power of the computer to the student for on-line practice and experimentation, while maintaining overall control to tutor the student concurrently. In such systems, the course elements and student experimentation would be coordinated and managed by specially designed operating systems.

At the beginning of this review, we suggested that courseware should be an integral part of software development. Interestingly, good courseware is analogous to good software. Course content should be accurate, well-organized, and appropriate to its intended audience. This is somewhat like saying software should be reliable, well-structured, and usable.

Instructional developers have long recognized that presentation is as important as content. Software developers are just beginning to appreciate the user interface problem. In courseware, ease of use ("user friendliness" in software parlance) is critical to success.

Finally, there is functionality. Software terms like "robust" and "extensible" only partly describe this attribute. Perhaps a better term would be "holistic." Seeing courseware in terms of interacting, organic wholes rather than the mere sum of elementary parts would draw attention to the user as part of the whole and would emphasize a harmony between package and user.

Spreadsheets are an example of holistic software; they merge the designs of the user with the capabilities of the empty spreadsheet. In our review, the computer and videodisc-based package came closest to being holistic. Both are characterized by "wholeness," that is, everything is contained in the package. Both are immune to user experimentation and respond to errors by changing the operating environment appropriately and incrementally. Both are characterized by heavy user involvement and satisfaction. Both become a tool that is easy to use and powerful in effect.

If one accepts the plausibility of the software and courseware analogy, it is safe to say that software developers and instructional developers have much to learn from one another. The future of both courseware and software will probably be not only a marriage of technologies, but also a marriage of minds.

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The Ada programming language and its implementation throughout the defense community is one of the significant computer events of the 80's. And the focal point for planning and monitoring this implementation is right here at IDA — the Institute for Defense Analyses.

This is creating high visibility, career opportunities for software engineering professionals at all levels from junior to very senior.

The work will be performed by the Computer and Software Engineering Division of IDA, a not-for-profit organization headquartered in Washington, D.C., serving the Office of the Secretary of Defense and the Joint Chiefs of Staff.

The IDA effort on behalf of Ada is focused on five areas: validation of Ada language processors and programming support environments (the highest priority); analysis of policy implications (including the impact of DoD policies on the domestic computer industry); education and training; promoting the adoption of Ada; and the development of automated Ada tools.

The broad-based mission of the Computer and Software Engineering Division also encompasses other important tasks. These include reducing the time required for VHSIC technology insertion, addressing applications software requirements for WIS (the WWMCCS Information System), and performing other major scientific and technological analyses with regard to the development and use of computing systems.

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