Performance Narrative

The SimMentoring project seeks to help novice teachers more rapidly develop maturity and expertise in adapting teaching to the diverse needs of all learners and increase retention rates of new teachers through development and use of simSchool – a web-based dynamic simulation of a classroom – together with new forms of pre-service teacher mentoring. The project stems from a partnership between the teacher education program at University of North Texas and CurveShift, LLC, a private sector educational solutions company that developed simSchool.

SimSchool is an online simulation that presents participants with a simulated classroom of students from a variety of backgrounds and with a variety of characteristics. The simMentoring project has expanded SimSchool's capacity to address new audiences by adding visual, auditory and kinesthetic learning styles to the simStudents. Project personnel are currently developing sim modules in reading/literacy, diagnosing special education issues, and classroom management as well as designing new instructional scenarios with user-friendly support materials.

The simMentoring project has provided feedback for enhancements to the online program that allow it to support pre-service and induction year teachers with simulations and feedback that mentor them in classroom strategies. The more users "teach" in the system, the more strategies they develop that will become part of their teaching adaptations.

The main goals of simMentoring are to: (1) expand maturity and expertise of pre-service and induction year teachers in adapting teaching to the diverse needs of all students, and (2) increase the retention of new teachers. While goal one is measurable during year one of the project, goal two will be an ongoing measure that will begin to be measured in year three and extend well beyond the project.

Additionally, the project expects to:

- Reduce costs for providing meaningful mentoring and instructional experiences (will be reported in year three)
- Produce new knowledge about teaching and the path of novice-to-expert development (reported in the following section and in year three)
- Provide new models for the study of teaching and learning in higher education (reported in year 1 and included in the following section)
- Be adopted by a broad variety of teacher preparation programs across the country (reported in following section)

It aims to do this by adding the following to simSchool:

- Visual, Auditory and Kinesthetic Learning Styles to simStudents (reported in the following section)
- Specific functionality, including the ability to create your own simStudents by specifying the various dimensions of the student (early versions assigned students at random) (reported in following section)
- Reading/Literacy instructional methods (in progress during year 1 and reported in year two narrative below)
- Special populations diagnostics (in progress and reported in year two)
- Classroom Management theories (in progress and will be reported in the following section for year two)

Progress on Objectives

Objective: Provide new models for the study of teaching and learning in higher education

Through the use of simSchool, pre-service students were able to simulate the teaching environment for students with multiple learning styles, learning levels and personality

differences. Through multiple iterations with input from the pre-service students including the assigning of tasks and comments from one to five simulated students, useful feedback was provided regarding decisions that were made by the pre-service students. As shown in Figure 1, there are many options to allow users to try an unlimited number of scenarios.

Objective: Be adopted by a broad variety of teacher preparation programs across the country

One of the advisory committee members incorporated simMentoring in her courses in the spring of 2008. At least two of the advisory committee members are preparing to incorporate simMentoring activities in their teacher preparation programs at their universities beginning in the fall of 2008. Materials that have been developed in the first and second years of the simMentoring project have been shared with the users to aid in the introduction and use of simSchool.

Objective: Visual, Auditory and Kinesthetic Learning Styles to simStudents

The visual, auditory and kinesthetic variables for simSchool were launched in March 2007. These variables allow users to configure the level of these attributes in their simStudents. Feedback is provided to users regarding student progress during the simulation.

Figure 1. User options for creating a simSchool classroom.

Objective: Specific functionality, including the ability to create your own simStudents by specifying the various dimensions of the student

Both "Create a Student" (Figure 2) and "Create a Task" (Figure 3) options were launched in April 2007. These functions allow the users to create a student based on selected attributes that change how the student reacts to given tasks and comments from the "teacher". The users may also create tasks of their own to assign to their simStudents. Both the created students and created tasks are saved in their simulated environment to be used in any of their current and future simulations. Project personnel review the tasks created by users and selected ones may be added to the system to all users to access the tasks. In the fall of 2007, students in the fourth year Professional Development School (PDS) phase of their teacher education program created simStudents who mirrored attributes of students in which they are working in a classroom. This activity was extended to fifth year certification special education students during the late spring and summer of 2008. During the spring of 2008 and summer of 2008, students in two third year teacher preparation classes (2 x 26 students) and doctoral candidates in one Educational Computing course (n = 11) completed a series of personality inventories to assess visual,

auditory, and kinesthetic attributes as well as the five major personality dimensions underlying simSchool. They were then instructed to construct simulations of themselves (through create a student) and to proceed to assign tasks to attempt to teach the created simulation of themselves. Rich discussions about the assumptions underlying simSchool and the analysis process required by a teacher were triggered by this exercise. The general consensus of those who have completed this exercise, as of summer 2008, is that simSchool provides an "uninhibited" representation of the personality traits of a learner. That is, while the preservice teacher might have impulses toward many of the behaviors exhibited by their simulated selves, most felt the socially conditioned student would only infrequently act on those impulses. This has prompted ongoing dialog as to whether there should be a "social conditioning" parameter added to the simSchool environment that would moderate instances of extreme behaviors. Another prospect being explored is whether the personality attributes might be placed on a logarithmic rather than linear scale.

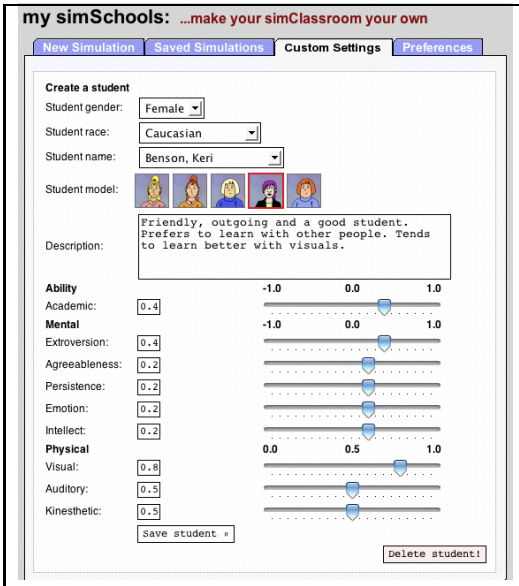

Figure 2. SimSchool users may create their own students based on nine sliding scale variables.

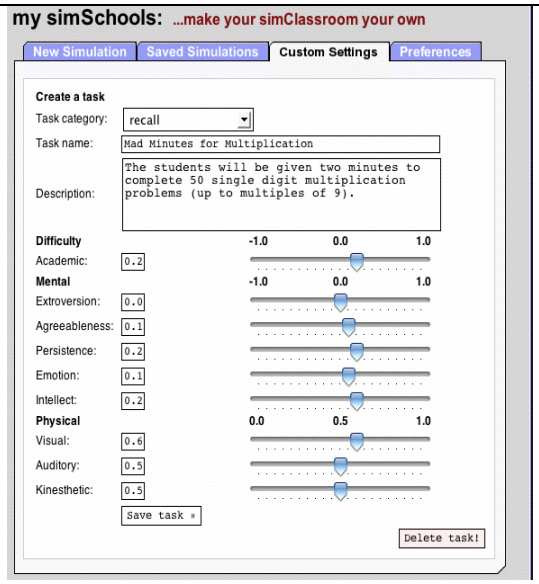

Figure 3. SimSchool users may create a task and assign levels of nine different variables that are required to successfully complete that task.

Many instructional aid sheets have been created to aid university students in their use of simSchool. Practice scenarios have also been created to aid students in the understanding of the use of the system. As of June of year 2, a total of five video tutorials have been created. Two were created in year 1 to visually guide users in the login and initial use of simSchool. Three additional videos were created in year two regarding the "make a task" and "make a student" modules. The completed video segments are linked on the project Web site to be used by other teacher education participants.

A user handbook was being created during year two and distributed to faculty at UNT and elsewhere. A pdf of the handbook is also posted for downloading from the project web site. This includes lesson plans to introduce and continue to use simSchool for pre-service and inservice teachers. Table 1 includes a timeline of project activities to date.

Table 1. Timeline of simMentoring Project Activities through June 2007

Summer-Fall 2007	Creation of handbook
Summer 2007	Introduction to simSchool with Dr. Kelley King's EDSE 3800 class
June 24-27,2007	NECC conference in Atlanta
Fall 2007	Pretest data gathering with Dr. Wickstrom's EDRE 4860 class and Dr. King's EDSE 3800 class
Sept. – Nov. 2007	Six simSchool sessions in Dr. Wickstrom's EDRE 4860 class
Sept. – Nov. 2007	Six simSchool sessions in Dr. King's EDSE 3800 class
October 11, 2007	Introduction of simSchool in CECS 4100 class (Knezek)
December 3, 2007	FIPSE meeting with Dr. David Gibson from CurveShift at UNT
Spring 2008	
February 11, 2008	EDSP 5560 and EPSY 5550-two hour session
February 22, 2008	ERE Conference at University of North Texas. Presentation of year one findings

March 3-7, 2008	SITE conference in Las Vegas. Presentation on Year One Findings
March 2008	3 CECS 4100 classes complete survey as control groups
March 2008	Four sections of CECS 4100 class (from four different instructors) complete three hour simulation block including one hour introduction to simSchool
April 2008	Printing of simMentoring handbook
Spring 2008	Five sessions of simSchool simulations with Dr. King's EDSE 3830 class; focus on "create a task"
May, 2008	All post-test data from CECS 4100 treatment and control groups, EDSP 5560 and EPSY 5550 collected
June, 2008	Five sessions of simSchool simulations with Dr. King's EDSE 3830 class; focus on "create a task" and "make a student" like themselves Doctoral seminar on the underlying theories and operations of simSchool (Knezek) Poster session and presentation at National Science Foundation Joint Annual Meeting (JAM), Washington, D.C. Presentation and featured all day "playground" for simSchool/simMentoring NECC Conference in San Antonio, Texas

Implementation Issues

The online system is continuing to be enhanced throughout the project. Additional servers were added to enhance the reliability and speed of the simulations. Planned enhancements are expected to give the users more flexibility as well as better feedback. One issue with using the system while it is being enhanced is in the creation of learning aids such as video segments, screen captures, tutorials, etc. The learning aids must be updated to include the enhancements. In a short period of time that is often difficult to manage.

Improving the quality of teaching and learning within UNT

During year one, simSchool was used primarily in a pilot test manner while new features (VAK dimensions, make a task, make a student) were being added. Exploration beginning with the initial instructor training session delivered by the developer of simSchool in December 2006, and continuing through use with three classes during the spring of 2007. This allowed the project team to finalize a specific plan for where simSchool had the greatest potential to augment the

existing teacher preparation curriculum. Six courses were targeted for enhancement through simSchool as part of the simMentoring project, over the three-year course of the grant.

During year two, two courses from the previous year were repeated (with new students) for the fall of 2008, and during the spring EDSE 3830 was again repeated while a graduate level special education fifth-year certification class was added during the late spring (Maymester) of 2008. This class had the students build themselves as the learner, and also create a simulation of someone he/she knows well. The class is planned for replication during the 10 weeks of summer 2008. Beginning early summer (June) 2008, a doctoral seminar focusing on the theoretical foundations of simSchool was added, and the EDSE 3380 was repeated once more.

During year 1 and continuing into year 2, reading / literacy classes were a primary focal point of simMentoring activities. Initial findings for gains in Instructional Self-Efficacy due to simSchool activities were derived from these courses and produced credible evidence for the utility of the simulation environment. As activities shift from literacy to foundations / management and special education during years two and three, it is worth noting that the veteran instructor of the literacy classes felt that the richest part of the simulation activities were not yet being measured by the instruments and evaluation procedures in place. In keeping with her early adaptations of having teacher candidates work in pairs to plan simulation activities, and then have one member of the pair function as the "pilot" while the other functioned as the "navigator", she also felt that the richest learning was in the dialogs engaged in *around the simulation environment* among the teacher candidates, and between the pairs as moderated by the instructor of the course. Future studies may be needed to determine how to better assess positive outcomes in this area.

Educational impact in other institutions.

The advisory committee members met as scheduled for year 1 at the Society for Information Technology in Information Technology (SITE) meeting in Texas in March 2007. Members of the advisory committee represent teacher education programs from around the country and include: University of Maine at Farmington, Southeastern Louisiana University, University of Nevada – Reno, and the University of Florida. A meeting is planned at the National Education Computer Conference (NECC) in San Antonio, Texas on June 30th 2008, for year 2.

Plans were formulated during year one of the simMentoring project and carried out in year two with concurrent teacher preparation activities based on simMentoring modules taking place at the University of Florida. Additional activities are slated to begin at two other teacher education programs for fall 2008 at the University of Maine at Farmington, where one of the advisory committee members teaches and at Southeastern Louisiana University where another member of the advisory committee teaches. Baseline data have already been collected from students in Maine.

In addition to these targeted teacher preparation sites, simSchool use is also growing at other universities. On an international level, a Korean version of simSchool was launched in Korea in 2007. Our project personnel have met with the Korean researchers and a postdoctoral fellow from their group is currently in residence at the Univ. of North Texas. Demonstrating the Korean version of simSchool to the summer 2008 doctoral seminar on simulating teaching and learning is one of many activities being completed by the visiting scholar.

As listed in Table 1, the simMentoring Web site was launched in the fall of 2006. Information on the project as well as resources that have been created during the project are included on the Web site. Also listed in the Table are six presentations that have been given

regarding the project at one local, three national, and one international conference during year 1. Both the Bucknell and Boise State contacts who are pursuing the use of simSchool in their teacher education programs were made at the conference presentations. During year 2, presentations were made at one local, one regional, one national, and two international conferences. One national conference was a National Science Foundation Conference for project directors, while at the other national conference (NECC), simSchool was one of a few projects nationwide receiving a full day "spotlight" venue.

How is your evaluation proceeding?

Evaluation for simMentoring is proceeding for the most part as planned. An initial plan was developed prior to proposal submission. This was updated and re-submitted by the external evaluator, Kirk Vandersall/Arroyo Research Services, in early spring 2007. Continual fine-tuning is under guidance from the advisory committee and from the external evaluator. Internal/external evaluator roles and duties are functioning as planned.

Measures

Many measures are being used to evaluate the simMentoring project. Among those initially planned and implemented are survey instruments, classroom observations, blogs, focus group sessions, as well as system login and use data. The battery of survey instruments includes: the Teacher Preparation Survey (adapted from Riedel from the Center for Applied Research and Educational Improvement); Technology Proficiency Self Assessment (TPSA) Email, WWW, Integrated Applications, and Teaching w/Technology; the Teachers' Attitudes Toward Computers (TAC) Questionnaire; and three technology integration measures – Stages, ACOT, and CBAM Levels of Use. In addition, Arroyo Research Services provided simSchool-specific items that were asked of the participants.

Some new measures are also in the planning and/or development phase. We have developed and (during year 2) validated an Instructional Self Efficacy scale and a Teaching Skills scale based on teacher preparation items provided by our external evaluator. During year 2 we are developing and pilot testing a new self-efficacy measure based on an itemization of the 15 types of skills required to excel in the simulator. The external evaluation team (Arroyo) has conducted structured interviews of the primary simMentoring users to provide qualitative assessment of project activities (summary is attached in upload). Results are promising to date.

Data Collection Time Schedule

We gather summative evaluation data for our project twice per long semester, pre-post. We gather data from treatment and comparison classes. We typically gather formative evaluation data bi-weekly, through blogs and classroom observations by faculty and instructional staff, as selected discussion forums with the learners. Faculty focus group sessions provide formative assessment for how and when to best introduce preservice students to simSchool, as well as which data items to gather.

Difficulties in Gathering Data

We have few difficulties gathering data because most is collected online. UNT has had a functioning system for more than 5 years. SimSchool had their support team develop a blog in response to our request.

Changes / Delays from Original Plan

There were no substantial delays to our original plan. We began evaluation activities during the first month of the project (with initial faculty training early Dec. 2006). Activities for special education teachers have been enhanced somewhat due to a concurrent grant received from the National Science Foundation by Investigator Tandra Tyler-Wood. Thus, additional

activities that benefit NSF Disabilities Research as well as FIPSE have been underway, beginning in year 2.

There have been some small changes from our original plan. We initially thought simMentoring efforts would be concentrated toward the end of the preservice teacher preparation curriculum, but we have shifted a major portion of the effort to earlier in the three - year sequence. This was due to project year 1 feedback from the faculty teaching with simSchool, and also due to advice from our Advisory Committee. (It turns out that candidates in their final months of credentialing are so busy "getting out the door" that there is little time for them to accommodate something new.) We initially envisioned that the post-baccalaureate teachers participating in our project would come from programs in the Department of Teacher Education & Administration, but instead they are coming primarily from certification programs in Special Education. This change has been beneficial in that Special Education "postbac" teachers have much more experience with students exhibiting extreme behaviors and hence are better prepared to think analytically about behaviors coming from simSchool models, and their theoretical as well as practical origins. A third modification is that we envisioned some induction year activities during year 2, but that has not been possible because training has moved to earlier in the teacher preparation sequence. Few graduates of the simMentoring have entered the teaching force to date. We are currently examining possible induction year scenarios for year 3.

Overview of Findings for Year 1

An Evaluation Summary of year 1 findings from the simMentoring project was uploaded with the year 1 report, for the reader's convenience. Major findings were:

Preservice teacher preparation candidates involved in the simMentoring project at the University of North Texas during the spring of 2007 exhibited moderate to large gains

(Cohen, 1988) on many of the 11 teacher preparation, technology proficiency, and technology integration indices produced from the data. The area in which the treatment group of preservice teacher candidates exhibited the largest gain in comparison to the two groups of their peers that did not receive simSchool access and training, was on items related to instructional self-efficacy. Pre-post effect sizes (Cohen's d) for the treatment versus two comparison groups on this indicator were treatment ES = .95 ($p < .0005$), comparison group one ES = .40 ($p = .14$), and comparison group two ES = .04 ($p = .91$). Items composing this indicator reflected preservice educators' confidence in their competence to bring about positive learning outcomes even in multiple learning conditions. Findings imply that simMentoring activities were successful in fostering instructional self-efficacy in preservice students.

Analysis of web log (blog) responses from students tended to reinforce the conclusions of the quantitative data, as well as provide insight for directions of future simMentoring Project improvements. Ninety-two (92) responses were logged by the first group of students to use the program, beginning in February and continuing through April of 2007. Of these, there were an average of three responses per student over time, which by and large reflected increasing degrees of satisfaction with the program based on:

- Multiple uses (having felt they understood the program better after the first and second uses, students were more comfortable navigating and using it).
- Responsiveness on the part of simSchool creators to student comments across the usage period.
- Students being allowed to work on the program in pairs (many felt that it was more effective to have one student-teacher watch the "class" while the other sorted through

potential responses and lessons).

Overview of Findings for Year 2

Continued assessment of attitude changes and learning gains were conducted during year 2 of the project. In addition, the external evaluator (Arroyo Research Services) interviewed ten of the faculty and project staff directly involved in day-to-day use of simSchool and provided a qualitative summary of findings (see attached report). Major internal evaluation findings are summarized in the paragraphs immediately following.

As a result of feedback received from the faculty using simSchool during year 1, greater attention was concentrated on introducing simMentoring activities at an earlier stage in the preservice teaching sequence during year 2. During the fall of 2007, one section (24 students) of the sophomore-level technology integration class required at the beginning of the teacher preparation sequence for most teacher candidates, pilot tested a 3-hour module that introduced simSchool in the context of it being like Oregon Trail or Lemonade Stand, but for teaching. Results were promising so during the spring of 2008 four sections of this class introduced the three-hour module and completed pre – post assessments. Results were significant self-reported pre-post gains in Instructional Self Efficacy ($n = 49$, $p = .03$, ES = .40) and Teaching Skills ($n = 49$, $p < .0005$, ES = .69). These would be classified as a moderate gains by Cohen's 1988 guidelines for Effect Sizes of .2 = small, .5 = moderate, and .8 = large. Note that these gains are smaller than those reported for spring 2007 for the senior-level Professional Development School (PDS I, student teaching observation) candidates who went through a nine - hour sequence of simSchool activities, as might be expected due to the shorter time on task. PDS I candidate ($n = 28$) effect sizes for spring 2007 were ES = .95 for Instructional Self Efficacy and ES = 1.00 for Teaching Skills (very large). However, the sophomore level Technology Integration class gains

during spring 2008 were similar to the junior-level secondary education methods class (n = 18) gains for those using simSchool during spring 2008: ES = .3 for Instructional Self Efficacy and ES = .29 for Teaching Skills. Note that all of these gains are in the range that would normally be considered educationally meaningful (ES >= .3). Also note that the second year (sophomore) students began at an average teaching skill level of 4.49 on a 1-5 scale, while third year (junior) teacher candidates began at an average teaching skill level of 4.54. Fourth year (senior PDS I) students began with a mean teaching skill level of 4.73. This indicates a smooth progression of teaching skills as candidates advance through the teacher preparation curriculum with the aid of simSchool at UNT. However, the specific kinds of simSchool-related skills acquired appear to differ as a result of simSchool related activities. This will be described in more detail in the paragraphs that follow.

Preliminary analysis of which teaching skills received the greatest benefit during simMentoring activities began in 2007 and continued with data gathered during the spring of 2008. The emergent trend was not surprising – that the skills rated the highest (where the candidates learned the most) depended on the focus of the course and the activities in which the preservice candidates were engaged. For example, during the spring of 2008 and again in the summer of 2008, both junior-level classes in secondary teaching methods lead by Dr. King placed the following items in the top three:

Item 4. Selecting objectives aligned with student needs.

Item 7. Sequencing teaching strategies.

Item 14. Making decisions based on the assessment results from my students.

These courses concentrated on methods for targeting tasks to meet the learning needs of students.

By contrast, the top three items for the Technology Integration course were:

Item 6. Selecting a broad array of teaching strategies

Item 7. Sequencing teaching strategies.

Item 12. Connecting teaching and learning.

This course is at the beginning of the teacher preparation sequence and focuses on ways to use technology to enhance the learning of students in general. Top ratings for things learned through simSchool for this course seem to reflect the orientation of the course.

Activities targeted at having teacher candidates use simSchool as a Constructivist tool to think about the process of teaching and learning were begun during year 2. During late spring and summer of 2008, simSchool was introduced to two special education graduate courses with the goal of having participants "construct" in the simulator a student with disabilities like one they had studied in detail in their coursework or career. This work was typically done in pairs, with the participants working with their own and their partner's created simulation of a learner.

Also during June 2008, a doctoral seminar course entitled "Simulating Teaching & Learning" was conducted by one of the simMentoring Co-PIs to explore the state of the art in simulators for teaching and learning. SimSchool was the primary example used in this course. Each student was required to: a) complete a battery of personality tests aligned with the eight simSchool primary indicators (five personality types plus visual, auditory, kinesthetic); b) construct in simSchool an image of themselves as a learner; c) design one or more new tasks tailored for their simulated learner; and d) reflect on the outcome. This activity created such rich dialog that major portions were also incorporated into the junior-level methods class. The impact of these new activities should be able to be evaluated by the end of the summer of 2008.

Sustainability of Project

The project's products (books, articles, workbooks, training materials and online access) are being packaged to ensure adaptation on other campuses by preparing and making available multiple pathways and entry points for professors, teachers, researchers, co-authors and co-developers. Different packages, entry points and development goals are needed for each audience whose goal is to provide guided use of the simulation platform to assist new or experienced teachers. We'll also provide traditional support materials in the form of conference presentations, training workshops at pre-conferences and as stand-alone offerings, and web-based materials. By the end of the simMentoring project, the simSchool program is planned to be fee-based for users. A fee structure is intended to be in place for individuals as well as classes of students in a university or school group setting. We envision that simSchool may be purchased by the students just as other textbooks or CD-based materials are currently purchased.