

Appendix A

Protocol for E-Learning Heuristic Evaluation

This instrument and protocol are intended for use by instructional designers and other experts engaged in heuristic evaluations of e-learning programs. The instrument itself lists fifteen heuristics for e-learning programs, some of which are based upon Jakob Nielsen's widely used protocol for heuristic evaluation of any type of software (<http://useit.com/papers/heuristic/>), and the rest of which are based upon factors related to instructional design. Although we have tried to be comprehensive, experts may decide to add new heuristics deemed relevant to the types of e-learning programs being evaluated or to the expert's specific expertise.

Steps:

1. An expert should review the heuristics and accompanying "Sample questions to ask yourself" in the instrument before reviewing an e-learning product. The expert should modify the instrument if needed, by adding, deleting, or changing heuristics.

2. It is important that the expert spend substantial time exploring the e-learning program before beginning the actual heuristic evaluation. Ideally, the expert will assume the role of typical learner who would use this e-learning program. Before beginning the review, the expert should be given (or try to discover) background information related to the e-learning program such as:
 - a. *Target audience and learner characteristics:* A thorough description of the intended audience and their learner characteristics (e.g., education level, motivation, incentive, and computer expertise) will enable the expert to judge the appropriateness of the user interface and other aspects of the program's usability in an informed manner.

 - b. *Instructional goals and objectives:* The expert should know as much as possible about the needs that the e-learning program is intended to address, ideally in terms of clear goals and objectives.

 - c. *Typical context for using this program:* Realistic scenarios for when, where, and how the e-learning program will be used should be known by the expert.

 - d. *Instructional design strategies used in the program:* If possible, a description of the design specifications used in developing the e-learning program should be provided to the expert so that the expert's judgment of the appropriateness of the instructional design strategies are informed with respect to the instructional designer's intentions.

 - e. *The status of the program's development and possibilities for change:* The expert should be informed as to where the program is in the development cycle (e.g., an early prototype, beta version, or older version under consideration for redesign).

3. After spending enough time to become familiar with the program, the expert should go through it from beginning to end to conduct the actual heuristic evaluation. (With lengthy programs, the expert may only review a representative sample of the program.)

4. The expert should make note of every usability problem found. For each problem, the expert should identify the heuristic it violates, and then give it a severity rating using the severity scale below. If the problem cannot be attributed to a violation of a specific heuristic, the expert should make a note of this. (If a number of problems are found that cannot be associated with specific heuristics, this may suggest the need for the development of new heuristics.)

Severity Scale

1. cosmetic problem only; need not be fixed unless extra time is available
2. minor usability problem; fixing this should be given low priority
3. major usability problem; important to fix; so should be given a high priority
4. usability catastrophe; imperative to fix before this product is released

5. After all the usability problems are found, the expert should go back through them and give each one an extensiveness rating using the extensiveness scale below.

Extensiveness Scale

1. this is a single case
2. problem occurs in several places in the program
3. this problem is widespread throughout the program

6. Most heuristic evaluations involve 4 to 5 experts. Once all experts have completed their evaluations, they may be brought together for a debriefing led by a moderator. The discussion of the usability problems may be videotaped for further analysis. If major differences appear in the problems found or the ratings given, the moderator may try to get the experts to resolve their differences and reach consensus. The experts may also be asked to suggest strategies for resolving the major usability problems found.

7. A heuristic evaluation report should then be compiled. Bar charts, tables, and other illustrations should be used to display the results. If feasible, screen captures should also be incorporated into the report to illustrate major problems as well as suggested enhancements.

8. The most important component of the heuristic report is a set of recommendations for improving the usability of the e-learning program. These should be as specific as possible to provide the designers with the information they need to eliminate the problems and improve the e-learning program.

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1. **Visibility of system status:** The e-learning program keeps the learner informed about what is happening, through appropriate feedback within reasonable time.

Sample questions to ask yourself:

- a. When modules and other components of the e-learning (e.g., streaming video) are downloading, is the status of the download communicated clearly?
- b. Is the user provided with information that indicates that the e-learning program is operating correctly?

2. **Match between system and the real world:** The e-learning program's interface employs words, phrases and concepts familiar to the learner or appropriate to the content, as opposed to system-oriented terms. Wherever possible, the e-learning program utilizes real-world conventions that make information appear in a natural and logical order.

Sample questions to ask yourself:

- a. Does the e-learning program's interactive design utilize metaphors that are familiar to the learner or related to the specific content of the program?
- b. Is the interface "user friendly," given the content of the program and its target audience?

3. **Error recovery and exiting:** The e-learning program allows the learner to recover from input mistakes and provides a clearly marked "exit" to leave the program without requiring the user to go through an extended dialogue.

Sample questions to ask yourself:

- a. Does the e-learning program distinguish between input errors and cognitive errors, allowing easy recovery from the former always, and from the latter when it is pedagogically appropriate?
- b. Does the program allow the learner to leave whenever desired, but easily return to the closest logical point in the program?

4. **Consistency and standards:** When appropriate to the content and target audience, the e-learning program adheres to general software conventions and is consistent in its use of different words, situations, or actions.

Sample questions to ask yourself:

- a. If appropriate to the content and target audience, does the e-learning product adhere to widely recognized standards for software interactions (e.g., going back in a Web browser)?
- b. If the e-learning program does not utilize common software conventions for interactions, are the novel interactions appropriate for the content and target audience?
- c. Does the program maintain an appropriate level of consistency in its design from one part of the program to another?

5. **Error prevention:** The e-learning program is designed to prevent common problems from occurring in the first place.

Sample questions to ask yourself:

- a. Is the program designed so that the learner recognizes when he/she has made a mistake related to input rather than content?

b. Is the e-learning program designed to provide a second chance when unexpected input is received (e.g., “You typed “bat” in response to the question. Did you mean “tab?”)?

6. Navigation support: The e-learning program makes objects, actions, and options visible so that the user does not have to remember information when navigating from one part of the program to another. Instructions for use of the program are always visible or easily retrievable.

Sample questions to ask yourself:

- a. Does the interface of the e-learning program speak for itself so that extensive consultation of a manual or other documentation does not interfere with learning?
- b. Does the e-learning program provide user-friendly hints and/or clear directions when the learner requests assistance?
- c. Does the e-learning program include a map or table of contents that allows the learner to see what has been seen and not seen?

7. Aesthetics: Screen displays do not contain information that is irrelevant, and “bells and whistles” are not gratuitously added to the e-learning program.

Sample questions to ask yourself:

- a. Are the font choices, colors, and sizes consistent with good screen design recommendations for e-learning programs?
- b. Does the e-learning program utilize white space and other screen design conventions appropriately?

8. Help and documentation: The e-learning program provides help and documentation that is readily accessible to the user when necessary. The help provides specific concrete steps for the user to follow. All documentation is written clearly and succinctly.

Sample questions to ask yourself:

- a. Is help provided that is screen or context specific?
- b. Is help or documentation available from any logical part of the e-learning program?
- c. Is help or documentation written clearly?

9. Interactivity: The e-learning program provides content-related interactions and tasks that support meaningful learning.

Sample questions to ask yourself:

- a. Does the e-learning program provide meaningful interactions for the user, rather than simply presenting long sections of text?
- b. Does the e-learning program engage the learner in content-specific tasks to complete and problems to solve that take advantage of the state-of-the-art of e-learning capabilities?

10. Message Design: The e-learning program presents information in accord with sound information-processing principles.

Sample questions to ask yourself:

- a. Is the most important information on the screen placed in the areas most likely to attract attention?

b. Does the e-learning program follow good information presentation guidelines for organization and layout?

11. Learning Design: The interactions in the e-learning program have been designed in accord with sound principles of learning theory.

Sample questions to ask yourself:

a. Does the e-learning program follow an appropriate learning design to achieve its stated objectives?

b. Does the e-learning program engage learners in tasks that are closely aligned with the learning goals and objectives?

12. Media Integration: The inclusion of media in the e-learning program serves clear pedagogical and/or motivational purposes.

Sample questions to ask yourself:

a. Is media included that is obviously superfluous, i.e., lacking a strong connection to the objectives and design of the program?

b. Is the most appropriate media selected to match message design guidelines or to support instructional design principles?

c. If appropriate to the content, are various forms media included for remediation and/or enrichment?

13. Instructional Assessment: The e-learning program provides assessment opportunities that are aligned with the program objectives and content.

Sample questions to ask yourself:

a. If appropriate to the content, does the e-learning program provide opportunities for self-assessments that advance learner achievement?

b. If appropriate to the content, do assessments provide sufficient feedback to the learner to provide remedial directions?

c. Wherever appropriate, are higher order assessments (e.g., analysis, synthesis, and evaluation) provided rather than lower order assessments (e.g., recall and recognition)?

14. Resources: The e-learning program provides access to all the resources necessary to support effective learning.

Sample questions to ask yourself:

a. Does the e-learning program provide access to a range of resources (e.g., examples or real data archives) appropriate to the learning context?

b. If the e-learning program includes links to external World Wide Web or Intranet resources, are the links kept up-to-date?

c. Are resources provided in a manner that replicates as closely as possible their availability and use in the real world?

15. Feedback: The e-learning program provides feedback that is contextual and relevant to the problem or task in which the learner is engaged.

Sample questions to ask yourself:

- a. Is the feedback given at any specific time tailored to the content being studied, problem being solved, or task being completed by the learner?
- b. Does feedback provide the learner with information concerning his/her current level of achievement within the program?
- c. Does the e-learning program provide learners with opportunities to access extended feedback from instructors, experts, peers, or others through e-mail or other Internet communications?