

## Intelligent Computer Aided Training Systems in the Real World: Making the Technology Accessible to the Educational Mainstream'

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### Abstract

Intelligent computer aided training systems hold great promise for the application of this technology to mainstream education and training. Yet, this technology, which holds such a vast potential impact for the future of education and training, has had little impact beyond the enclaves of government research labs. This is largely due to the inaccessibility of the technology to those individuals in whose hands it can have the greatest impact, teachers and educators. Simply throwing technology at an educator and expecting them to use it as an effective tool is not the answer. This paper provides a background into the use of technology as a training tool. MindLink, developed by HyperTech Systems, provides trainers with a powerful rule-based tool that can be integrated directly into a Windows application. By embedding expert systems technology it becomes more accessible and easier to master.

### INTRODUCTION

Education stands at a crossroads, the decision to continue on straight, maintaining the status quo, or to take an alternate route rests not only on the educational community but on businesses, legislature, research and development groups, the military, and the community. The road to take must reflect the existing and future technology and the job skills necessary for the 21st century.

#### Technology

From the crib to adulthood, technology is everywhere. It's our microwave, TV., VCR, and stereo system. It's reflected in our children's Nintendo games, Walkman stereos, and hand held video games but it's not in our schools. As the school bells across America ring each day, students are transported back in time to our 18th century agrarian roots [1]. Technology is left at the door (pity the child who brings a walkman to school) and the modernized version of the school primer emerges from student's desks.

#### School Technology

School technology has been shamefully outpaced by the outside world. Computers, older than the children who operate them, still provide the core of the technological environment. TVs and VCRs are most widely used while videodisc players, TV studios and interactive video systems are in the minority [8].

% of Schools Using These Tools	
Television Set	97.1
Videocassette recorder	95.6
Video Camera	82.9
Videodisc player	19.5
TV studio	7.9
Interactive video system	7.2

*Source: Corp. for Public Broadcasting, 1991*

**Figure 1: Technology in the Classroom**

Teachers, lacking staff development time to prepare innovative lessons and insecure about the technology, are inadequately prepared to inform our students. It wasn't until 1992 that the National Council for Accreditation of Teacher Education added Educational Technology to the national accreditation standards for teacher trainer institutions [8]. The impact of this decision will not affect education until the current Sophomores graduate and become involved in the classroom - another 3 years away.

## **WORKER PREPARATION**

Businesses, R&D, and the military cry that workers are inadequately prepared to meet today's needs but continue to develop systems that do not reflect the current state of education. A bridge must be built to span the ever widening technology gap. Money alone will not do it. Although corporate spending on schools has been limited (only about 10% of the 2.2 billion dollars that corporations give annually goes towards K through 12 education) corporate spending for remediation of poorly skilled workers reaches over \$20 billion annually. Over one-half of the Fortune 1000 companies have had to put remedial courses in place to bring workers to the level of a HS graduate.

Former President Bush's New American Schools Development Corporation (NASDC) planned to spend up to \$200 million in corporate donations to develop future school models. NASDC, however, is controlled by CEOs from large corporations lacking little or no knowledge of life in the school trenches, where the war is being won or lost. Many decisions are based on what is already known and proven with little or no push taking or forward thinking. The end users, the teachers, and the children are given little thought or have little influence over when major decisions are made.

Internet, a "superhighway" for information, promoted by President Clinton, reflects such a decision. Although a valuable resource tool, it is overwhelming and fails to reflect that less than 2% of classrooms have access to a phone line or a modem [5]. Resources accessible only to research facilities and universities must not be the sole factor influencing technical decisions.

### **Spending**

Only four countries, Finland, Switzerland, Canada, and Australia, spend more than the United States on public expenditure for education but little is allocated towards technology [3]. Many state budgets don't reflect a technological focus. In 1992 Alabama and Maryland had no specific funds generated or allocated to support educational technology.

Underscoring this problem is the fact that the movement is not towards spending more but less. In 1987, 34.2% of the State General funds and 11.5% of the Federal General funds to states were spent on elementary and secondary education. In contrast to 1991, 33.6% of state funds and 11.0% of federal funds were spent. Money alone however, is not the answer. Besides monetary gaps, a large gap exists between material development and current trends in education. Much of the computer software focuses on drill and practice or rote memorization rather than the development of critical thinking skills. Our education system, now modeled after the industrial revolution, focuses on basic skills needed for basic jobs. We must begin teaching process and the ability to teach oneself to learn [2].

## **WHAT'S NEEDED**

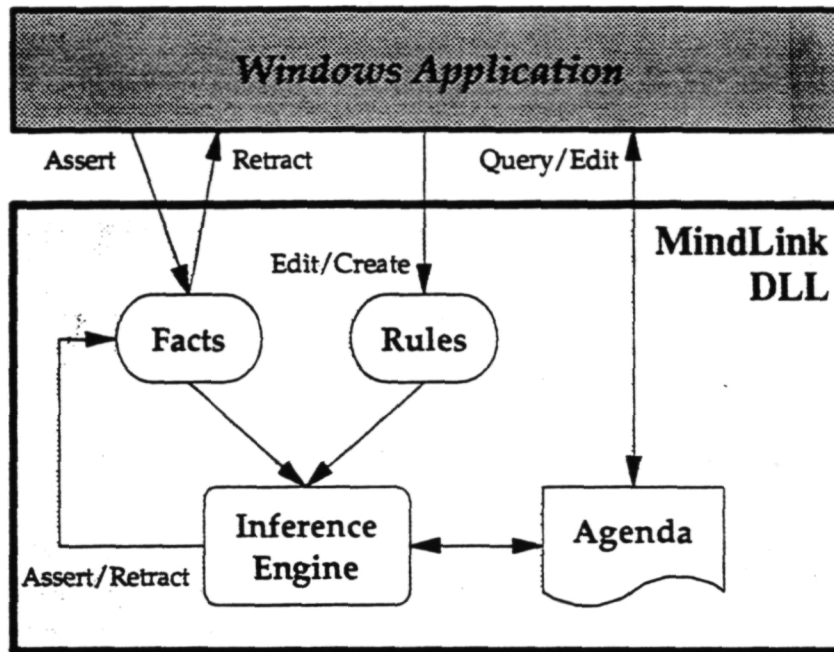
We must begin to coordinate the efforts of educators and other influences. Existing paradigms of students must be altered to begin to look at students as customers and education as the product [4]. The product must reflect the upcoming needs of the job field in the 21st century. The SCANS Report [9] attempts to look at the skills students will need to enter the workforce of the future. It focuses on competencies and skills necessary to succeed.

SCANS is composed of 5 workplace competencies and 3 foundation skills. The workplace competencies focus on the technology, systems, information, interpersonal skills, and resources that effective workers of the 21st century need to use productively. Foundation skills are the basic skills, personal qualities, and thinking skills necessary to succeed in the future.

Technology and training are keys which will drive the curriculum beyond basic skills and enter learning as a process and search for information.

### Availability of Technology

How then can we begin to make a difference? We can neither assume that a national initiative will develop to take care of the problem, nor can we do nothing, hiding behind the excuse that our local problems are such a small part of the whole that changes would have no effect.



For the mainstream teacher there is little accessibility to cutting edge research. Simply throwing technological tools at the educational developer has little or no meaning. Authoring systems for computer based training and development such as Toolbook, Owl and Authorware are powerful but require a tremendous effort on the instructional plan designer to be used effectively. The time to develop mastery and expertise of such systems is beyond the scope of the mainstream teacher. What is needed is a powerful tool, which is simple to use, doesn't take a significant amount of time to master, and allows educators and developers of training systems to insert the technology

directly into the ICAT application with minimal effort. MindLink, developed by HyperTech Systems, is the first step towards this goal. It takes the full range of functionality of an expert system but contains it in a well-defined shell. MindLink is implemented as a Windows Dynamic Link Library (DLL). This provides compatibility and accessibility to a wide range of Windows applications. A rule-based inference engine, MindLink allows the user to specify rules which describe what can be inferred or should be performed based on the known facts. as a DLL, integration with applications is simply a matter of linking the DLL at run or compile time. this allows maximum flexibility of student interaction while still working within the parameters, or rules, specified by the educator. MindLink provides an extensible environment for developing and delivering intelligent applications in ToolBook, ObjectVision, Smalltalk/V, C, C++ and other development tools and languages which support linking DLLs.

### THE FUTURE AND CONCLUSIONS

Building on the power of MindLink, HyperTech is moving towards the development of an intelligent lesson plan assistant. This tool will provide the core set of capabilities including student tracking, performance, evaluation and remediation recommendations for any training system.

Education is at a crossroads. Technology can be the catalyst and facilitator of change that allows educators to take an alternate route towards a successful future that meets the needs of businesses, military and the community.

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