CS486C – Senior Capstone Design in Computer Science
Project Description

Project Title: JASS© : Jabulani School Simulation Portal

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Introduction:

Research over the last decade has shown that teachers and, specifically what they do and how they interact with students, are the most significant factor in learning outcomes and student performance. As classrooms become more diverse, the differences in student backgrounds have increased the challenge of creating and delivering effective pedagogical experiences; teacher training and preparation must be improved to meet this challenge and produce more effective, understanding and competent teachers. In particular, there is a need to improve teacher preparation to ensure that program graduates are well prepared to educate all students—including those from increasingly diverse socio-economic, racial, ethnic, linguistic, and ability/disability backgrounds—to achieve high learning outcomes that ensure that they are college and career ready (NCATE, 2010).

To address this challenge, we have been working on developing a virtual "training space" called "the Jabulani School Simulation (JASS©)". The goal was to design a system that allows education faculty to create and deploy individually-customized classroom simulations, which are then used as the basis for a series of training exercises that allow education majors (let's call them "teachers in preparation" or **TIPs**) to gain hands-on experience with diversity issues they will typically face within the a diverse classroom. Simulations have become an increasingly popular mode of learning for the field of teacher education in general but, to date, few if any deal directly with issues of diversity in the classroom.

The JASS development effort has spanned the last two years, focusing initially on exploring and building the research behind the simulation concept, and then on "manually" prototyping classrooms and learning modules to work out how exactly the JASS concept would actually function. This effort was successful, yielding a solid conception of JASS; we are ready to implement JASS as a working web-based system. The essential pedagogical process underlying JASS can be summarized as follows:

1. The JASS project develops (over 200 already exist; 600+ are targeted) a large repository of detailed "personal profiles" of imaginary students that span the full range of diversity that

exists; each profile includes the student's story, data on learning, background characteristics (such as race, language, socio-economic status, ability, etc.), videos, and other information.

2. When JASS is deployed, education faculty can create a new "virtual classroom" in the system, then use JASS's search and filtering tools to populate the class with student profiles from the archive containing all available student profiles. This allows an infinite diversity of classrooms to be created for exploration by TIPs.

3. For a learning exercise, TIPs are assigned a pre-populated virtual classroom as "their class", and are given a series of exercises (e.g. situational scenarios plus associated questions to address) to complete by their faculty mentor. TIPs are able to examine their classrooms (the student profiles) to "get to know" their class and, based on this, answer the questions (e.g. in short essays). These responses are submitted within JASS, resulting in notification of the faculty member.

4. The faculty member connects to JASS and evaluates pending TIP responses (i.e., "grading"). If the TIP has provided a "passing" response, they are thus notified and are able to advance to the next level, i.e., are allowed to go on to the next exercise. If they "fail", they are given feedback by the faculty member and can revise and resubmit the exercise.

The aim of this project is to implement the JASS concept as a robust, secure web-application that can be used by education faculty at NAU, as well as made available (perhaps for a fee) to other education schools and faculty around the nation. Some keys features of the JASS prototype will include:

- Secure registration of both faculty members and TIPS (students). Must provide for easy invite-based account creation, as well as profiles to store user information and preferences.
- Ability to register new education schools (e.g. NAU School of Education) within the system via request/approval to a global JASS administrator. Allows designation of a local administrative-user for each school, who then handles all administration for that site/school.
- Ability for faculty and administrators at each registered education school to:
  - o Allow the local site admin to register/edit/manage new faculty users, who then have permission to create/deploy new "virtual classrooms" to registered TIPs associated with their school.
  - o Register new TIPs associated with that school. Having TIP accounts controls student access to JASS, allows faculty members to create/populate virtual classrooms and training exercises for individual TIPs; allows students to upload solutions; and provides a way to document/view TIP learning progress.
  - o Create or edit virtual student profiles in private archive owned and accessible only to that education school. An advanced feature might allow education schools to publish/share their corpus of virtual student profiles for use by other education schools (and their faculty) who are also registered in the JASS system.
  - o Allow faculty to create new "virtual classrooms", populate such classes with profiles searched/selected from the archive of available profiles, and make these classrooms selectively accessible to individual TIPs registered at their institution.
- Provides a "classroom viewer" that allows TIPs to view/explore classes and the students they contain that have been assigned to them.

- Allow faculty to assign learning exercises to TIPs under their supervision; allows TIPs to submit solutions to such learning exercises (generally a document, e.g., response essay).
- Provides some sort of "dashboard view" as homepage for both faculty and TIPs. Faculty can see status of exercises assigned to various TIPs; can view submitted solutions; and can enter scores; TIPs can see/open/submit exercises that they have been assigned, as well as scores received.

The features outlined above would provide a basic but functional JASS prototype (minimal viable product). Additional features that we would like to explore if possible include:

- Exploration of "gamification" aspects. This could include features like a "scoreboard" that, for instance, shows the progress of all TIPs at an institution through the series of exercises designed by local faculty, as a sort of motivational tool. Other ideas include "dynamic student profiles": here, students in a classroom would start out with "basic" profiles containing minimal information about each student. By successfully completing exercises, TIPs would "gain information" on their class, causing additional information to appear in student profiles. This would simulate learning more about students as a result of successful interactions with the class.
- Archiving and indexing of exercises created by faculty. In the basic version, "exercises" are just textual assignments, e.g., blocks of text pasted into a form by faculty, and then visible to TIPs. An advanced version would allow exercises to be created independent of deployment, tagged with various tags (learner level, complexity, etc.), and added to an archive accessible to all faculty at an institution. Deploying an exercise would be as simple as a faculty member finding a suitable existing exercise, and dragging it from the archive onto the profile of the targeted TIP.

The above features are just meant to be an illustrative outline of how JASS should work when implemented. A fun and challenging part of this project is to have a technically-gifted team working with inspired sponsors from the education faculty to develop the fine-grained details of JASS look, feel, and function.

If successful, this prototype will provide a strong proof-of-concept for JASS as a novel, research-validated model for preparing young teachers for highly diverse modern classrooms. As such, it could become a cloud-based resource used by educational faculties nationwide to prepare new generations of teachers.

Knowledge, skills, and expertise required for this project:
- Knowledge of modern frameworks and tools for effective webapp development.
- Database development skills to support development of appropriate data schema for backend database.
- Skill in development and user-testing of web-based GUIs including forms, drag-n-drop, videos, and other media elements.
- Gaming background or understanding of some gaming strategies and design

Equipment Requirements:
- There should be no equipment or software required other than a development platform and software/tools freely available online.

- A server to host development and deployment of the JASS server will be provided by the client, based on recommendations by the team.

Software and other Deliverables:

- The web application, as outlined above, deployed and tested on server designated by client. Must include a complete and clear Administrator's Manual written for IT staff for installing, configuring and maintaining the software.
- An HTML-based online user's manual, detailing end-user operations for both faculty and TIP users.
- Complete professionally-documented codebase, delivered both as a repository in GitHub, Bitbucket, or some other version control repository; and as a physical archive on a USB drive.
- A strong as-built report detailing the design and implementation of the product in a complete, clear and professional manner. This document should provide a strong basis for future development and growth of the product.