# Lyle Spencer Research Awards - 10009742

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## Proposal Summary

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| Proposal Title: | Low-Stakes Practice Spaces to Support the Cultural Competency of Teachers |
| Project Summary (200 word limit): | The accelerating diversity in student populations is creating a demographic rift with the population of teachers. Cultural competency is critical for teachers when supporting learning with students of diverse cultural, linguistic, and socioeconomic backgrounds. It incorporates the fostering of two-way, respectful communication with parents and guardians while using family- and community-related information as a resource for learning. MIT Teaching Systems Lab, Educational Testing Service, and American University propose to collaboratively research affordances of games and simulations to create low-stakes practice spaces for teachers to apply cultural competencies in authentic and dynamic classroom contexts. Leveraging our team's expertise from related work, we will employ a design-based research approach using evidence centered game design as the primary design framework to (a) advance our understanding of teachers' cultural competency in specific contexts, (b) use our understanding of the competency to iteratively design and test games that form a low stakes practice space that supports the learning of cultural competency as part of specific teaching practices, and (c) examine the efficacy of this approach in terms of learning and assessment. |
| Duration (in months): | 24 |
| Financial Scope (including no more than 15% indirect costs): | $750,000 to $1,000,000 |

## Letter of Intent

The Letter of Intent narrative should be uploaded as a PDF file and should address two overarching questions:

1. *"Why is this work worth doing?"* **Describe the project** by clearly articulating the importance of the proposed research and your ideas about why it should be undertaken. Use language that is appropriate for an educated lay audience. Your description should include the **major research questions** and a clear answer to the "so-what?" question—explaining how the study will make a meaningful advance in understanding education, noting especially how it will advance the aim of improving educational practice. To that end, you should situate your research questions in the existing literature and clearly

explain what new knowledge you expect to gain by answering these questions. The first essential criterion of a successful LOI, therefore, is a project rationale and research questions that illuminate the importance of the end for which the research is conducted.

2. *"Can you really do it?"* We seek to fund research that is not only important but for which there is a viable plan of action that your team is well-equipped to put into effect. **Describe the methods** you plan to use to answer your research questions, clearly specifying the **sources of data** you will draw on, the **sample** you will study, the **data collection instruments** you will employ, and the **types of analyses** you will conduct. (We recognize that not all disciplines and projects lend themselves to inclusion of all of these elements. If your proposed work does not align well with this structure, we welcome a clear statement of theory and methods that fits properly with the kind of project you envision.) Linking your research questions and research design should be a clearly explicated **conceptual framework**. Below we ask you to pinpoint how the research skills and technical capabilities of the investigative team align with the overall demands of the proposed work.

Formatting requirements: The Letter of Intent may not exceed 2000 words; at the conclusion of the narrative, please note the word count in parentheses. Your reference list should follow your narrative in the same PDF and will not count toward the 2000 word limit. The text should be double–spaced and in a standard, readable font and font size.

## Research Team

A PDF file should be uploaded that includes a brief biosketch for the PI and each Co-PI on the project. Each biosketch should be no longer than 200 words and should identify elements in the researcher's scholarly background that have prepared them for the role that they will play in the work being proposed. The text should be double-spaced and in a standard, readable font and font size.

## Proposal Data

**Topic/Subject:** Please indicate the top 3 topics your Spencer proposal is focused on:

Teacher Education/Development

**Methods/Approach:** Please indicate the top 3 methodologies you plan to use in your project:

**Disciplinary Perspective:** Please indicate the disciplinary perspectives to be utilized in your project:

Education

**Subjects/Informants:** If applicable, please indicate the subjects/informants involved in your Spencer proposal.

Teachers

**Geographical Scope:** What country will your research be focused on?

Only in the United States

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|---|---|
| Please Specify Location: | Massachusetts |

## Attached Documents

Below is a list of the files that have been uploaded to the application.
The files listed below follow on the remaining pages of this document.

| | |
|---|---|
| Proposal Narrative: | TSL_ETS_AU_v4.pdf |
| Research Team Biosketch: | ResearchTeam.pdf |
| PI CV: | YoonJeonKim_CV_July2016.pdf |
| Co PI CV's: | Reich_cvita_2014_jun_10p.pdfBauerMalcolmVita2016.pdfFinnCurriculumVitae_2016.pdftreanor_cv.pdfCurriculumVitae.pdf |

# Low-Stakes Practice Spaces to Support the Cultural Competency of Teachers

## Why is this work worth doing?

In the U.S., students' cultural, linguistic, and socioeconomic backgrounds are becoming increasingly diverse. Students of color make up almost half of the public school population (Boser, 2014) and by 2035, they will be the statistical majority of the student population (U.S. Bureau of Census, 2000). Similarly, students who are English language learners are dramatically increasing in number - estimated as 4.4 million students in 2012 (U. S. Department of Education, 2015). The demographics of the national teacher workforce have not kept up with that of students. Only 18% are teachers of color and this disparity is growing larger in most states (Boser, 2014).

To support the learning and development of all students, especially those in more vulnerable populations, teachers must be prepared to consider a wide range of cultural experiences to effectively teach students and respectfully communicate with their families (Banks et al., 2005; Gay, 2010). Teachers' cultural competency should be emphasized in teacher education because (a) students' academic performance can be improved when teachers utilize knowledge of students' social, cultural, and language backgrounds and (b) students in marginalized populations are more likely to have negative experiences in school that can be addressed, in part, by engaging parents in positive and supportive ways (Banks et al., 2005; Delgado-Gaitan, 1991).

Despite the importance of teachers' cultural competency there is scarce evidence on how it can be effectively nurtured (Self, 2016). Traditional teacher education programs have been criticized for not adequately preparing teachers to teach diverse populations (Hollins & Guzman, 2005). Such competencies are not fully integrated into teacher training or remain theoretical constructs rather than practical competencies. In contrast, medical training often involves role-play practice of high-stakes interactions (Kurtz, Silverman & Draper, 2005). In a comparative study of teachers, social workers, and therapists, Grossman and colleagues (2009, p.2056) conclude that "prospective teachers have fewer opportunities to engage in approximations that focus on contingent, interactive practice than do novices in the other two professions [studied]." To support teachers' development of cultural competency, structured opportunities should be provided to gain experience in authentic settings where they can engage in targeted deliberate practice (Grossman, 2010). Developing these cultural competencies requires multiple opportunities to practice and get feedback throughout a preparation program, and some of this practice can occur productively in designed settings or simulations.

One promising approach is live and synchronous role-play simulations. Trained actors play the role of student or parent and rehearse with teacher candidates in situations where cultural diversity causes conflicts (Dotger, 2013). This method is a powerful learning mechanic, but can also be expensive and difficult to scale. Implementation requires synchronously coordinating actors, experts, and teachers.

## What is the work?

We propose to develop and research a suite of games and simulations that allow in-service and pre-service teachers to rehearse for and reflect on specific teaching practices and moment-to-moment decisions which emphasize cultural competency. We will focus on practices that support teachers' interactions with families, and the community at large, to build "funds of knowledge" (Kihlstrom & Cantor, 2000). Teachers will practice applying these funds of knowledge to their teaching, specifically to lesson planning and student interaction. Underlying these practices are a broad constellation of social, emotional, and metacognitive skills including persistence, cultural awareness, perspective taking, metacognitive evaluation and regulation, and rapport building (McCloskey, Grandjean, Behymer & Ross, 2010). Our goal is to leverage technology to create rich learning experiences that are targeted to specific skill development and that are easily scalable to a wide audience at low cost.

We will employ a systematic and culturally sensitive assessment design approach called evidence-centered design (Mislevy, Steinberg, & Almond, 2003). This involves (a) the collection of teacher-familial cultural and ethical dilemmas, (b) creation of representative vignettes, and (c) creation of simulated social practices and situations. We will employ design-based research (DBR) as the overarching research and development approach (Collins et al., 2004; Easterday, Rees Lewis, & Gerber, 2014) in which we will follow iterative phases of design, development, and evaluation. We will address the following research questions:

- What are the features and different types of interactions (i.e., learning mechanics) that can foster teachers' *cultural competency* in the game and simulation environment? (RQ1)
- What are the effects of game- and simulation-based training on teachers' *practices* related to cultural competency? (RQ2)
- How valid and reliable is the training for assessment of cultural competency? (RQ3)

If this research is successful, then the output the project will be a series of game-based learning experiences for addressing specific challenges in incorporating cultural competency and a development

process for co-creating scenarios for games and simulations with practicing teachers. Our ultimate goal is to cultivate a new genre of technologies for supporting teachers in practicing ambitious pedagogy.

## How will we do the work?

MIT Teaching Systems Lab, American University, and ETS have each created and piloted early prototypes related to *the goal of using games and simulations to create a low-stakes practice space for teachers that is scalable and readily assessable.* Working together we can significantly advance the field to improve teachers' learning of culturally embedded teaching practices. This collaborative work will allow us to leverage each institute's expertise and resources. The following highlights some of our early prototype work.

Teaching Systems Lab: Teaching Systems Lab has two prototypes exploring how we can leverage affordances of games and simulations to create opportunities for targeted practice and reflection in teaching. Each prototype employs a different learning mechanic.

- Video Interactive Case Studies: In this prototype, teachers watch short videos of classroom scenarios and then at volatile moments of instruction--an interestingly phrased misconception, a sexist comment about girls in science, or a defiant act--teachers are prompted to record an improvisational audio response. The system can prompt teacher candidates to listen to responses from fellow teacher candidates, write reflections on their responses, or watch an additional video showing how the actual teacher in the scenario addressed the situation.
- Eliciting Learner Knowledge: Eliciting Learner Knowledge is a turn-based game where teachers are assigned a role either as teacher or as a K-12 student with a defined set of conceptions and misconceptions in a specific content area. Through an asynchronous chat-based system, teacher candidates use probing questions and quizzes to elicit student understanding. At the end of the game players attempt to guess or characterize the conceptions and misconceptions of other players.

American University: The researchers at American University have employed both game design and artificial intelligence (AI) techniques to enable adaptive decision making in dynamic simulation games (McCoy et al., 2014; Treanor, McCoy, & Sullivan 2016). In many games, players' choices are largely ignored in favor of prescribed sequences of interaction. American University's AI system enables content creators to write high-level rules that allow the system and player to interact in a socially fluid manner.

This flexibility allows learning mechanics about cultural competency to be deeply integrated into the game experience. The following lists three games and prototypes that have employed this technology:

- Cultural Learning: A current collaboration between American University and ETS on game-based learning and assessment of cross-cultural competency. In this game, players attempt to recognize cultural norms and individual's characteristics while interacting with a group of computer-based characters from an unknown culture.
- IMMERSE: The goal of the project was to produce a game-based training environment that teaches people how interact as "good strangers" via practicing the skills necessary to have successful social interactions in unfamiliar languages and contexts.
- Prom Week: A simulation game centered around understanding and interacting with the norms and individual beliefs of the students in an American high school.

ETS: In addition to the Cultural Learning work with American University, researchers at ETS developed evidence-centered game design (ECgD) initially to address the complexities of simulation- or game-based training and assessment (Bauer, Williamson, Mislevy, & Behrens, 2003). The approach merges methods of cognitive science and psychometrics to enable the design of complex systems that assess and support the learning of multidimensional constructs such as teachers' cultural competency. In collaboration with GlassLab, we have successfully applied the approach in commercially available games that teach multidimensional constructs like argumentation and systems thinking.

## Design Framework: Evidence Centered Game Design

As the primary design framework that enables the coherent alignment among learning mechanics, the competency, and practice scenarios, we will employ an ECgD approach. Two team members, Yoon Jeon Kim and Malcolm Bauer, have extensive experience with applying this approach (Kim, Almond, & Shute, 2016; Zapata-Rivera & Bauer, 2012). ECgD activities will include domain analysis and domain modeling including literature review, re-analysis of existing data, and ethnographic approaches (e.g. collection of critical incidents, focus group methodologies as employed by Eberly, Joshi, & Konzal (2007)) to develop design patterns (Mislevy & Riconscente, 2006) that define and connect competency, evidence, and situations suitable for use in the development of learning games for pre-service learning, and in-service professional development for teachers.

## Research Framework: Design-Based Research

This project will employ a design-based research approach (Collins et al, 2004; Easterday, Rees Lewis, & Gerber, 2014). We will co-design representative vignettes and simulated social practices to be embedded in our game platforms involving teachers and parents from the partnership sites (e.g. Boston Teacher Residency and Boston Public Schools).

To address RQ1, we will first interview and observe teachers at our partnership sites in Massachusetts, to understand effective teaching practices related to this competency. Insights gained will be used to (a) design interactions within the games and simulations, (b) design authentic practice scenarios, (c) operationalize and align the competency with the designed learning experience, and (d) develop and revise a theory of action (TOA) (Bennett, 2010) that defines and connects the intended effects (i.e. the professional development goals) with the components (i.e. the games and their critical features), a theoretical rationale, the psychological mechanisms involved, unintended negative consequences, and possible mitigation strategies.

Learning mechanics and practice scenarios will be developed in the game and simulation platform via iterative development including agile prototyping, frequent user testing, and continual refinement. This process includes partnership sites teachers and teacher candidates in the MIT-Wellesley Scheller Teacher Education Program and in the newly developed Woodrow Wilson Academy for Teaching and Learning. To address RQ1, we will analyze differences in performance on games with different features or across systematic manipulations (e.g. A/B testing). Other validated instruments such as Cultural Diversity Awareness Inventory (Larke, 1990) may be used to measure how our interventions foster different aspects of cultural competency.

To address RQ2, we will explore changes in pre/post measures of cultural competency along with classroom observations and teacher logs to evaluate how our intervention influences their related teaching practices. Additionally, semi-structured interviews will be conducted with the observed teachers to determine barriers to changes in their practices.

To address RQ3, we will perform both confirmatory and exploratory analyses in keeping with the application of evidence centered design to the development of games and simulations. We will conduct analyses that initially focus on identifying predicted patterns indicative of components of cultural competency (confirmatory), unanticipated patterns (exploratory), and changes in patterns that may be indicative of learning.

## Conclusion

Teaching quality is a major factor affecting student learning. In this project we offer a novel approach to improving teaching quality through the creation of low stakes practice spaces. We apply this notion to a pressing and growing issue: teachers' cultural competency in their interactions with students, parents and guardians, and the community to develop funds of knowledge to be directly practice in teaching contexts. Project outcomes will initially impact teachers and students in Boston. Given how easily such technology is disseminated, we expect the games we develop to be used widely by teachers across the country. Most importantly, we expect that what we learn about low stakes practice spaces for teachers will profoundly change the way pre-service and in-service teachers learn to teach and how they interact with students, parents and guardians, and other members of the community.

Word count: 1994

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