Using 3D digital game-based learning environments to enhance second language acquisition

1. Project Background

The seminal MLA Ad Hoc Committee on Foreign Languages Report identifies a burgeoning national “language deficit” (2007, p. 2) and characterizes the two-tiered configuration that today artificially separates second language acquisition specialists from literature faculty in university foreign language departments as being antiquated and highly inefficient. According to the report, the unfortunate upshot of this artificial division is the prevailing curricular model that devalues the early years of second language learning while simultaneously monopolizing upper-division language courses in the service of literary studies. Traditionally low enrollments in many foreign language tracks reveal this division to be particularly unappealing to many university students. Seeking broader and more diverse paths to mastery of a second language and culture, students tend to find the two-tiered configuration to be stifling, incongruous, and largely irrelevant to popular fields of study.

To correct the current two-tiered configuration, the MLA Report calls for the adoption of curricula in second language acquisition that can increase the translingual and transcultural competence of a broader range of university students, not just those interested in literary studies. Ideal curricula will be those that “situate language study in cultural, historical, geographic, and cross-cultural frames; that systematically incorporate transcultural content and translingual reflection at every level; and that organize the major around explicit, principled educational goals and expected outcomes” (p. 5). In an effort to ensure that the study of second languages will remain relevant for a networked and digital society in the future, the MLA Report additionally calls for efforts to “provide substantive training in language teaching and in the use of new technologies” (p. 7). To wit, the report invites increased efforts to delve into technical and disciplinary fields that traditionally have not been included in the study of foreign languages yet harbor the potential of transforming language departments into more “meaningful players in higher education” (p. 3).

2. Nature and Goals of the Project

Seeking to address the technical, interdisciplinary, and instructional needs outlined for foreign language departments in the MLA Report, the proposed CATL Scholars project will design, prototype, test, and evaluate a 3D digital game-based learning (3D-DGBL) environment to teach the target language and culture to advanced high school and beginning university students. Specifically, the project will prototype one level of a standalone 3D graphic adventure game for the PC platform requiring students to navigate a simulated environment in the target culture while meeting specific instructional goals and managing the sociocultural and linguistic demands of an assumed in-game persona. The proposed project will build on cutting-edge scholarship in the field of DGBL and mandates for curricular change in second language acquisition (SLA) by looking for specific ways in which 3D-DGBL environments can (a) engage a wider range of university students in the SLA process through challenging and meaningful gameplay; (b) be streamlined into existing SLA curricula; (c) be aligned with learning objectives and assessment strategies; (d) function as a gateway to upper-division cultural studies and language courses; (e) promote deeper learning through the development of transferable mental schemata and situated sociocultural knowledge; and (f) foster deep translingual and transcultural reflection. The proposed project will generate new and progressive scholarship in the form of research articles and, eventually, a book on 3D-DGBL for SLA.

3. Student Involvement

Elon University students will play a pivotal role in developing, analyzing, and refining the proposed 3D-DGBL environment. In the past, students majoring in digital art, computer science, and the target second language assisted in modifying an existing proprietary game platform to outline possible directions that development of the environment could potentially take. In Fall Semester 2009, students in an intermediate conversation course in the target language were also involved in project development. The linguistic, cultural, historical, and political examinations in the course served as the basis for a larger class project of creating non-player character (NPC) dialogue for the game, which students tested as a paper-based game prototype during the course capstone experience.
Future work on the project will require select students in the target language iteratively to test the game prototype in order to bring its interface and gameplay more into line with commercial off-the-shelf games and popular video gaming memes. Testing will also be conducted to ensure that learning objectives in the game can be accomplished in a reasonable amount of time and with minimal player confusion, in addition to formulating what types of “just-in-time” (JIT) instruction are needed to help the player navigate the game’s virtual spaces. Following this iterative testing, the game prototype will be deployed in a live instructional setting and student learning evaluated by means of a mixed-methods study. This repeated process of focused student testing and development, followed by in-class assessment of the learning environment, will continue over a period of three years until the game level is completed.

4. Teaching and Learning: Evidence and Effectiveness

The first mixed-methods study of the game prototype will be conducted Spring Semesters 2011 in a lower-division target language course. Data collected from the mixed-methods study will be published in a leading journal on second language teaching and learning. The data will also be applied towards directing and shaping future development of the 3D-DGBL environment, resulting in one fully completed game level with supporting course materials by Fall Semester 2013. Data gathered every Spring Semester over the course of three years will form the foundation for a book project detailing the development and use of 3D-DGBL environments for SLA.

5. Teacher-Scholar Implications

3D-DGBL for SLA is a central component of my research agenda and serves as an important way to bridge the gap between scholarly work and classroom teaching. The nature of this cutting-edge research presupposes a large amount of student involvement and feedback, with the students themselves being the beneficiaries of the entire development process by ultimately having a 3D-DGBL environment that can assist them in the SLA process and prepares them for immersion abroad.

6. Wider Implications and Transferability

As noted above, 3D-DGBL is an instructional approach that directly responds to current mandates for curricular change in the field of SLA. It is hoped that products of the proposed CATL Scholar project can be disseminated in two ways. First, the game, game resources, source code, and supporting instructional materials will be openly distributed via an Elon University website under a Creative Commons Attribution-Noncommercial-ShareAlike Generic 2.5 license. By distributing game and curricular resources in this manner, it is hoped that future interdisciplinary research and development can be fostered at the national and international levels. Second, the game and supporting course materials will serve as the foundation for a book project currently in progress researching 3D-DGBL for SLA. It is hoped that the book project will be a seminal contribution to the field, help to articulate best practices, shape theory on 3D-DGBL for SLA, and outline future areas of research and development.

7. Budgetary Needs and Project Timeline

Funds are kindly requested to cover the costs incurred by conference travel, the purchase of needed software, advanced training for 3D modeling and game design software, and the purchase of 3D models and game resources. The conferences currently being targeted include the Games, Learning, Society conference; the American Council on Teaching Foreign Languages conference; the Modern Language Association convention; the Montreal International Games Summit; and the Game Developers Conference. I intend to apply the two course releases provided each year by the scholarship toward the development and testing of the 3D-DGBL environment and its supporting curricular materials. As I will be on a semester sabbatical in Spring 2012, I kindly request that the monies reserved for covering the course release in this semester be translated into funds for supporting the project.

The project timeline (detailed below) anticipates a three-year span in which work on the 3D-DGBL environment will proceed through iterative phases of prototyping, testing, analyzing, and refining the environment with help of select students and direct involvement of lower-division courses in the target language.
In the course of this process, data will be generated that forms the basis of journal articles and ultimately a book project on the use of 3D-DGBL environments for SLA. The project will culminate with the launching of a website that will disseminate the developed environment and supporting curricular resources, in addition to inter-departmental discussions exploring the feasibility of expanding the environment to include other game levels, learning objectives, and target languages.

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### Project Timeline

<table>
<thead>
<tr>
<th>Period</th>
<th>Activities</th>
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<tbody>
<tr>
<td>Fall 2010</td>
<td>Work closely with select Elon University students to refine graphical user interface (GUI) for prototype 3D-DGBL environment, clarify learning objectives, and develop supporting course materials.</td>
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<tr>
<td>Spring 2011</td>
<td>Test 3D-DGBL environment in lower-division target language course, gather and interpret data, begin article on results of mixed-methods study.</td>
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<tr>
<td>Summer 2011</td>
<td>Continue project development work and expand prototype 3D-DGBL environment into one complete game level, finish and submit article on study results, begin work on book project.</td>
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<tr>
<td>Fall 2011</td>
<td>Continue collaboration with select Elon University students to refine GUI and environment learning objectives, continue development of game level, test environment repeatedly to ensure playability and immersive flow, and work on book project.</td>
</tr>
<tr>
<td>Spring 2012</td>
<td>Test 3D-DGBL environment in lower-division target language course, gather and interpret data, refine environment and instructional materials based on gathered data and student feedback, and work on book project.</td>
</tr>
<tr>
<td>Summer 2012</td>
<td>Continue project development work and expand prototype 3D-DGBL environment into one complete game level, and work on book project.</td>
</tr>
<tr>
<td>Fall 2012</td>
<td>Working with other faculty in the Department of Foreign Languages, explore the feasibility of expanding the 3D-DGBL environment to include other levels and learning objectives, and work on book project.</td>
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<tr>
<td>Spring 2013</td>
<td>Test 3D-DGBL environment in lower-division target language course, gather and interpret data, and include data gathered from past three research studies into book project.</td>
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<tr>
<td>Fall 2013</td>
<td>Publish book project and go live with game website.</td>
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### 8. Application Notes

Project development is done primarily with free and open-source software. 3D modeling and animation is done in Blender (http://www.blender.org) and texturing of the 3D resources is done in GIMP (http://www.gimp.org). Game level design and programming is done in Unity 3D (http://unity3d.com). A screen recording of the 3D-DGBL environment as it currently stands can be found on the CD accompanying this application (screen_recording.mov), in addition to a prototype game build without object interactivity and learning objectives (test.exe). Both the game and video will play more quickly if the source files are copied to the computer hard drive and launched from there. Once the game has been launched (double-click the .exe file), movement within the environment can performed with the key/mouse combinations:

- W (or up-arrow): move forward
- A (or left-arrow): move left
- D (or right-arrow): move right
- S (or down-arrow): move back
- Mouse: Manage player orientation

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Addendum A

Screen capture of integrated game authoring tool (Unity3D), showing the main editor window, currently developed 3D models, and rendering statistics.