# Zachary O. Dugas Toups - Teaching Statement

I will engage students through team-oriented game design and development projects. Retention and gender balance are ongoing problems in STEM[1] fields (average 69% male [3][2] and less than 45% completion rate among STEM aspirants in 2004 [1]). Game mechanics, the times in game play where the player makes a decision and the system reacts through its designed rules [4], are the *lingua franca* of new generations of students. The systematic and information-centric nature of games addresses computer science and engineering, while games' narrative and social nature invokes the arts. Game design opens opportunities to address hard science and engineering problems in the context of human-centered computing, social computing, narrative, and visual art and design. While games serve as valuable teaching tools themselves [2], game design is a difficult and rewarding educational enterprise. Success requires creativity, interface design, and complex system engineering. These qualities bridge STEM disciplines with fields that have traditionally attracted female students, such as language, communication, social studies, and art (average 60% female [3][3]).

Designing a game is a communicative exercise: just as the computer interface communicates with the user, so, too, does the game, through its mechanics. In fact, game mechanics are a medium through which players communicate with each other. Through game design and other long-term development projects, my students will learn to construct and evaluate human-centered interfaces and complex systems. Such educational processes immerse students in real-world problem solving tasks that lack correct solutions. Further, these projects require team skills, invoking my research in improving team coordination [6]. Deliverables throughout each semester will ensure students learn to communicate effectively through written and spoken word and multimedia, such as system demos and video. By performing original engineering and scientific work, strongly connected to the arts, students will not only gain a range of valuable skills, but also craft a portfolio of exciting work that will serve them as a foundation for research or industry roles.

## ROLE OF PROJECTS IN CLASS

Projects comprised of both group and individual components will form an essential role. I take my inspiration from highly successful instructors at Texas A&M University, including Andruid Kerne, Frank A. Shipman III, and Scott Schaefer. Students will be expected to specify and execute a project plan. Individuals will develop their own ideas, outside of the group, so as to avoid fixation on other team members' [5]. This specification will provide them with essential engineering skills while including research components in which the students evaluate the work with users and players.

The research process involves a number of stages that are applicable not only to scientists, but also engineers, other workers, and everyday life. Through the process of research, students examine prior work, identify gaps in knowledge, optimize resources, and develop new knowledge. Iterative cycles of building understanding, creating new systems and experiments, and evaluating progress are essential. The research process not only creates new knowledge, but is also a useful exercise for activities undertaken not only at work, but also in day-to-day life.

Depending on their level, students will be given appropriate independence in deciding what they will do. For example, in early introductory courses, students may be assigned a project specification. Students will focus in on one or more components of the project, as determined by the course's educational goals. In higher-level courses, students will be assigned project categories from which they focus their own work. This draws on the template from Kerne's Senior Capstone: Design (CSCE 482, spring and fall 2010), in which students bid on project categories

---

[1] Science, Technology, Engineering, and Mathematics

[2] Derived from the categories of Biological and biomedical sciences; Communications technologies; Computer and information sciences; Engineering; Engineering technologies; Mathematics and statistics; and Physical sciences and science technologies.

[3] Derived from the categories of Communications, journalism, and related programs; English language and literature/letters; Foreign languages, literatures, and linguistics; Liberal arts and sciences, general studies, and humanities; Social sciences; History; Visual and performing arts.

through a proposal-writing component. For example, when I was involved in Senior Capstone, I specified a project in which students use a set of iPhones to produce a mobile game; multiple teams bid on the project, and the best proposal won. In the highest-level courses, such as introductory graduate courses and beyond, the students will be expected to develop original work, based on and building from existing literature.

## COMMUNICATION

In all areas of academic and professional life, the ability to communicate is essential. Students in my classes will learn to communicate their ideas, designs, and results through multimedia. Students will need to communicate effectively within their own teams. They will need to manage one another's schedules and set up meeting times; my experience in educating teams in coordination will prove valuable in this regard [6]. Students will work with written word, developing project proposals that will be judged by their peers and instructors. They will write reports on their work, which may be submitted for publication. Course presentations will support students in developing public speaking and multimedia authoring skills. As projects are engineered, they will be demoed to classmates. Video has become the best means to rapidly disseminate information to others, so many classes will include a video development component.

## COURSES

I am well equipped to teach a number of existing courses and am excited by the opportunity to develop my own, new courses. My expertise includes game design, human-computer interaction, computer supported cooperative work, and software development. I plan to develop depth courses on game design, such as game interface design.

## CONCLUSION

My teaching philosophy is informed by my experiences. I have witnessed the value of team projects in teaching; my own dissertation area began as a project in one of Kerne's classes. I believe that game design in the classroom is a potentially effective way to improve retention and gender balance in STEM disciplines, as it connects science and engineering with design, narrative, and art.

## REFERENCES

1. HIGHER EDUCATION RESEARCH INSTITUTE AT UCLA. Degrees of Success: Bachelor's Degree Completion Rates among Initial STEM Majors. *HERI Research Brief*. Available online: http://www.heri.ucla.edu/nih/HERI_ResearchBrief_OL_2010_STEM.pdf. January 2010.

2. HONEY, M. A., HILTON, M. Eds. *Learning Science: Computer Games, Simulation, and Education*. National Academies Press, Washington, D.C., USA, 2010.

3. NATIONAL CENTER FOR EDUCATION STATISTICS. *Table 287: Bachelor's degrees conferred by degree-granting institutions, by sex, race/ethnicity, and field of study: 2007-08*. Available online: http://nces.ed.gov/programs/digest/d09/tables/dt09_286.asp. June 2009.

4. SALEN, K., AND ZIMMERMAN, E. *Rules of Play: Game Design Fundamentals*. MIT Press, Cambridge, MA, USA, 2004.

5. SMITH, S. M. Getting into and out of mental ruts: A theory of fixation, incubation, and insight. In *The Nature of Insight*, R. J. Sternberg and J. Davidson, Eds. MIT Press, Cambridge, MA, USA, 1994, 229–252.

6. TOUPS, Z. O. *Non-mimetic Simulation Games: Teaching Team Coordination from a Grounding in Practice*. PhD thesis, Texas A&M University, College Station, TX, USA, August 2010.