Title: ***Recommendations for Authoring, Instructional Strategies and Analysis for Intelligent Tutoring Systems (ITS): Toward the Development of a Generalized Intelligent Framework for Tutoring (GIFT)***

Length of Workshop: Full-Day

Detailed Description of the workshop topic's importance to the AIED Community:

The purpose of this workshop is to provide the AIED community with an in-depth exploration of the Army Research Laboratory's effort to develop tools, methods and standards for Intelligent Tutoring Systems (ITS) as part of their Generalized Intelligent Framework for Tutoring (GIFT) research project. GIFT is a modular, service-oriented architecture whose goal is to address authoring, instructional strategies, and analysis constraints currently limiting the use and reuse of ITS today. Such constraints include high development costs; lack of standards; and inadequate adaptability to support tailored needs of the learner (Picard, 2006). GIFT has three primary objectives: (1) provide an authoring capability to develop new ITS and their components (e.g., learner models, pedagogical models, user interfaces, sensor interfaces), and standards to support the reuse of existing ITS components and leverage external training environments (e.g., serious games - Sottilare and Gilbert, 2011); (2) provide an instructional manager that encompasses best tutoring principles, strategies, and tactics for use in CBTS; and (3) an experimental testbed to analyze the effectiveness and impact of CBTS components, tools, and methods.

GIFT 2.0 was publicly released in November 2012 and is based on a learner-centric approach with the goal of improving linkages in the adaptive tutoring learning effect chain as outlined in Figure 1.

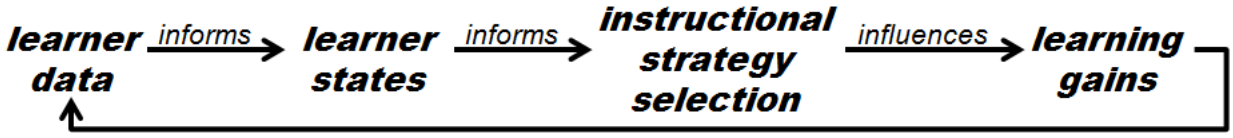

Figure 1: Adaptive Tutoring Learning Effect Chain (Sottilare, 2012)

ARL's objective for GIFT is to make ITS affordable to develop and maintain while still providing the same or better instruction as an expert human tutor in one-to-one and one-to-many educational and training domains. New versions of GIFT will be delivered every six months over the next five years; each release will build upon previous versions of the framework by providing additional functionalities and features identified by the user community which encompasses more than the US military. More information about GIFT can be found on www.gifttutoring.org.

This workshop closely aligns the theme of AIED 2013, "*From education to lifelong learning: constructing pervasive and enduring environments for learning."* A key advantage of a generalized approach to ITS development (and GIFT in particular) is its standards and their high potential for reuse across educational and training domains. Other advantages that drive efficiency and affordability are GIFT's modular design and standard messaging; it's largely domain-independent components; and it's reuse of interfaces, methods, and tools for authoring, instruction, and analysis.

GIFT developers anticipate providing authoring tools to accommodate a variety of user populations including learners, domain experts, instructional system designers, training and tutoring system developers, trainers & teachers, and researchers. Future plans include incorporating empirically evaluated models of teaching and learning as well as intelligent technologies for both individualized and small team tutoring. The GIFT developers hope to benefit from the insight of experts in the ITS field as future versions are developed and released to the public.

Descriptions of the Workshop's Content and Themes:

The workshop is proposed in five sections or themes listed below. Each theme is described in detail in "proposed format" section

Theme: Fundamentals of the Generalized Intelligent Framework for Tutoring (GIFT)

Theme: Authoring Intelligent Tutoring Systems using the GIFT Authoring Construct

Theme: Adapting Instructional Strategies and Tactics using GIFT

Theme: Analyzing Effect using GIFT

Theme: Learner Modeling

Names, Short Biographies, and Contact Information of the Workshop chair(s):

Robert A. Sottilare, robert.sottilare@us.army.mil, (407) 208-3007; Dr. Sottilare is the Chief Technology Officer for the SFC Paul Ray Smith Simulation & Training Technology Center within the U.S. Army Research Laboratory Human Research & Engineering Directorate (ARL-HRED). He leads adaptive tutoring research within ARL as part of the Learning in Intelligent Tutoring Environments (LITE) Lab. The focus of his current research program is on the application of artificial intelligence tools and methods to the authoring and assessment of adaptive training environments including tailored learner modeling and instructional strategies.

Heather K. Holden, heather.k.holden@us.army.mil, (407) 208-5693; Dr. Holden is a researcher in the Learning in Intelligent Tutoring Environments (LITE) Lab within the U.S. Army Research Laboratory – Human Research and Engineering Directorate (ARL-HRED). The focus of her research is in artificial intelligence and its application to education and training; technology acceptance and Human-Computer Interaction.

List of program committee members:

- Robert Sottilare, Army Research Laboratory, Workshop Co-Chair and Organizer
- Heather Holden, Army Research Laboratory, Workshop Co-Chair and Organizer
- Arthur Graesser, University of Memphis, Workshop Advisor
- Xiangen Hu, University of Memphis, Workshop Advisor
- James Lester, North Carolina State University, Workshop Advisor
- Ryan Baker, Columbia University, Workshop Advisor

Proposed format of the workshop (e.g., approximate timeline) and type of activities (e.g., paper presentations, discussions, demos, etc):

This workshop is designed to be a full-day event divided into five themes:

Theme: Fundamentals of the Generalized Intelligent Framework for Tutoring (GIFT) (est. 2 hours): This section of the workshop will provide a tutorial on the GIFT ontology and its major architectural constructs: authoring, instruction, and analysis. A demonstration of GIFT 3.0 will also be provided. This theme is dedicated to meeting the following learning objectives for attendees:

- Understanding the motivation for a generalized framework for tutoring systems
- Understanding the functional constructs of GIFT
- Demonstrating GIFT in an external training environment (as a game-based tutor)

Theme: Authoring Intelligent Tutoring Systems using the GIFT Authoring Construct (est. 1 hour): This section of the workshop will include presentations based on an open call for papers to GIFT users regarding their experiences using GIFT authoring capabilities and recommendations for GIFT design enhancements.

Theme: Adapting Instructional Strategies and Tactics using GIFT (est. 1 hour): This section of the workshop will include presentations based on an open call for papers to GIFT users regarding their experienceswith using GIFT as an instructional tool and recommendations for GIFT design enhancements.

Theme: Analyzing Effect using GIFT (est. 1 hour): This section of the workshop will include presentations based on an open call for papers to GIFT users regarding their experiences using GIFT testbed capabilities to determine performance, learning, and retention effect, and recommendations for GIFT design enhancements.

Theme: Learner Modeling (est. 1 hour): This section of the workshop will include presentations and discussion regarding the results of a Learner Modeling Advisory Board conducted at the University of Memphis in September 2012. The advisory board consisted of key experts from academia, government and industry in the field of learner modeling for ITS.

Potential solicitation plans for workshop funding from sources, such as international projects, research networks, or industry: The proposed workshop will be organized by the Army Research Laboratory.

CITATIONS:

Picard, R. (2006). Building an Affective Learning Companion. Keynote address at the 8th International Conference on Intelligent Tutoring Systems, Jhongli, Taiwan. Retrieved from http://www.its2006.org/ITS_keynote/ITS2006_01.pdf

Sottilare, R. and Gilbert, S. (2011). Considerations for tutoring, cognitive modeling, authoring and interaction design in serious games. Authoring Simulation and Game-based Intelligent Tutoring workshop at the Artificial Intelligence in Education Conference (AIED) 2011, Auckland, New Zealand, June 2011.

Sottilare, R. (2012). Considerations in the development of an ontology for a Generalized Intelligent Framework for Tutoring. *International Defense & Homeland Security Simulation Workshop* in Proceedings of the I3M Conference. Vienna, Austria, September 2012.