CAI TOOLKIT: A NEW AUTHORING SYSTEM FOR TEACHING LANGUAGES

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ABSTRACT

CAI TOOLKIT was developed to provide computer assisted instruction capabilities to those teachers without a technical background. Commands for the UCSD Pascal system are given in English, thus simplifying learning the system. It consists of six Tools: AUTHOR, CHED (Character Set Editor), SHPED (Shape Editor), LPRINT, UTIL, and LEARN. In beta sites with five instructors, it was found the system works well with languages as diverse as Chinese and Arabic, with storage capabilities for building up extensive character fonts.

In CALICO's first edition, James Pusak, author for DASHER, was quoted as saying, "Successful foreign language CAI requires that a proven teacher's learning strategy reach language instruction in a flexible and adaptable form."

Among other criteria Pusak mentioned for the ideal system were:

1. It should not make assumptions about users, such as foisting color or sound effects or blinking lights on them unless the user wants them.
2. Changes in lessons should be easy to make, sequences should be alterable, and praise and criticism responses easily modified.
3. Above all, Pusak insisted that such a system would not be language specific. That is, it would be suitable for many languages.

CAI TOOLKIT was developed to meet the needs of scholars and teachers without much technical background. These needs seemed to be threefold: (a) a powerful easy-to-use answer analysis that would at least approach rudimentary artificial intelligence (b) a system simple enough so that users could create not one lesson, but several lessons in one day (c) powerful, easy-to-use graphics that would create virtually any shape a user could imagine.

One-Day Learning Curve?

The resulting CAI TOOLKIT is a kit of specialized tools used to develop and present Computer-Assisted Instruction courseware. Of course, most language instructors have little desire to spend the hundreds of hours often necessary to become skilled programmers with complicated systems. So although the CAI TOOLKIT system uses Pascal (Apple-Pascal 1.1 and IBM-Pascal), an instructor creates the lessons using English commands, thus simplifying the learning process.
In preliminary tests with six educators - three familiar with computers and three novices - each was able to productively create lessons in one day following the tutorial guide provided in the manual. They did not gain total mastery, of course, but adequate skill levels were attained that made the system immediately useful.

Further alpha site testing showed that the system needed a shape library, arc graphics, and frame copy capability for those who wanted to save a frame for another part of the same lesson. When these were added and the usual bugs ironed out, beta site testing was begun. The objectives, apart from developing a system to offer design capability to those unskilled in computers, were to: (1) test functions of the software to be sure it worked properly and was documented clearly and accurately, and (2) test to see if it fulfilled the intended purpose — it did what teachers wanted it to do.

Five instructors were selected as beta test site instructors, three experienced micro-computer buffs and two relative novices. They tested the six software tools that make up CAI TOOLKIT: AUTHOR, CHED (Character Set Editor), SHPED (Shape Editor), LPRINT, UTIL, AND LEARN.

At one of the beta sites - a language instructor at Ft. Bliss, Texas - found occasional troubles with word wraparound. This as well as a documentation problem in setting the left margins were corrected. It was in dealing with the shapes produced by the SHPED tool that the biggest problem emerged. The objectives of the beta sites in this regard were to be sure all shapes would draw clearly, to be sure the user could get the correct shapes from the shape library he had created, and to be sure that animation worked correctly. One tester found that the limit of 16 shapes in the library was not enough for his language instruction purposes. Changes were therefore made that now allow hundreds of shapes in the shape library.

In the LEARN tool, answer analysis using words and characters provide a major element of the system. The tool does conversion of each answer of a question, so that more than one answer can be correct or an answer may be partially correct. Thus if a correct answer to a question asking for the nation's largest state was Alaska, partial credit would be given for the right answer which failed to capitalize the word. In addition, if a student should answer Texas, he would receive the response, No, but Texas was the largest state until Alaska was admitted.

In the CHED tool the beta sites pointed out that the documentation was not clear on which keys to press to get obscure characters such as the upside down question mark in Spanish. After the documentation was changed, a language training expert noted that the character editing function was much easier than the system he was accustomed to.

Obviously, in teaching a foreign language, special characters are often needed. To meet this need, an overstrike capability was added to the system. It may be used in the answers as well as in the text.

As for the UTIL tool, one beta site found the need to copy one frame for use in another lesson. This feature has been added.

The printing function, LPRINT, was criticized by the beta site testers because it worked only with Apple dot matrix printers. The program was consequently adapted for Epson and CITOH brand printers.

Not Language Specific

What were the results after the changes recommended by the beta test sites were effected? It has been suggested - in line with Pusak's suggestion that a system not be language specific - that the ultimate test of a powerful authoring system is its ability to create oriental language characters. With the AUTHOR tool in the graphic mode, Chinese characters were easily drawn to develop a Chinese character font at the rate of more than one per minute.

At one of the beta sites, a language instructor, said that this feature allows him to (a) show three Chinese characters with potential meanings for drill and practice and/or testing, and (b) using the animation feature, he can show the sequence of strokes for drawing characters. Using special versions of this system, it can create lessons in Arabic and Hebrew, languages which must be read from right to left. This ability allows it to accommodate almost any language and the language teacher can store hundreds of special or foreign characters on a floppy disk - thousands if a hard disk is available. When a graphics tablet is added, the creation of foreign language characters becomes extremely easy.

This is reminiscent of what Pusak may have had in mind when he wrote, "The ideal authoring system must provide tools which are specifically designed to support the production of foreign language CAI materials."

Six Basic Tools

The six tools in the CAI TOOLKIT include the following:

TOOL 1: AUTHOR

The primary tool used to enter courseware into the computer. Prompt lines are always displayed at the top of the
CRT to help select the functions needed in authoring a course. All functions are selected by a single key stroke. Functions include:

A. Text
1. Two character fonts can be used in each lesson.
2. Variable spacing easily added between characters or between lines.
3. Highlighting can be done either by underlining or using reverse video or both.

B. Graphics
1. Rectangles
2. Line Drawings
3. Ellipses or circles and arcs
4. Any shape can be stored in shape library for retrieval issue in any part of lesson
5. Animation
6. Color

C. Audio Capacity
1. Notes can be created controlling both pitch and duration.

D. Events
1. Time-allows ability to pause a given number of seconds during presentation of a frame.
2. Keys - learner response to continue

E. Background Color
1. Author may set background color of all or part of the screen
2. Block Erase

F. Answer Analysis
Powerful answer analysis techniques allow any subject to be taught. Answer analysis techniques allow the following:
1. Numeric answers with tolerance
2. Numeric answers that ignore commas and or dollar signs.
3. Text answers in which words are ordered or not, extra words are allowed or not, spelling to be exact or not.
4. Selection from a set of answer options using the cursor.
5. Optional spaces or characters in the answer. Example: 6AM, 6 am and 6 A.M. could all be accepted for 6AM.

SPECIFIC ANSWER ANALYSIS OPTIONS INCLUDE:
6. Correct, incorrect, neutral and unexpected answer types.
7. Word, Character, Numeric and Cursor Position answer analysis techniques.
8. Answer analysis modifiers (Extra, Ordered, Subset and Spelling).
9. Left-to-right or right-to-left learner input to allow for foreign languages of math/engineering needs.
10. Up to twenty answer fields available for any single question or problem.

G. Feedback to learner
1. May use text or audio tones or both

H. Branching Capability
1. Unconditional
2. Call and return
3. Repeat
4. End of lesson

TOOL 2. CHED
Used to create additional character sets or fonts for use in courseware. Characters are created using a simple, easy to use on-screen grid. It takes only seconds to create a new character.

TOOL 3. SHPED
Used to create original graphic shapes that can be stored in libraries for use at any point in courseware. Can also be animated within the lessons.

TOOL 4 LPRINT
Tool needed to print lessons, including graphics, to provide hardcopy documentation.

TOOL 5 UTIL
A subset of tools used to copy, delete, and rename lessons, character fonts, and shape libraries.

TOOL 6 LEARN
This tool allows the author to present the lessons to students. It is on a separate diskette that will automatically start LEARN when the computer is turned on. Student needs only this one disc to operate the learn tool. Also, the computer need only have one disk drive.

Summary
CAI TOOLKIT was developed for those in language teaching who want to design their own CAI courseware, even though they may not have computer experience beforehand. In beta site testing it was found the six tools gave versatility to the system and allowed handling even of such diverse languages as Chinese and Arabic. The graphics capabilities of the system allow for animation, for innumerable shapes, and for extensive storage of the shapes.