[Frequently Asked Questions](#)
[VOICE Program References](#)
[VOICE Program Videos](#)

NOTE: By pressing the "Submit" button, your answers will be submitted. You will not be allowed back to change your answers.

[<< Previous Page](#) [Submit](#)

[Save & Return Later](#)

Figure 11. The red text below the additional help links does indicate that the link opens in a new window, but this was not apparent to me in my first use of the site.

Your survey responses were saved!

You have chosen to stop the survey for now and return at a later time to complete it. To return to this survey, you will need the survey link to this survey.

Survey link for returning

You may bookmark this page to return to the survey, OR you can have the survey link emailed to you by providing your email address below. If you do not receive the email soon afterward, please check your Junk Email folder.

* Your email address will not be stored

Figure 12. The only apparent exit from the additional help modules is via the “Save and return later” button, which leads to an unwanted state rather than back to the previous survey section.

Rating: 2 - Ineffective

Heuristic 4: Consistency and standards

Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

The structure and features of the main survey sections in the health intervention module generally follow platform conventions. Inconsistencies largely appeared in small variations in copy across additional help modules or in questions.

Each questionnaire/check-in has the same structure and visual appearance, with all page elements appearing in the same places across the main survey sections. This shows overall attention to consistency and platform standards, making navigation consistent across main sections.

However, the additional vocal health tips sections open in windows with unclear conventions and have divergent navigation from main survey sections. The “Save & Return Later” button exits the vocal support help modules, while the “Close survey” button exits the additional support pages. Neither of these functions are consistent with the use of these terms elsewhere in the health intervention module.

Additionally, the header, navigation options, aesthetics, colors, and fonts vary across main and peripheral sections. Logos, headings, and navigation are simply not present on some optional pages, leading to an unfinished and disorienting appearance in these additional windows at the end of “Save & Return Later” dialogues and additional help sections (Figure 13). Pop-up boxes for the same “Save & Return Later” feature have varying aesthetics and navigation options (Figure 14). While not as crucial for orientation and navigation, a unified aesthetic in these pop-up boxes gives a sense of greater consistency and makes clear that these actions are part of the same process.

The figure consists of two side-by-side screenshots of a survey application. The left screenshot shows a main survey page with the 'Lions VOICE clinic' logo, the 'University of Minnesota' logo, and a 'WELCOME BACK!' header. It includes a question 'How much did your voice problem bother you over the past few days?' with radio button options: 'Not at all', 'A little bit', 'Somewhat', and 'Very much'. Below this is another section asking about the frequency of experiences like 'My voice problem upsets me.', 'The clarity of my voice is unpredictable.', and 'My voice difficulties restrict my personal and social life.' with similar radio button options. A red circle highlights the 'Page 1 of 4' link at the bottom right of the page. The right screenshot shows a pop-up window titled "'Return Code' needed to return". It contains the text 'Copy or write down the Return Code below. Without it, you will not be able to return and continue this survey. Once you have the code, click Close and follow the other instructions on this page.' and a text input field containing the code 'TMLPLJY'. A 'Close' button is at the bottom right of the pop-up.

Figure 13. Presence of logos, headers, and navigation options is inconsistent across different types of sections.

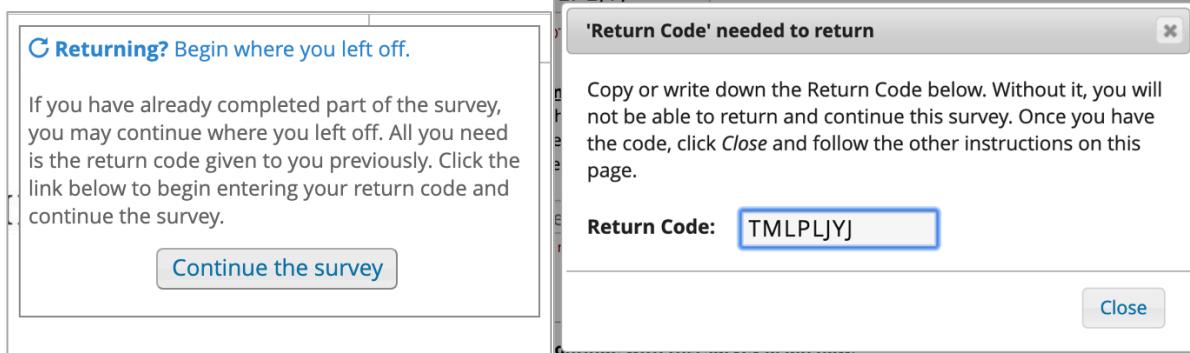


Figure 14. Fonts, colors, survey box styles, and navigation options are inconsistent across pop-up boxes for the same feature.

While less important for navigation and core functioning, written copy on additional help sections uses inconsistent formatting. Most sections include bullet points, with each bullet-pointed sentence starting with an action verb (see Figure 15). However, not all do. For example, on the vocal health tips sections, the first sentences on each page of the section are not bulleted but all other sentences on the page are. Within the "Strategies for dealing with physical symptoms" resource, some pages' copy is all bullet points and some pages' copy is only in paragraph form (see Figure 15). Headings throughout the vocal health tips sections are not descriptive, and differ in tone and format from those on other pages; across sections, some headings are action-oriented (e.g., "At Home," "At Work") while others are playful and non-descriptive (e.g., "Yawning isn't just for the tired," "Bottoms Up!") (see Figure 15).



Resize font: A A A



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Strategies for Reducing Vocal Strain

AT HOME

- Avoid talking over the TV or stereo at home, or turn the volume down
- Avoid talking to other family members from different rooms if it causes you to shout or raise your voice
- Avoid loudly calling for your pet - try using a whistle or bell instead



Resize font: A A A



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Strategies for Dealing with Physical Symptoms

Page 2 of 4

BOTTOMS UP!

Hydration is an essential part of vocal health. Drink enough liquids so that you never feel thirsty or dry, and your urine is colorless or nearly so. Caffeinated and alcoholic beverages are drying, so when you have either make sure you follow it with hydrating choices. Eating foods rich in water like fruits and vegetables also helps. Remember that sipping water and keeping hydrated on a daily basis works better than drinking a large amount of water all at once - pace yourself! Keeping your salivary glands stimulated can also help. You can do this by sipping on liquids throughout the day, chewing on gum or sucking on hard candies (non-menthol), and keeping your environment humidified.

Figure 15. Top: Typical copy on an additional help section with vocal health strategies and an action-oriented heading. Bottom: Inconsistencies in copy format and heading tone on another additional help section.

Additionally, wording in directions and questionnaire choices is sometimes inconsistent. Text directing users to “Please select one” answer only appears on some pages, and only on some questions on those pages (see Figure 16). In my review of the module, there was no apparent reason for this difference, such as whether the question was required. Similarly, multiple choice questions of the same type had varying wording for options, including “Yes No Undecided” and then “Yes No Maybe” as options for the same type of question (see Figure 17).

<p>7. How much of a problem do you have with your voice?</p> <p><input type="radio"/> No problem <input type="radio"/> A small problem <input type="radio"/> A moderate problem <input type="radio"/> A big problem <input type="radio"/> A very big problem <input type="radio"/> Don't know</p> <p style="text-align: right;">reset</p>
<p>Please Select One</p>
<p>8. Are you receiving any psychological treatment or therapy currently?</p> <p><input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Prefer not to answer</p> <p style="text-align: right;">reset</p>
<p>9. Have you received any psychological treatment or therapy in the past?</p> <p><input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Prefer not to answer</p> <p style="text-align: right;">reset</p>

Figure 16. Inconsistencies in where “Please Select On” appears, with no clear difference in question importance.

<p>Do you plan to continue perceived control exercises like these on your own, now that the study is over?</p> <p><input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Undecided</p> <p style="text-align: right;">reset</p>
<p>If you knew someone with a voice problem, would you recommend this resource to them?</p> <p><input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Undecided</p> <p style="text-align: right;">reset</p>
<p>If you had ongoing difficulty with a voice problem, would you return to this resource?</p> <p><input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Maybe</p> <p style="text-align: right;">reset</p>

Figure 17. Inconsistencies in wording on multiple choice questionnaire options.

These copy and wording concerns are relevant, but not as crucial as the overall consistency in page formatting and navigation. While platform standards were observed on main survey sections, additional help sections varied in their adherence to platform standards, complicating navigation and comprehension.

Rating: 2 - Ineffective

Heuristic 5: Error prevention

Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

Overall, the health intervention module has effective error prevention through features that present users with a confirmation option before making potential “slips,” or errors due to inattention. For example, an additional choice bubble at the bottom of the page requires users to confirm before leaving a page with unanswered questions (see Figure 18).

PLEASE CONFIRM: You have left some questions on this page blank. You may either go back and answer them or click continue without answering. To continue, select "Ok, continue" below.

* must provide value

Ok, Continue

Figure 18. The required bubble here requires users to confirm their choice to leave a page with unanswered questions.

A pop-up window gives a second reminder that leaving the page without saving means you will not be able to return if the “Ok, Continue” button is left unchecked. (see Figure 19). These two features provide effective error prevention for a potentially common slip.

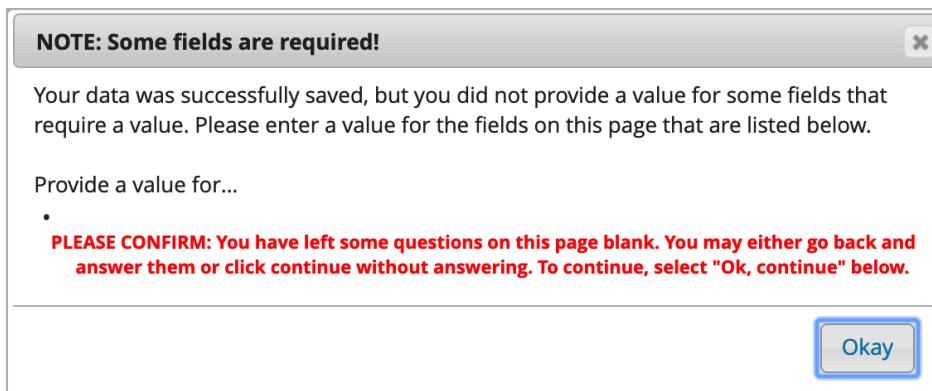


Figure 19. This pop-up window provides a second level of error prevention for the potentially common slip of leaving questions unanswered.

Additionally, there is error prevention for potentially common mistakes, or errors resulting from an inappropriate series of goals for the system. In contrast to slips from inattention, mistakes are often a result of misunderstanding the model behind the system (Laubheimer, 2015). One example of such error prevention occurs when a user tries to leave the system without saving the required code. When a user chooses to save the responses and continue at a later time, the system provides a pop-up window with the steps needed to return, information on what the user needs to do so, and an easy way to copy/paste the necessary code (see Figure 20). This sequence reduces the chance for a user to accidentally leave without the information needed to return due to a misunderstanding of their ability to leave and return to their place in the survey.

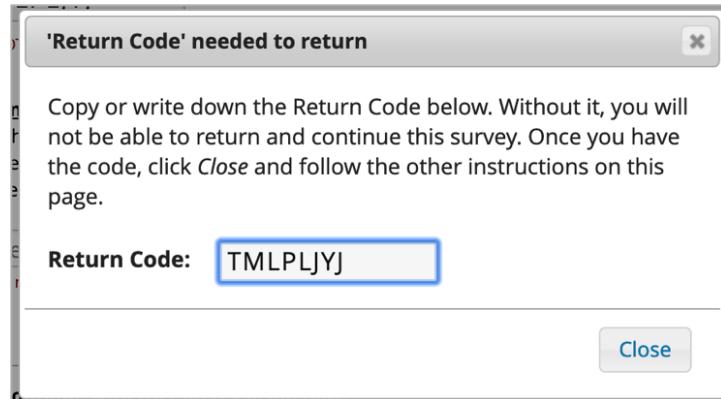


Figure 20. This pop-up window prevents the potentially common mistake of trying to leave and return to the survey without saving the required code.

Similarly, there is a warning in red text at the bottom of each survey page reminding users that “By pressing the Next button, your answers will be submitted. You will not be allowed back to change your answers” (see Figure 21). This reduces the chance of making the mistake of going forward with intent to return or revise answers later, which could be a common mistake as the ability to return to past pages is a common website feature.

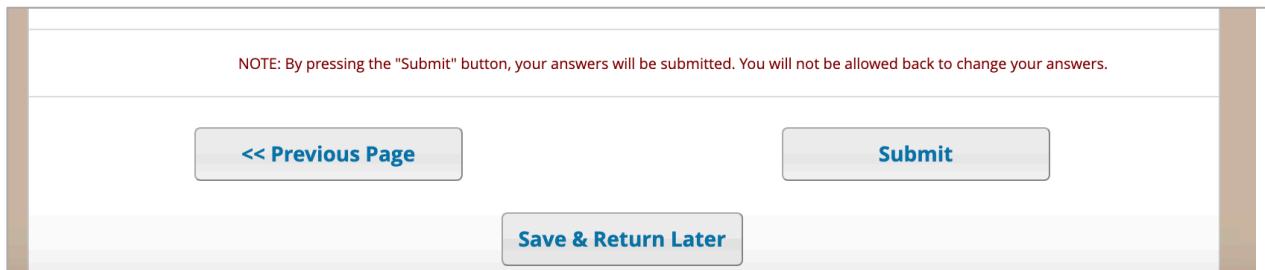


Figure 21. The warning near navigation options reduces the chances of mistakenly continuing with intent to return or revise answers later.

However, there is no prevention from accidentally clicking out of the survey by closing the window/tab. This is a potentially common slip that would leave a user without a means to return to the survey.

Rating: 3 - Effective

Heuristic 6: Recognition rather than recall

Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

The health intervention module has several features that make key information visible, minimizing user memory load, but additional help sections do not maintain the same level of visibility.

Broad instructions for use of the system are evident in the header of the survey queue, the effective home page for the module (see Figure 22). The buttons for each survey section are labeled with “Begin survey,” providing a clear starting point (see Figure 22). Survey questions also include directives to “Please select one” or “Select all that apply” (see Figure 23). While the process of saving and returning to the survey is a bit complicated in that the user is required to retain a code for continuing the survey, the pop-up window with the code provides clear instructions (see Figure 20).

The screenshot shows a web-based survey queue titled "Survey Queue". At the top, there is a dark grey header with the title and a "Get link to my survey queue" button. Below the header, a message welcomes users to the VOICE Education Program and provides contact information. A note at the bottom of the header says, "If at any point, you lose this webpage, access your program again by clicking on the link sent to your email." The main content area is a table with two columns: "Status" and "Survey Title". Each row contains a blue "Begin survey" button and a survey title. The survey titles listed are: Welcome!, Demographic Questionnaire, VOICE Baseline Questionnaires, VOICE Education Program, VOICE Check-In 1, VOICE Check-In 2, VOICE Check-In 3, VOICE Check-In 4, VOICE Check-In 5, VOICE Check-In 6, VOICE Final Questionnaire, and One Month Follow-up Questionnaire.

Figure 22. Instructions for general use are provided in the dark grey header, while buttons are clearly labeled for action.

This screenshot shows a survey question titled "1. What is your gender?". To the right of the question are five radio buttons labeled "Male", "Female", "Transgender", and "Other". Below these options is the instruction "Please Select One". To the right of the radio buttons is a "reset" button. The next section of the form is titled "2. What race do you identify as?". To the right of this question are seven checkbox options: "White, Caucasian", "Black, African American", "American Indian or Alaska Native", "Asian, Asian American", "Native Hawaiian or Pacific Islander", and "Other". Below these options is the instruction "Mark All That Apply".

Figure 23. Instructions for multiple-choice questions are displayed in blue text below the options.

Aside from visible and easily retrievable instructions for module use, there are several instances in which previous objects and actions are visible. At the beginning of new survey sections, users are reminded of their previous choices before they are asked to reflect on any changes since their last session. This reduces the need to remember past survey responses. Similarly, the “One Month Follow-up Questionnaire” includes screenshots of the introductory videos in the sections where users are asked to rate the videos’ helpfulness.

The survey queue has a convenient button labeled “Get link to my survey queue,” which allows users to copy a link to their survey or send an email containing that link to themselves, reducing need to remember the page address or save past emails containing the link (see Figure 22, Figure 24). Hovering over this link results in a box directing the user to the page where the code can be entered to restart the survey, again reducing the need to remember information and procedures across sessions.

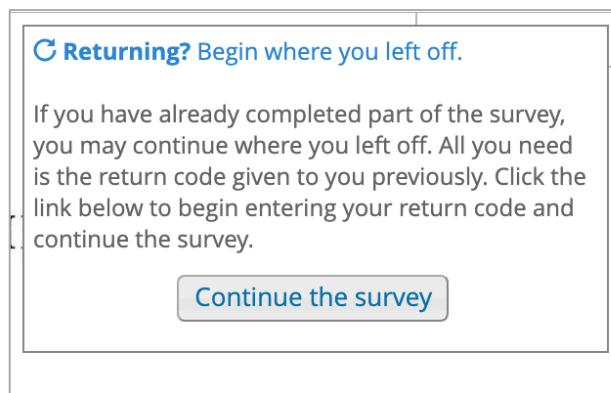


Figure 24. This box gives clear directions and a link to continue the survey after saving and returning.

Voice education videos provided at beginning give important information at first session, which is then accessible in subsequent sessions via links at the bottom of each page. The FAQ is also available on all pages via a link at the bottom of the page (see Figure 25).

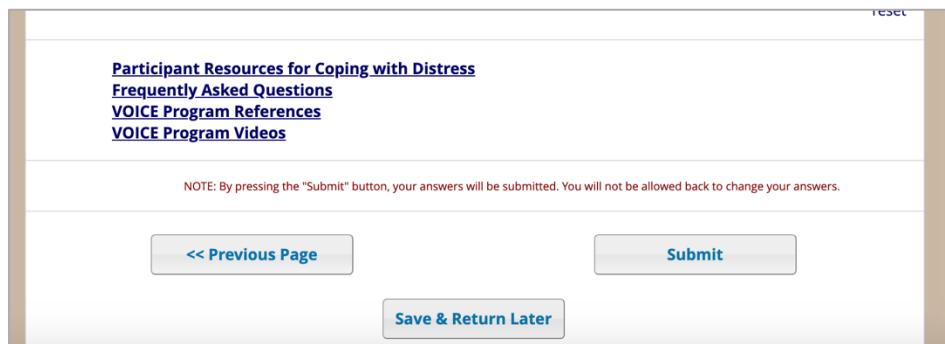


Figure 25. Additional resources, educational videos, and an FAQ are available at the bottom of each page.

While these features reduce memory load throughout the main health intervention module, additional help sections do not enable recognition as effectively. Options are not visible on any one page of the additional help sections. For example, the additional help section

“Strategies for Reducing Vocal Strain” contains the sections “At Home,” “At Work,” “Out and About,” and “Anytime.” However, these sections are not visible on the starting page or any other page in the section. Instead, the user must use the “next” button to advance through pages with no clear understanding of what content is included in the section or which sections come next. While chunking the information into sections is an effective strategy for organizing content, reducing scrolling, and increasing readability, the options for sections should be presented up front for optimal usability. Currently, the full options are not available at any point for these additional vocal health tips sections.

Rating: 3 - Effective

Heuristic 7: Flexibility and efficiency of use

Accelerators — unseen by the novice user — may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

While the module’s requirement that users proceed in a set sequence and at a set pace constrains the opportunities for accelerators and flexibility, there are still instances in which the module offers options for increased efficiency, and a few options for flexibility.

For example, there is an option to resize the font on each page in the main sections of the module. This provides flexibility for users with different screen sizes or sight capabilities (see Figure 26). The option to expand text boxes gives flexibility for users with different screen sizes or amounts of writing. The option to save and return later also enables flexibility, as the user is able to leave and return as they would like.

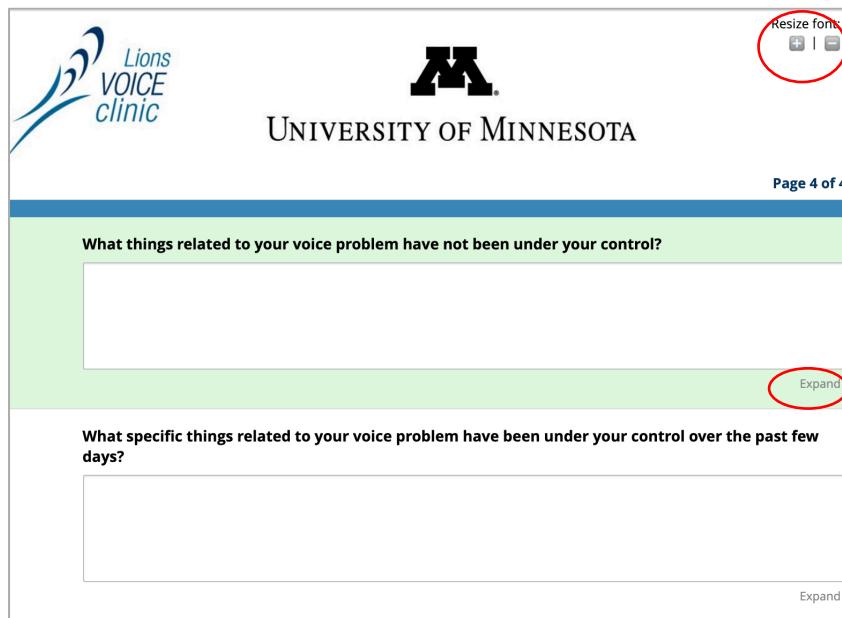


Figure 26. The option to resize fonts (circled in the upper right corner) and the option to expand text boxes (circled below the first text box) both provide flexibility.

There are also several features enabling efficient use. Additional resources are available via links at the bottom of each page, rather than in-text (See Figure 27). This design caters to both experienced and inexperienced users by providing access to additional information. However, even the presence of the link menu may be redundant to the most experienced users, and there is no way to hide the link menu. It also is grouped with action items, despite being optional information.

The screenshot shows a survey page with a light gray background. At the top, there is a horizontal bar with four blue links: 'Participant Resources for Coping with Distress', 'Frequently Asked Questions', 'VOICE Program References', and 'VOICE Program Videos'. To the right of this bar is a small blue 'Reset' button. Below the links is a note in red text: 'NOTE: By pressing the "Submit" button, your answers will be submitted. You will not be allowed back to change your answers.' At the bottom of the page are three buttons: '<< Previous Page' on the left, 'Submit' in the center, and 'Save & Return Later' on the right. The entire page is framed by a thick brown border.

Figure 27. The link menu offers easy and somewhat efficient access to additional resources but could be improved by being moved away from action items and/or providing options to hide the menu.

As the user progresses in the sequence of surveys, the list of surveys in the survey queue accordions up (See Figure 28). The list still shows the number of completed survey sections and gives the option to view all, but the accordion feature hides unnecessary information.

Status	Survey Title
✓ Completed	8 surveys completed! (view all)

Figure 28. The survey queue accordions up to hide completed surveys, while still providing an option to view all.

Similarly, the box reminding the user to select “Ok, continue” if questions remain unanswered disappears once all questions are answered.

Rating: 3 - Effective

Heuristic 8: Aesthetic and minimalist design

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

The health intervention module exhibited minimalist design in most features. The module as a whole uses a simple three-color color scheme with neutral colors including blue, beige, and white. Headings are contained in bars and do not have unnecessary formatting or ornamentation. There are no ads or recurring pop-ups with unnecessary information. As such, key elements are highly visible. While the aesthetic (fonts, colors, shape design) is not highly impactful, it is simple and successful in displaying important information.

There are two features that I have identified as potential sites for improving the modules' aesthetic and minimalist design are the menus for additional help resources and the images in the additional resource sections. The link for VOICE program references is potentially rarely needed (see Figure 27). It seems unlikely that a typical ENT patient would need to access the research citations for the module on a regular basis, for example. These menus could be moved or given a hiding option to reduce on-screen clutter and end competition with potentially more relevant information.

Additionally, some of the images in the additional vocal health tips sections are of questionable relevance. Images of social scenes pertinent to the health strategy section serve a purpose in reinforcing messages of belonging and resilience, but static shots of objects minimally enhance the content and do not reinforce messages in the text. These images are not harmful but take up space that could potentially be used more effectively (see Figure 29).



Figure 29. Left: A relevant image that reinforces the message of the text. Right: A less impactful image showing a static object.

Rating: 3 - Effective

Heuristic 9: Help users recognize, diagnose, and recover from errors

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

The only error message I was able to generate fully met the recommendations for this heuristic. When re-entering the link to a completed survey section, an error message appears that clearly indicates the problem ("you have already completed this survey") and suggests the only allowed option, "Close survey" (see Figure 30). Depending on whether users report or encounter technical errors, besides the single one I was able to generate, additional error message may be needed. However, if the past survey link error is the only technical error that happens in survey use, the module has adequate error messaging.

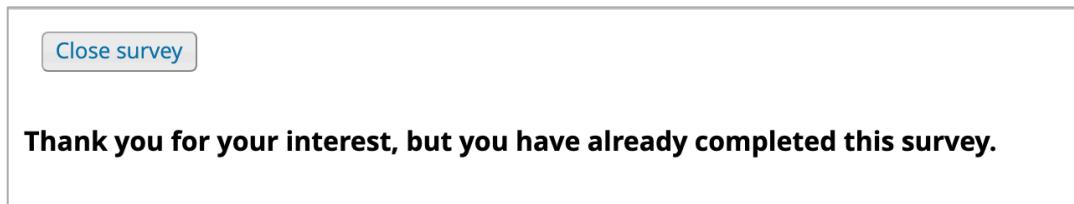


Figure 30. The error message effectively names the error and provides a constructive solution via the “Close survey” button.

Rating: 3 - Effective

Heuristic 10: Help and documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

The health intervention module has sufficient instruction dispersed throughout the module for normal functioning. Help is available via email on the survey queue/home page, plus an FAQ on each page (see Figure 31). Instructions are also readily available throughout the module (see Heuristic 6, p. 16).

A screenshot of a website page titled "Voice Education Program Research Study". At the top are logos for "Lions VOICE clinic" and "UNIVERSITY OF MINNESOTA". A "Resize font:" button is in the top right. Below the title is a blue header bar with the text "Frequently Asked Questions". There are four main sections with red headings: 1. "I'm stuck. Who should I contact?" with the answer: "Please contact the research coordinator at voice@umn.edu or 612-625-6747." 2. "Why does it say there are not any activities to complete?" with the answer: "Each part of the program is open for a "window" of time. After the window closes, there may be a day to a few days of time where no activities are available. It is ok if you missed the last activity's window. You will be sent an email when the next one is ready for you." 3. "Do I have to complete the website activities within a certain amount of time after receiving the email?" with the answer: "Each activity will be open to work through for different amounts of time. You have up to a week to complete the first part of the program and two to three days to complete each check-in. For more specific details, please ask the research coordinator." 4. "Can I share this website with a someone else with a voice problem?" with the answer: "This website is intended for individual use by participants in the study. Sharing it with others is not recommended." The page has a clean, professional layout with a white background and black text.

Figure 31. The FAQ is available on the survey queue/home page and all following pages via link. However, it is not searchable, there is minimal troubleshooting for technical issues, and there are no instructions for specific user tasks.

However, there is minimal troubleshooting information for technical issues and no information on specific user tasks. While the help documentation is not too large, it is also not searchable and includes questions that are not focused on the user's task, such as “Who funds this study?” and “Who approved this study?”. While instructions for use and error codes are dispersed throughout the system, there is no single centralized overview of how to use the system, which actions are allowed, which are not possible, and how to do

complex tasks like saving and returning.

Rating: 2 - Ineffective

Conclusion

The health intervention module effectively meets most of Nielsen's heuristics for usability, but there is room for some improvement, particularly in the additional resource and vocal health strategy modules. The health intervention module is most effective in providing visibility of system status, error prevention, recognition rather than recall, flexibility and efficiency of use, a simple but clear aesthetic, and constructive and specific error messaging. The areas for improvement that I have identified are largely in the additional resources and vocal health strategy modules, and include features relating to the module's match with real world conventions, user control, and consistency in layout and copy. A list of recommendations, drawn from the body of the analysis, is presented on page 25.

Table 1 (below) offers a more complete summary of the health intervention module's strengths and areas for improvement.

Heuristic Evaluation Summary

Heuristic	Rating	Strengths	Areas for improvement
1 - Visibility of system status	3	System shows current status effectively in main survey sections via page counts, color confirmations, and written action confirmations.	System status and future options are not as apparent in additional help sections
2 - Real-world match	2	Survey section numbering, sequence, and naming are logical and consistent with real world conventions. Survey questions follow conventions for type and format. Embedded YouTube videos take advantage of familiar features, platform.	Procedure for leaving and returning is not conventional or natural. “Survey” terms do not match real-world conventions (potentially out of scope). Additional sections open, close, and function in unconventional and non-natural ways. Links to additional sections are grouped with action items – not logical or natural.
3 - User control	2	Reset function is an effective undo feature	Navigation from main survey sections to additional

			<p>help resources and back again is difficult and requires extensive interaction to undo</p> <p>‘Emergency exits’ are not apparent or are misleading in additional help sections</p>
4 - Consistency	2	<p>Main survey sections use consistent layout, functioning, color, and terms</p>	<p>Additional help resources do not use consistent navigation, layouts, logos, terms, and headers</p> <p>Pop-up boxes for the same feature do not use same aesthetic and navigation across different pages</p> <p>Formatting, headers, and tone are inconsistent within and across additional help resources</p> <p>Multiple choice directions and options vary across similar questions</p>
5 - Error Prevention	3	<p>Several effective error prevention features for slips like leaving questions unanswered as well as mistakes like trying to leave and return without the required code</p>	<p>No prevention from accidentally closing whole survey window without saving</p>
6 - Recognition	3	<p>Instructions for system use are dispersed throughout and readily available</p> <p>Questionnaires and check-ins provide built-in references to past information</p> <p>“Get link to survey queue” feature reduces memory load</p>	<p>Contents and options are not apparent on any single page in the additional vocal health tips sections</p>

		Educational videos, FAQ, and additional resources are available at the bottom of each page	
7 - Flexibility	3	Font resize option is available Text boxes can be expanded Survey queue automatically accordions up as surveys are completed, but still provides an option to view all	No ability to hide link menus with additional resources and vocal health tips sections
8 - Aesthetic	3	Aesthetic is simple, neutral, and uncluttered	References are likely unnecessary for typical function Some images in the additional vocal health tips sections are less relevant and therefore less impactful than they could be
9 - Error messaging	3	Error messaging is clear and provides both an explanation and a solution	
10 - Help and documentation	2	FAQ and help email are readily available on survey queue/home page FAQ is available on all main survey pages Instructions for use are available throughout the module	Help is not searchable No documentation for technical issues Some questions not focused on user tasks No centralized overview of instructions, features, problems, and complex tasks

Table 1. Summary of heuristic ratings.

Recommendations

Based on the findings of this heuristic analysis, the following changes could increase the health intervention module's usability.

Main Module Sections

Recommendations for module sections accessed from the Survey Queue:

- Move the voice-related tips section and additional resource links to a separate area for optional, informational features so that they not intermingled with action items and navigation
- Allow users to hide voice-related tips and additional resource link menus
- Review use of "Please select one" text in survey questions for consistency
- Review use of "Yes No Undecided" and "Yes No Maybe" as options for the same types of survey questions
- Review need for VOICE program academic reference link in the link menu on every page
- Add a dialogue box or other form of error prevention to prevent users from accidentally exiting the survey by closing the survey tab/window in their browser
- Create a searchable help section that includes:
 - A centralized overview of instructions for use
 - Error message meanings
 - How to use the system
 - Which actions are allowed (saving and returning with code, modifying text size, hiding some menus, viewing additional resources)
 - Which are not possible (leaving without saving, bypassing questions with intent to return, going backward/forward in survey at will)
 - How to do complex tasks like saving and returning

Additional Resource Sections

Recommendations for additional resources linked within survey pages, including voice-related tips and additional information:

- Add a page count to the pages in the "Strategies for Reducing Vocal Strain" additional help sections, like the page count on main section pages
- Provide an overview of what is included in each additional vocal health tips section at the beginning of the section - perhaps with a page explaining the goal of each additional vocal health section and bulleting/linking what pages are included within it
- Change the FAQ, VOICE program references, additional help sections, and VOICE program video pages to include a menu, navigation options, and/or an option to return to the survey queue
- Give an 'emergency exit' back to the main survey from new windows, including FAQ, VOICE program references, additional help sections, and VOICE program video pages
- Revise copy and headings in the additional voice-related tips sections ("Strategies for Reducing Vocal Strain," "Strategies for Dealing with Other People's Opinions,"

“Strategies for Singers and Other Heavy Voice Users,” “Strategies for Dealing with Physical Symptoms,” and “Strategies for Dealing with Emotional Symptoms”) to be consistent in tone and format across sections

- Make headings action-oriented and descriptive
- Choose a pattern for paragraphs and bullet point use
- Ensure bullet points on a page start with the same type of word (noun, adverb, etc.)
- Replace static shots of objects (which minimally enhance the content and do not reinforce messages in the text) with more relevant images, possibly of social scenes pertinent to the health strategy section

Potentially Out of Scope

Recommendations for any part of the module that are potentially out of scope of this project and platform:

- Change exit buttons from additional windows to redirect back to previous place in the survey, and indicate so in button text
- Eliminate wording like “survey,” “survey queue,” “submit” rather than “done” or “continue,” and “close survey” to leave a window, and replace with conventional terms like “module,” “home,” “continue,” and “return to module.”
- Add the ability to create a unique user ID that allows participants to leave and return to the survey without an extended dialogue and the need to remember and save codes
- Add autosave feature

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