

Characteristics Considered in Evaluating Educational Software¹

Instructional Quality

General

- Program is useful in a school-based, instructional setting (i.e., in a classroom, computer laboratory, media center, or school library).
- Program avoids potentially controversial, nonstandard teaching methodologies.
- Program allows completion of a lesson in one class period (approximately 30 minutes).
- Instruction is integrated with previous student experience.
- Program is likely to save time for the student when compared to other means of presenting this topic.
- Program is likely to save time for the teacher when compared to other means of presenting this topic.
- An on-disk tutorial concerning the program's command structure is provided when appropriate (e.g., for a word processing program).

Content

- Content is appropriate for intended student population.
- Content is accurate.
- Content is current.
- Content breadth is reasonable (does not focus on too few or too many different concepts or content topics within one session).
- The processes and information learned are useful in domains other than the subject area of the program.
- Content is free of grammar, spelling, punctuation, and usage errors.
- Content is free of any bias or stereotyping.
- Content supports the school curriculum.
- Content is relevant to the subject field.
- Definitions are provided when necessary.
- There is continuity between the information presented and prerequisite skills required.

¹Based on items used by 36 public private, and governmental software evaluation agencies, and additional items considered important by selected teachers, software publishers, university professors, and private consultants. Many of the educational software experts consulted in the compiling of this list felt that subject-specific and population-specific characteristics would have to be considered for a thorough evaluation. See Ellen Bialo and Jay Sivin, "An Analysis of the Scope and Quality of the Current Supply of Educational Software and of the Available Sources of Information on Educational Software," OTA contract report, Sept. 30, 1987.

- Content avoids taking a side on potentially controversial moral or social issues.
- There is a need for better than the standard treatment of this topic in the curriculum.

Appropriateness

- Application is well suited to computer use.
- The pedagogic approach used is superior to what is available elsewhere.
- Readability level is appropriate for the intended student population.
- Tone of address is appropriate for the intended student population.
- The means of response (e.g., single keystroke, manipulating graphics) is appropriate to the intended student population.
- Prerequisite skills required are appropriate for the intended student population.
- Time required for use by a typical student does not exceed the attention span of that student.
- Multiple levels of instruction are available.
- Difficulty levels are based on discernible logic (e.g., reading ability, complexity of problems).
- Sufficient exposure and practice are provided to master skills.
- Sufficient information is presented for intended learning to occur.

Questioning Techniques

- Questions are appropriate to the content and effectively measure student mastery of the content.
- Questions incorrectly answered can be repeated later in the lesson/exercise.
- The number of trials are reasonable and appropriate (e.g., student receives the correct answer after no more than three or four trials, and after at least two trials).
- Calculation can be accomplished easily on-screen when appropriate.

Approach/Motivation

- Approach is appropriate for the intended student population.
- Format is varied.

- Overall tenor of interaction is helpful.
- Student is an active participant in the learning process.

Evaluator's Field Test Results

- Student understands the on-screen presentation, and can proceed without confusion or frustration.
- Student enjoys using the program.
- Student retains a positive attitude about using the program.
- Student retains the desire to use the program again, or to pursue the topic in other ways.
- Program involves students in competition in a positive way.
- Program fosters cooperation among students.

Creativity

- Program challenges and stimulates creativity.
- Pedagogy is innovative.
- Program allows the student as many decisions as possible.
- Program provides opportunities to answer open-ended questions and provides evaluative criteria to assess responses.
- Program demonstrates a creative way of using knowledge.
- Program challenges the student to alter an underlying model, or design an alternative model.

Learner Control

- Learner can alter program sequence and pace.
- Learner can review instructions and previous frames.
- Learner can end activity any time and return to main menu.
- Learner can enter program at different points.
- Learner can stop in the midst of an activity, and at a later session begin at that stopping point with the previous record of progress intact.
- Help is available at likely points of need.

Learning Objectives, Goals, and Outcomes

- Learner objectives are stated and purpose is well defined.
- Steps are taken to make learning generalizable to other situations.
- For programs requiring use over several days, learning outcomes are worth the time invested.

Feedback

- Feedback is positive.
- Feedback is appropriate to the intended student population and does not threaten or inadvertently reward incorrect responses.
- Feedback is relevant to student responses.
- Feedback is timely.
- Feedback is informative.
- Feedback is corrective when appropriate.
- Feedback remediates and/or explains when appropriate.
- Feedback employs a variety of responses to student input, and avoids being boring or unnecessarily detailed.
- Feedback remains on the screen for an appropriate amount of time.
- Branching is used effectively to remediate.
- Program uses branching to automatically adjust difficulty levels or sequence according to student performance.

Simulations

- Simulation model is valid and neither too complex nor too simple for intended student population.
- Variables used in the simulation are the most relevant.
- Variables in the simulation interact and produce results approximately as they would in real life.
- Assumptions are adequately identified.
- Program simulates activities that can be too difficult, dangerous, or expensive to demonstrate in reality.
- The time needed to complete both a step and the entire simulation is reasonable and effective.
- Encourages decisionmaking or calculation rather than guessing.

Teacher Modifiability

- Teacher can easily change or add content.
- Teacher can easily regulate parameters (e. g., number of problems, rate of presentation, percentage correct needed for mastery) for each class using the program,
- Teacher can easily regulate parameters (e. g., number of problems, rate of presentation, percentage correct needed for mastery) for each student.
- Parameter set-ups can be bypassed (e. g., default settings are available).

Evaluation and Recordkeeping

- Program provides an adequate means of evaluating student mastery of the content.
- If tests are included, criteria for success are appropriate for the ability/skills of the intended student population.
- [If tests are included, content accurately reflects the material presented.
- Scorekeeping and performance reports are provided for the student when appropriate (e.g., summary of problems correct/number attempted, running point totals).
- Useful information about student performance is stored for future retrieval.
- Useful diagnostic pre-test or placement test is provided, where appropriate.
- Useful diagnostic or prescriptive analysis of student performance is available to the teacher, when appropriate.
- Student performance information is easily accessible to the teacher.
- Management system includes adequate security.
- Program allows printout and screen display of student records.
- Program can hold multiple performance records of a single class (e.g., 35 to 50 students).
- Program can hold multiple performance records of several classes (e.g., up to 5 classes) arranged by class.

Documentation and Support Materials

- Quality of packaging is durable and appropriate for student use (e.g., not too large to be used at a computer station).
- Student, parent, or teacher guides and materials are clearly identified as such.
- Technical and operational explanations for implementation are clear and complete.
- If appropriate, "quick start-up" section is included.
- Useful reproducible student worksheets are provided.
- Other valuable support materials are provided (e.g., wall charts).
- Sample screen-by-screen printouts of the program are provided.
- Teacher support materials can be separated from student materials.
- Useful suggestions are provided for introductory classroom activities.
- Useful suggestions are provided for classroom activities during the use of the program, where necessary or helpful.
- Useful suggestions are provided for followup activities.

- Useful suggestions are given for classroom logistics in a variety of hardware situations (e.g., single or multiple machines) and student groupings.
- Useful suggestions are provided on how to integrate program with the regular curriculum.
- If the program is open-ended, subject-specific suggestions are included.
- Clear explanations of the differences between the various difficulty levels are provided.
- Prerequisite skills are clearly stated.
- Accurate and clear description of instructional activities are provided.
- Accurate and clear descriptions of content topics are provided.
- Where appropriate, a description of how material correlates to standard textbook series is provided.
- Necessary information can be found quickly and easily (e.g., contains index, table of contents).
- Quick reference card for program use is included, where appropriate.
- Printed text is clear and readable.
- Printed graphics are clear and readable.
- Printed text is free of errors in spelling, grammar, punctuation, and usage.

Technical Quality

General

- Audio can be adjusted (i.e., turned down or off).
- Audio is clear and used effectively.
- Character sets used in text display are clear, appropriate, and visually interesting.
- Graphics are acceptable on a monochrome monitor.
- Graphics are clear and can be easily interpreted.
- Program is "crash-proof."
- Program runs consistently under all normal conditions and is "bug-free."
- Program runs without undue delays (e.g., graphics fill in a timely manner, does not excessively access disc drive).
- The transitions between screen display are effective (e.g., text changes).
- Program guards against multiple key presses advancing the student past the next screen (e.g., leaning on return key and thereby missing several screens as they flash by).
- Program avoids unnecessary or inappropriate moving back and forth between screens (e.g., from page to feedback or data pages).
- Special features (e.g., flash, inverse, scrolling, split screen) are used appropriately and effectively.
- Program requires a minimal amount of typing (except typing programs).

- Random generation or selection is used when appropriate (e.g., to allow repeated use by varying the problems or data presented).
- Program judges responses accurately and accounts for minor variations in the format of the input (e.g., accepts either the correct word or letter choice in a multiple choice item).
- Program allows user to correct answer before being accepted by the program.
- Program accepts partial answers as correct whenever appropriate.
- Where students must input responses, inappropriate keys are disabled.
- Control keys are used consistently.
- Students require a minimum amount of teacher supervision while using the program, when appropriate.
- Computer (and peripherals) operation does not interfere with concentration on activity.
- Program makes effective use of peripheral devices (e.g., joysticks) for alternate input modes while still allowing keyboard input.
- Program considers a previously unexplored potential of the computer or greatly expands an existing capability (e.g., new animation techniques, digitized speech).
- Program uses other technologies (e.g., audio cassette, videodisc, videotape) to enhance learning, when appropriate.
- Printing is easy and simple to accomplish with a variety of popular printers.

Clarity

- Procedural and instructional statements are clear.
- On-screen prompts clearly indicate where user should focus attention.
- Frame formatting is clear, uncluttered, and consistent from screen to screen (e.g., screen input is restricted to a consistent location).
- Presentation of each discrete content topic is logical.
- Sequence of content topics and instruction is logical and in appropriate steps.
- Sequence of menu items is logical.
- Prompts and cues are clear and consistent, and logically applied.
- Hints are clear and not misleading (e.g., length of spaces in fill-in blanks matches number of letters needed).
- Demonstrations and examples are clear and available when appropriate.
- Interface is simple enough to be used with little or no reading of the documentation.

- Program makes clear where the user is in the program (e.g., question number, page headings).
- User-computer communication is consistent and logical.
- Prompts to save work are given when appropriate.

Start-up and Implementation

Teacher:

- Software code modifications or unusual manipulations of discs are not required to use program effectively.
- Start-up time for teacher implementation is not excessive.
- Teacher needs a minimum of computer competencies to operate program (e.g., does not require installing add-on boards).

Student:

- Start-up time for student implementation is brief enough to permit completion of a lesson.
- Students need a minimum of computer competencies to operate program (e.g., does not require use of control-key combinations).

Graphics and Audio

- Graphics and audio are used to motivate.
- Graphics and audio are appropriate for the intended student population.
- Graphics, audio, and color enhance the instructional process.
- Graphics help focus attention to appropriate content and are not distracting.

Probeware and Peripherals Included in the Software Package

- Probes or peripherals are durable.
- Probes or peripherals are sensitive.
- Audio and/or graphic quality are effective.
- Probes or peripherals are easy to install.
- Calibration is accurate and easy.
- Data displays are flexible (e.g., can be scaled, redrawn).
- Data analysis is useful.

Hardware and Marketing Issues

- Potential usefulness of the program justifies its price in comparison to other similar products.
- Peripherals (not included in the package) that are difficult to acquire or inappropriately expensive are not required.
- Producer field test data are available.

- Field test data indicate that students learned more or better, or had a better attitude toward the subject matter, as a result of using the program.
- Preview copies are available.
- Back-up copies are provided.
- Adequate warranty is provided.
- Telephone support is available.
- If allowable, multiple loading is possible.
- Site license is available.
- Network versions are available.
- Multiple copies discount available.