Tech., Inst., Cognition and Learning, Vol. 3, pp. 00-00
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Can We Really Halve Development Time? – Reaction to Scandura's Commentary

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We need to approach with caution Scandura's claim that half of the authoring tasks described for PLATO can be eliminated by use of AuthorIT. In our analysis, the benefit to productivity is likely to be closer to 10%, rather than the 29% that Scandura claims.

Keywords: CBT, authoring systems, CAI, automated development.

Scandura's discussion in this issue of AuthorIT's productivity (Scandura, 2005) is tantalizing. Those in the TICL community are used to thinking structurally about instruction, and it seems very logical from this perspective that a rigorous approach to knowledge structure analysis ought to greatly accelerate the creation of detailed instructional strategy outlines, at least for tutorials (computer-based direct instruction), and at least for declarative knowledge and well-structured procedural knowledge.

Despite this potential, we need to approach with caution Scandura's claim that half of the authoring tasks described for PLATO can be eliminated by use of AuthorIT. There appear to be differences in the definition of terms. Foshay and Preese include all of the front-end tasks through rapid prototyping and early learner trials in Front End Analysis (FEA) and Instructional Strategy Design (ISD). This includes having a

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human define the subject matter to be covered, create a design outline or other framework of instruction, create test specifications and assessment items, storyboard the graphics, etc. By contrast, Scandura appears to put more emphasis on some of these tasks (e.g., defining the subject matter) and eliminating other parts such as detailing instructional processes and creating assessment items. However, it is not clear how test specifications and assessment items are handled although Scandura (2005) suggests that specific problems are created automatically from templates.

In effect, AuthorIT requires a detailed representation of the content to be learned, and appears to use that representation as a basis for automating other tasks. The latter include what we call the instructional framework and assessment items. Both approaches require actually writing text messages and the like. There is a trade off, therefore, between additional effort required in AuthorIT to represent the content to be learned versus automation of instructional processes, generation of specific assessment problems from prototypes and specifying interactions between them. For PLATO, when building direct tutorial instruction online, creating the instructional framework is about a third of the 30% we allocated to ISD, or 10% of total cost. To this we must add about 15% for creating assessment items and writing interaction messages. Thus, if AuthorIT can eliminate the instructional framework step, a 10% productivity gain, and reduce the time spent creating assessment items and interaction messages, that would be most welcome – even though it may not add up to the 29% Scandura claims.

However, there are two potential qualifiers on Scandura's claim. First, part of the 10% savings in creation of the lesson structure through AuthorIT may be consumed by time spent in the Configuration Tool to get exactly the desired lesson behavior. This kind of "tweaking" of behavior should be minimal, but in automated expert system development it has turned out to be a significant task, so there is cause to seek further evidence with AuthorIT. Second, the integrity of AuthorIT's work depends on a very precise knowledge structure analysis using AST's, so some of the time savings in instructional strategy specification might be offset by increased analysis cost; one could argue however, that the end result of the more precise analysis would be higher quality, so it may well be justified to spend more time in analysis in order to spend less time in design using AuthorIT.

The advantages of automation for the step of Integration of Components and Testing (ICT) seem more probable. In a typical commercial project, this step involves linking together literally thousands of objects and assets created with a variety of tools (each in the correct version), placing them

under control of the management and delivery systems, "stress testing" them to assure scalability, and deploying them in a production environment or within a user's installation package, to run flawlessly on a variety of user platforms. In a typical courseware project, this process accounts for 30% of development cost (including quality assurance testing for content, instructional design and software). It is not clear how much of this process AuthorIT automates, so Scandura's claim of a 25% productivity enhancement is hard to evaluate. Full evaluation will require detailed comparison to other general-purpose tools, including those being used at PLATO.

If the dream of automated (interactive) instruction is to become a cost-effective reality beyond the few small niches where it exists today, we need much greater authoring productivity. Better approaches to automated authoring appear to be an important productivity strategy. The business case, however, poses a "chicken or egg" dilemma: Such systems rarely make it to commercialization because the market is so small, but the reason the market is so small is because development is cost- or time-prohibitive. Approaches such as AuthorIT's need to be developed for use by large-scale CBT developers — and others as well. The sooner, the better.

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