U.S. Army Research Institute for the Behavioral & Social Sciences

FACT SHEET

ADAPTIVE INSTRUCTIONAL SYSTEMS
Small Business Innovation Research

As military systems have become more complex so have their training requirements. Force reductions further necessitate increased training to maintain readiness and proficiency, which in turn increases pressure on limited training resources. Military training programs tend toward temporally driven schedules that are incompatible with proficiency based progression. This produces a tendency toward outcome proficiency criteria derived from the mean or minimum obtainable level in a fixed time window. This results in unnecessarily high elimination rates and remedial instruction loops. The remediation loops increase manpower requirements and complicate training planning. Training eliminations entail wasted investment in recruiting and training those personnel.

Adaptive training methodologies have the potential to accommodate individual differences within required time limits to avoid instructional failures, ensure minimal proficiency outcome and the opportunity for maximizing the outcome proficiency for each individual. Current advances in conceptual modeling and in artificial intelligence technologies may provide the basic components of machine-based instruction that adapts to and evolves with the individual student through the skill acquisition process.

Under the DoD Small Business Innovation Research program, ARI initiated five parallel contract research efforts for the first phase of research and development. The project objective is to develop an approach to design and implementation of computer-based training systems that dynamically adapt instructional methodology to individual differences in learning style and rate, capitalize on student strengths and match content and structure of training events to the student's conceptual structure.

The Phase I technical goals were to develop a technical approach to conceptual modeling of student and instructor behaviors and inferred

cognitive processes as they evolve through the process of learning a complex skill, specifically, hovering a helicopter, and to develop a technical approach for implementing these models within a computer based instruction module that teaches this task in a low-cost flight simulator. One target system to host this development is Intelligent Flight Trainer (IFT). Phase I is complete and it is expected that two Phase II contracts will be awarded.

In Phase II the technical goals are to implement the selected approaches developed in Phase I in a demonstration conducted on the IFT or another existing military instructional system and generalize the principles of the approach for application to other aspects of initial flight training and to other skill acquisition instruction modules.

Resulting adaptive instruction system technology may be refined and used in initial entry training of rotary wing pilots. It is likewise adaptable to other occupational skill training programs such as advanced aircraft transitions, air traffic control and aviation maintenance.

In addition, the technical approach will be applicable to instructional systems that are more heavily loaded on cognitive skills such as command and control and staff officer training. They are equally applicable in industrial and academic settings.

Adaptive instructional systems have a potential to reduce training costs by avoiding unnecessary planning and management activities and by reducing elimination and setback rates. They can increase force readiness by producing more proficient practitioners and by returning subject matter expert instructional staff to operational positions.

This work is being conducted within SBIR Program 99.2, Topic OSD99-04. It contributes to The Manpower, Personnel and Training critical technology area for DoD and the Human Systems – Personnel Performance and Training technology area for the Army.

For additional information, please contact Dr. William R. Howse, ARI - Rotary-Wing Aviation Research Unit, ARI_RWARU@ari.army.mil.