



University of Pittsburgh

Improving Skills of Technicians and Other Middle-Level Skilled Workers

Intelligent tutoring Systems Can Help

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Intelligent Tutoring Systems Work

- Sherlock showed strong results with both immediate and six-month-delayed testing
- Testing included real tasks from the domain as well as tasks from a simulated far transfer domain
- 25 hours of practice on the tutor = 4 years of on-the-job experience



Return on Investment Is High

- We built five generations of ITS systems, two with AF and three with Intel. The last Intel-sponsored tutor cost about \$70,000 to develop (Intel had a lower cost estimate). The first time a single trainee used what was learned from that tutor, the savings to Intel was about \$80,000!
- It's hard to see a rationale for not doing more ITS development



Building an ITS Is Manageable Today

- But, Managing Development of an ITS Can be Scary
 - The average corporate training director had more traditional training and may not know how to track progress in building an ITS
 - An ITS, at \$70,000, may cost twice as a verbal aerosol approach, making it a visible risk



Building an ITS Is Manageable Today

- **Expert Models Can Be Approximated**
 - When new roles for workers arise, there may not be complete models of expert performance
 - With the right talent, that is not a barrier
 - Sometimes, the resulting ITS could help “experts” improve



Building an ITS Is Manageable today

- Therefore, CEO's Need to Push for ITS Usage
 - If it's scary to have an ITS project in a training department, the CEO must emphasize potential ROI and push for pilot ITS efforts



ITS's are for the Hard Stuff

- The most important uses are to prepare for emergent tasks and task that require hard problem solving, *tasks that exercise the broader skills that companies want more of from their middle-level-skill employees*



Good Bets for Research

- Developing ITS's for skills that combine knowledge that rests on multiple ontologies
- Skills that are exercised by teams



ITS's Belong in Schools and Community Colleges, Too

- **Collaboration skills**
- **Evaluating information**
- **Confronting complex tasks with confidence**