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Work experience:

Aug 2007-Present **Carnegie Mellon University –** Senior Research Programmer / Analyst

I have been the software lead on the TED1 and TED2 grants. The Training in Experimental Design tutor has been an effort to develop an Intelligent Tutor for teaching CVS (Control of Variable Strategy) reasoning in early middle school students across a broad ability range. We are currently in the final phase of TED development, integrating the knowledge obtained over the course of over a dozen large scale and other small scale studies.

Recent achievements include:

- Extensive enhancements of the TED tutor-engine. These include the creation of both a declarative graph-based scene-selection engine and an intra-scene animation engine. Both engines provide for complex and dynamic behavioral descriptions and AS3 based runtime edge constraints through a built-in Eval interpreter. These engines provided the capacity to manage very large scale adaptive multimedia instruction through highly modularized components and on demand loading.

- A Dart based XML socket server architecture that provides a middle tier to a MongoDB backend. This server provides non-preemptive multitasking through a novel Isolate-Pool design. It also incorporates a unique MongoDB connection sharing architecture.

- Integration of our Bayesian Knowledge Tracing component into the scene-graph architecture to drive student progress through the tutor.

My contributions to Phase 2 of the project include:

- Created a fully distributed client server architecture that supports multiple tutoring sessions with remote logging. This system is comprised of 5 components; the student and researcher interfaces; a central tutor component service; an arbitration service that manages system wide resource allocation with load balancing and finally a logging service component.

- A Flash/Flex/AS3 automation framework for the researcher and student interfaces. This framework has full scripting and logging capabilities to remote servers. It also supports live multi-session monitoring and fine-grain real-time playback of student sessions.

- Designed the streaming XML protocols (SOAP based) and the schemas for TED client/server communication. Also encapsulated the CTAT/DataShop schemas to permit interoperability with TED services.

- Integration of the University of Pittsburgh's Smile Bayesian inference engine.

- Designing the Production Systems used to model the student interaction during individual problem execution and scaffold the tutoring session to accommodate the students' misconceptions.

- Designed the SQL backend databases and the ODBC based logging components.

- Designed scripted Audio/Video segments integrated with interactive animations utilizing chroma-key and flash video with embedded cue points.

- Graphic design and Interaction design on the pre/post tests, registration components, student and researcher interfaces.

- Lead the user studies and analysis which included videotaping and logging of all student activity; accompanying think aloud studies and questionnaires.

- Lead the in-school computer studies with multiple groups that ranged in size up to 100 simultaneous student connections.

My contributions to Phase 1 of the project include:

- Design of a unique dynamic UI framework. This UI model provides automated tweening and management of objects through scene transitions to provide greater visual continuity and user awareness of feature persistence across tutoring scenes.

- Developed the physics models and Flash/AS3 implementation of high fidelity experiment simulation/animation with full drag and drop interaction.

- HCI design on the Student Interface.

- Lead the usability studies and managed a later small scale computer study in local Pittsburgh school.

2013 Discovery Study – Pro bono software development

- HCI design and implementation of a Tablet based app for a study designed to probe the effect of instruction on discovery behavior in young children. This work was done to support a post-doctoral researcher fellow in the Post-PIER program.

2012 CVS Study - Pro bono software development

- Customizations of the TED tutor and modifications required for Tablet (Android) based delivery. This work was done to support a post-doctoral researcher fellow in the Post-PIER program.

2011 Curiosity Study - Pro bono software development

- HCI design and implementation of a software package for a large scale study designed to probe curiosity in children just entering school. The ultimate goal of this research was to examine potential methods of quantifying curiosity. This work was done to support a PhD candidate in the Klahr lab.

2011 University of Toronto - OISE Institute for Child Studies – Pro bono software development

- Developed an Away3D based virtual tour component and authoring application for the LitDiet.org website.

2009 Massachusetts Institute of Technology – Pro bono software development

- Developed a CUDA enhanced convolutional neural network implementation.

1994 – Aug 2007 Synaptek Research - Software Architect

Synaptek produced 2 major software applications. The TAPLESS text Input Method is a language modeling technology for pen centric computing. The TAPLESS product line has registered users in 18 countries. ZipWiz is an advanced archiving utility that currently has over 600 thousand downloads and registered users in 34 countries.

1988-1994 LTI – Hardware/ Firmware Development Engineer

My team designed the ATLock line of security products for DOS based PC's. This was an ISA adapter implementing a BIOS extension to provide secure user level access to file data through BIOS level drive re-mapping and encryption.

Jan 2000–Mar 2001 Sheridan College – Partial load faculty (four successive contracts)

I had an opportunity to teach part-time at Sheridan, replacing a professor on sabbatical. Courses included

Comp4048 Object Oriented Software Construction, Comp4052 Problem Solving / Programming, CPGM32Y1 Introduction to Object-Oriented Programming, Comp21E1 C Programming.

Jan-Jun 1988 (continuing) **University of Toronto (OISE)** – Software Development Engineer

I began my work with the Ontario Institute for Studies in Education developing a software package for dyslexia research. The data obtained was used in the successful defense of a student's doctoral thesis. Since this initial project I have continued to provide pro bono technical support and programming services for various OISE research projects. I enjoy the challenges and rewards of the research environment working with both faculty and students.

Education: McMaster University - 2 Years
Program - Honours Mathematics and Theoretical Physics

Technical Skills:

Operating Systems:	Windows 3.x/9x/NT/2000, XP, Vista, 7/8, Windows Server 2000/2003/2012, Linux (Fedora, Ubuntu), OSX, Solaris, DOS.
Languages:	C/C++, ActionScript3, Flex, Dart, Java, JavaScript, JESS, Assembler, VB, Fortran etc.
IDEs:	FlashBuilder, Dart Editor, Visual Studio …5,6,2005,2008,2010,2012 Embedded VC3/4, NetBeans, Eclipse, FlashDevelop, Flash v4-CS5.5, QTDesigner, etc.
3D API's :	Away3D, OpenGL, PaperVision3D.
3D Design :	Swift3D v5, Blender, Caligari TrueSpace v2-v5.2
Physics Engines :	Box2D
Web technologies:	ActionScript3, Flex3, Flash, Java, JavaScript, HTML, DHTML, FrontPage, etc.
XML:	Liquid XML Data Binder, Liquid XML Studio (XSD design), ActionScript3 (E4X), tinyXML
Graphic design:	Adobe Photoshop v3-v6, Flash v4-CS5.5, Fireworks MX-CS5.5, Corel v3-v5, etc.
Video Editing:	Premiere v4-v5, After Effects CS3.
Audio Design:	Adobe Sound Booth/Audition, Audacity.
Productivity:	Word, Excel, PowerPoint, Project, Visio, Outlook, FirstClass, Open Office etc.
Database:	MongoDB, MySQL, ODBC, SQL server, Access,
Virtualization:	VMware Workstation, VMware Fusion.
Math tools:	MatLab.
Test Equipment:	Tektronix oscilloscopes and digital signal analyzers; Fluke multimeters; Atron in-circuit emulators; Logical Devices programmers; PCB reworking stations.
Processor Architectures:	x86, ARM, 8051, and some exposure to 68hc11.
Certifications:	CCNA, MCSA (Server 2003), SCSA (Solaris 10), Security+, Network+, A+

Publications:

Siler, S. A. & Willows, K. J. (2014). Age and ability-related differences in the effect of figure concreteness on learning and transfer of a mathematical concept. Learning and Instruction, 33, 170-181. DOI: 10.1016/j.learninstruc.2014.05.001

Siler, S. A., Klahr, D., Magaro, C., Willows, K., & Mowery, D. (2010). Predictors of transfer of experimental design skills in elementary and middle school children. Proceedings of the 10th ITS 2010 Conference. Lecture Notes in Computer Science, 6095, 198-208.

Siler, S. A., Mowery, D., Magaro, C., Willows, K., & Klahr, D. (2010). Comparison of a computer-based to a hands-on lesson in experimental design. Proceedings of the 10th ITS 2010 Conference. Lecture Notes in Computer Science, 6095, 408-410.

Conference Presentations:

Siler, S. A., Klahr, D., Magaro, C., & Willows, K. (Accepted). The effect of instructional framing on learning and transfer of experimental design skills. Paper to be presented at the 2012 National Association for Research in Science Teaching (NARST) Annual International Conference. Indianapolis, IN.

Siler, S. A., Klahr, D., Willows, K, & Magaro, C. (2011). The effect of scaffolded causal identification in the transfer of experimental design skills. Paper presented at the fall 2011 conference for the Society for Research on Educational Effectiveness (SREE). Washington, D.C.

Siler, S. A., Klahr, D., Willows, K, & Magaro, C. (2011). The effect of prompted causal identification in the transfer of experimental design skills. Poster presented at the 33rd Annual Conference of the Cognitive Science Society. Boston, MA.

Siler, S. A., Klahr, D., Magaro, C., & Willows, K. (2011). Training in Experimental Design (TED): Integrating Lab and Classroom Research into the Design of Computerized Instruction for Elementary and Middle School Students. Talk given at the 2011 National Association of Laboratory & University Affiliated Schools (NALS) Annual Conference. Pittsburgh, PA.

Siler, S. A., Klahr, D., Magaro, C., & Willows, K. (2010). Biases that Interfere with Children's Learning of Experimental Design. Talk given at the American Psychological Society (APS) Conference 2010, Boston, MA.

Siler, S. A., Strand-Cary, M. S., Magaro, C., Willows, K., & Klahr, D. (2010). Training in Experimental Design (TED): Developing Scalable and Adaptive Computer-based Science Instruction (Year 4). Poster presented at 2010 IES Research Conference, Washington, D.C.

Siler, S. A., Klahr, D. Strand-Cary, M. S., Magaro, C., & Willows, K. (2009). Adapting an effective lesson plan for a computer-based tutor. Talk given at the 13th Biennial Conference for the European Association for Research on Learning and Instruction (EARLI), Amsterdam, Netherlands.

Siler, S. A., Strand-Cary, M. S., Magaro, C., Willows, K., & Klahr, D. (2009). Training in Experimental Design (TED): Developing Scalable and Adaptive Computer-based Science Instruction (Year 3). Poster presented at 2009 IES Research Conference, Washington, D.C.

Siler, S. A., Strand-Cary, M. S., Magaro, C., Willows, K., & Klahr, D. (2009). Alternative beliefs about experimental design. Paper presented at the Annual Meeting of the American Educational Research Association, 2009, San Diego, California.

Siler, S. A., Strand-Cary, M. S., Magaro, C., Willows, K., & Klahr, D. (2008). Training in Experimental Design (TED): Developing Scalable and Adaptive Computer-based Science Instruction (Year 2). Poster presented at 2008 IES Research Conference, Washington, D.C.

Software Portfolio: These are samples from over a dozen variations of CVS instruction:

Framing Study – Effect of instruction framing in Science, Fairness or Logic contexts.
http://tedserver.psy.cmu.edu/tedloader/#demo
Concrete Abstract Study – Effect of Concrete versus Abstract examples or Fading.
http://tedserver.psy.cmu.edu/tedloader/#democa
TED pre/post-tests:
http://tedserver.psy.cmu.edu/pt2/
Prior work:
www.TAPLESS.com
www.ZipWiz.com

Awards:

CNET review - 4 out of 5 stars
Pocket PC Magazine Best Software Award nominee 2003, 2004, 2005
Pocket PC Magazine Hot Download – August 2003