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National Transit Institute

Transitions

A Newsletter for Training and Education in the Transit Industry

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Alternative Fuels For Small Buses and Vans First Topic in Series of New Technology Seminars

Though the hum of the air conditioning was a little loud, background noise could not deter either participants or panelists from intense discussions of which alternative fuel would work best in which situation. As the day wore on, participants became comfortable interrupting panelists and each other with their eager questions. Meanwhile the panelists relaxed into their teaching roles, throwing away prepared presentations and "digressing" into explanations of whatever interested the audience.

Such was the exciting environment of NTI's first new technology seminar – Alternative Fuel Use in Small Buses and Vans – presented on May 18 in Austin, Texas. Co-sponsored by the Community Transportation Association of America, the seven-hour seminar was offered as part of regular pre-conference training at CTAA's EXPO '93.

The New Technology Seminar is neither a training workshop nor a panel presentation; rather it is an innovative training approach designed by NTI to enhance dissemination of information on best practices and new research. Each seminar offers a day-long opportunity for twenty to twenty-five transit managers or key professionals to interact extensively with a teaching team composed of researchers and transit agency representatives. The aim of each seminar is to provide a solid base of technical and practical information so participants can move towards making a commitment regarding whether or not and how to implement a particular new concept in their agency.

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Training Directors Plan National Conference

Early last May, a group of training directors from across the country met at Rutgers in New Brunswick, New Jersey, to help NTI set the agenda for a national transit trainer's workshop and conference, which will be held in Princeton in early March 1994. The planning group's objective was to design an opportunity for training directors and professional training staff to spend a few days together focusing on ways to improve the organizational effectiveness of training in the transit industry, hone their personal training skills, and share innovative curriculum ideas and techniques.

Participating in the planning group meeting were Alicia Ashton, Director of Operations at the Utah Transit Authority; Barbara Carpenter, Manager of Employee Training and Development for the Washington Metropolitan Area Transit Authority; Jack Dempsey, Assistant Vice President for Employee Development and Training at the New York City Transit Authority; Denise Marchioro, Training Coordinator at the Spokane Transit Authority; Jack Stites, Manager of Operations Instruction, Orange County Transit Authority; Dea Walker, Director of Training Services and Career Development for the Greater Cleveland Regional Transit Authority; and Craig Williams, Director of Human Resources, Central New York Regional Transit Authority. The meeting was hosted by NTI

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Games Provide Learning Bridge to Complex Computer Information Systems

According to a group of psychologists at the City University of New York Graduate School, the successful implementation of complex computerized information systems in the workplace calls for a different kind of training from the usual technical instruction offered by vendors. They call this kind of training "constructive activities," that is, activities that force people to discover for themselves—or "construct"—the logical assumptions behind what the system does. This is the kind of activity that takes place when a worker simply plays with a system, experimenting and making mistakes while trying to understand the principles that underlie its processes. It is also an activity that can be offered in the more structured, and for some, non-threatening environment of a "constructive" simulation game. These games are not intended simply for practice but rather are designed to use what a worker already knows to teach new basic concepts. Lia DiBello, a research associate at CUNY's Laboratory for Cognitive Studies of Activity, calls this a "germ cell" model for training, because once people have internalized the basic principles of a complicated system, they can teach themselves the procedural details.

MRP at the TA

"To make full use of what MRP can do, users actually need to think like the computer."

For the past year DiBello and her co-researchers, working under the direction of Dr. Joseph Glick, have been studying (and improving) worker response to the use of a computerized inventory and production control system at the New York City Transit Authority's overhaul division. This system, which is used throughout industry, is known as Material Requirements Planning, or MRP. MRP is a computerized database and decision support system for "just-in-time" planning of parts purchasing and goods assembly. Successful implementation can reduce the number of dollars carried as inventory and improve on-time delivery of goods. The TA is looking to MRP to reduce its overhaul division's $9 million inventory, a significant portion of which has become out-dated, as well as to improve the timeliness of delivery.

MRP, however, is notoriously complicated and hard to use, with a poor implementation record. In fact, studies show only about a 50 percent success rate. According to DiBello, MRP is difficult not so much because its computer interface is so "unfriendly," but because it demands that users exercise expert judgment as they try to mesh the capacities of a system that works according to rigid rules with the "messiness" and unpredictability of the real world on the shop floor. Just knowing the computer commands is not good enough, she says. To make full use of what MRP can do, users actually need to think like the computer.

So in order to teach workers and managers in the TA's overhaul division how to think like MRP, the CUNY group created the Starship Factory MRP game. The game is played during a popular two-day workshop and has been carefully designed to provide a thorough generic "conceptual introduction" to the whole family of MRP software programs (about 200).

The MRP Game

In late June, two NTI staff, along with representatives of the MTA, participated in a shortened version of the MRP game to experience first hand the results of the CUNY research. During MRP training, teams of players work together to assemble finished paper starships for on-time delivery. It sounds simple, but it is not easy to carry out. In fact, the starship game is an engaging, challenging, and often amusing experience, involving estimating future needs, purchasing, inventory control, work scheduling, and accounting. As the interplay of activities becomes increasingly complex, players find that ordinary, intuitive responses don't work well. Although our team was composed of intelligent and experienced people, trying very hard to succeed, we gradually sunk into debt, built up too much of the wrong inventory, and got behind in deliveries. Before we failed miserably, the game was called so we could evaluate what had happened, why, and how MRP would have solved our "problem."

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According to CUNY's research, previous educational level is no predictor of success at the MRP game, nor is previous technical training on MRP. All teams fail sooner or later, although some shop workers last longer than most office people, since they have learned from experience to hoard parts they might need for future assemblies. The game, of course, is somewhat rigged against the players: no time is allotted for players to work out a planning system, for example, so they must work intuitively. Under pressure of time they tend to default to whatever expertise they already possess, which is just what the game's designers want them to do.

Fairness, of course, is not really the point. Rather the game is structured in this way to generate a sense of "crisis" so players will be more receptive to the new MRP ideas, which are presented as ways to "win" at the game. Also, the game helps players understand just what their intuitive ways of doing things are, and this awareness makes change possible. Thus, the game creates a framework for a discussion and evaluation of the core concepts behind MRP. After discussion the game is replayed; DiBello says teams try to apply the new logic and do significantly better. They not only learn the concepts, but become convinced they work and so will use them.

After the game, workshop participants move to computer terminals for technical training in a specific software version of MRP using the starship assembly factor for practice. At the TA, terminals containing both the starship information and the "real stuff" reside on the shop floor. Even after being trained, workers like to play with the starships, honing their MRP skills in a non-threatening game environment.

"A small amount of time with a sufficient number of constructive activities may make a great deal of difference in the knowledge acquired."

Call for a New Kind of Training

The hypothesis that forms the basis for this research in workplace learning is that complicated information-rich computer programs that function according to non-intuitive rules may require workers to apply different kinds of intelligence from what was demanded in the past. In a presentation to the National Society for Performance and Instruction (Chicago, 1993), DiBello and Glick argued against the "longstanding assumption [that] technological advance will lead to the de-skilling of . . . the workforce." Rather, they think that because a computer's decision-making rules are so rigid, users are going to have to get smarter. They will have to be able to evaluate and mold system output to fit the constraints and haphazard conditions of the real world. "Using [such a] system effectively requires a good grasp of its internal logic, its 'theoretical" assumptions, and the limitations" of the fit between the computer solution and the real world.

According to the CUNY researchers, standard technical training simply encourages workers to add skills to what they already know. They do not, in other words, incorporate the reasoning behind the procedures into a new conceptual frame for understanding what is happening on the screen and hence are rarely able after training to solve the variety of problems that occur when the computer hits a glitch. Nor does this kind of training enable workers to evaluate the validity of particular computer-generated solution.

Generic simulation games designed to teach participants the fundamental strategies underlying a family of complex computer programs such as MRP, can turn regular employees into program experts, according to DiBello and Glick. This should be good news for transit agencies worried about how to match shrinking training budgets with the need to train for rapidly changing technologies. A different kind of training, rather than more time spent on task-oriented skill building aimed at familiarizing workers with lists of keyboard commands and screens, is what is needed. Employees need to have opportunities to "draw on their existing assumptions to invent a solution." It is this invention, or "construction," that is the fundamental learning activity. Games themselves are not the only vehicle for these activities, of course, but games do provide a non-threatening environment that is both close enough to real world activities to permit bridging and far enough from everyday life to be fun. ■