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KEYWORD – ONLINE LEARNING

Simulating a Federal Legislature

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Abstract

This article describes implementation of an online learning tool designed to complement traditional didactic teaching. LegSim is a web-based virtual legislature that students organize and operate. They represent constituents, choose leaders and allocate committee positions, sponsor, co-sponsor, and research legislation, and negotiate and strategize to advance their policy priorities. Instruction is flexibly adapted to changing events as students acquire conceptual, procedural, and operational knowledge through their participation in a learning community.

Introduction

I hear and I forget. I see and I remember. I do and I understand.
K'ung-fu-tzu, Chinese philosopher & reformer (551 BC - 479 BC)

Advances in communication technologies and media have dramatically influenced economics, politics, and society in recent decades. These advances have had less impact on teaching practices, in part, because there are few technological innovations designed to serve the needs of educators, particularly in the social sciences. Thus, social science instruction remains primarily a didactic, book-centered process.

In this article, we argue that computer-based simulations offer qualitatively different tools for supporting student-centered, experiential learning in the social sciences, two factors identified as important for promoting learning in the fields of engineering, science, and medicine (Bransford et al. 2000). Despite growing claims about the educational benefits of games and simulations (Gee, 2003; Prensky, 2001; Sawyer, 2002), many educators are understandably skeptical. Drawing on our own experiences over the past 5 years, we can begin to describe the affordances of a particular web-based legislative simulation, and why we believe simulations will be increasingly important in future social science education.

Games and Simulations

Both games and simulations seek to model some type of dynamic system, either real or imagined, and therefore, can be defined as *a collection of related parts, which, through interactions with each other, function together to create a complex whole* (Kauffman, 1980;

Salen & Zimmerman, 2004). Games, such as chess and Go, are thousands of years old, and motivate play because they offer clear goals, multiple ways to win, some learner-control, and the possibility of proficiency through repetition (Malone, 1980; Gredler, 2004).

Games typically are goal-driven, and can be highly abstract or fantasy-based. In contrast, simulations are open-ended, and usually, realistic representations of some aspect of the real world. In such *experiential* simulations, a scenario is presented, players assume roles, and decisions are made as a situation unfolds over time (Gredler, 2004). Kriegsspiel, designed by Prussian lieutenant von Reisswitz in1824, was the first attempt to represent realistic battlefield situations (Bonk & Dennen, 2005; von Reisswitz, 1824). Case-based simulations have been traditionally used in law and medicine; as early as 1926, college students created a simulation of the League of Nations that later became the popular Model United Nations widely used in middle and high schools, and colleges today (Muldoon, 1995).

Technological advances during the Second World War introduced new ways to instantiate games and simulations using the computer's computational speed and programmable functionality. Social scientists developed some of the earliest computer simulations for the purpose of studying economic behavior based on formal game theory (von Neumann & Morgenstern, 1944). After the Second World War, computer-based simulations were used to study problems in business, meteorology, defense, and numerous other fields, where experiments were not physically, financially, or ethically feasible, but could be mathematically modeled (Forrester, 1961; Levenson, 1989; Shubik, 1982). Gredler (2004) refers to these as *symbolic* simulations.

Entertainment games were slower to appropriate computer technologies, which is ironic, considering that commercial computer gaming industry revenues in the United States now rival those of film (Bonk & Dennen, 2005). However, when Willy Higginbotham created an interactive table-tennis-like game that was displayed on an oscilloscope in the Brookhaven National Laboratories in 1956, his goal was to keep visitors to the laboratory from being bored (Herman, 2001). When the game "Pong" was released on the market years later, it not only demonstrated how electronic games could capture people's attention (Baer, 2005), but also that failure can be a powerful motivator in the right context (Gee, 2003).

Computer-based games and simulations have now established beachheads in a broad range of professions where "on-the-job" mistakes can have catastrophic consequences, such as first responders, city planners, surgeons, military leaders, and business managers (Berry & Hilgers, 2004; Dorner, 1996; Oppenheimer, et. al., 2001; Sterman, 2006; Traum, et. al., 2005). Only a small number of computer-based political science simulations are available for high school and college educators, such as those provided by the ICONS Project, and the Game of Politics simulations (e.g., Kahn, 2006) although individual educators have also developed simulations for use in their own classes (e.g., Baranowski, 2006; Bernstein & Meizlish, 2003; Endersby & Webber, 1995).

From an educational viewpoint, simulations and games offer *situated learning* experiences that encourage the analysis and synthesis of information (content), and behavioral and cognitive responses (Gredler 2004; Greeno 1998). Well-designed games and simulations put participants in

situations where they receive feedback based on their choices, have opportunities to make adjustments and see the results, and are able to repeat the process until they gain proficiency. A useful distinction can be made between "closed" simulations, in which cycles of play converge on a desired goal, and those that are "open-ended," in which outcomes are not predetermined but emerge from player choices. Juul (2002) refers to the former as games of progression, and the latter games of emergence. Thus, participation in a virtual surgery simulation leads to convergence on the best way (for example) to make an incision. In contrast, resource management decisions in a game like Sim City may lead to a thriving or declining city for many different reasons. However, the simulation has value because it is expected that the advantages and disadvantages of different strategies will emerge organically with experience. The most dramatic examples of open-ended emergence simulations are the massively multiple player on-line games (MMPOGs) such as Second Life or The Sims on-line, where large numbers of participants construct virtual worlds. Scholars are beginning to study these organic 'worlds' to better understand how social structures or economies develop.

LegSim: Legislative Simulation

LegSim is an established, server-based, political science simulation, which has been accessed via the Internet and used in approximately 60 courses by about 2500 students over the past 5 years. Each class gets it own dedicated legislature that the instructor customizes according to considerations such as class size and time available. It is designed to be used over an entire semester in conjunction with a conventional didactic, college-level political science course. LegSim can mimic any legislative assembly. We focus here on the U.S. House of Representatives version that was conceived in 2000 by one of the authors.

LegSim is an open-ended emergence simulation. Students populate and organize the legislature, and then advance proposals based on their personal legislative priorities. They own it and are collectively responsible for what it does or does not produce. Although each class has its own unique and unpredictable experience, the choices, actions, and decisions students make as the legislative session progresses, enables similar insights to emerge from every class (e.g. the importance of procedures, knowing your subject, and compromise).

One of the strengths of the simulation is its accessibility via the web, which means that students are able to hone their legislative skills from any location with Internet access, at any time of the day. This dramatically increases opportunities for student interactions when compared to the opportunities available in a traditional course or class-based simulation. Figure 1, for example, shows that peak on-line interactions occur near midnight. Students are choosing to engage with LegSim during what might be considered their own time. Vincent and Shepherd (1998), who also use an Internet-based, role-playing simulation to teach Middle East politics at Macquarie University (Australia), observed similar behaviors, reporting that at the height of the simulation, "students from both sides of the Pacific were willing to work through the night."

Figure 1. LegSim On-line Participation by Hour of the Day

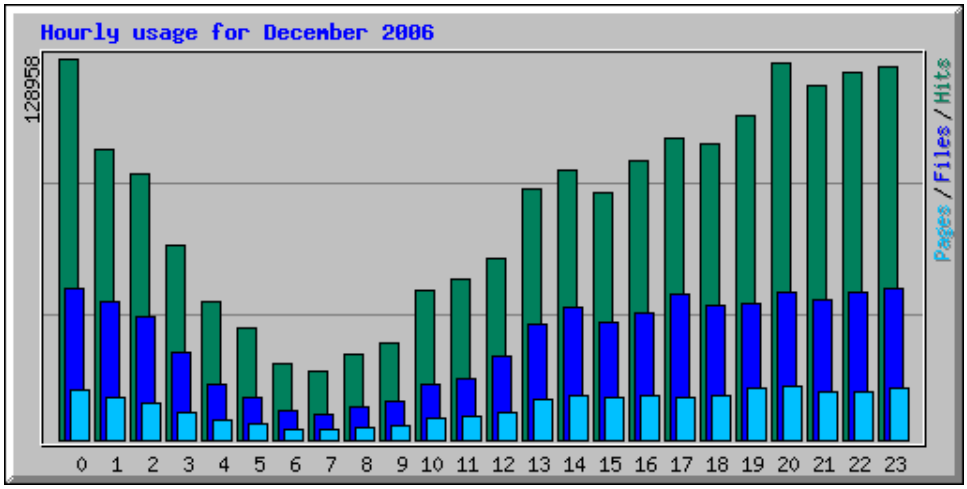
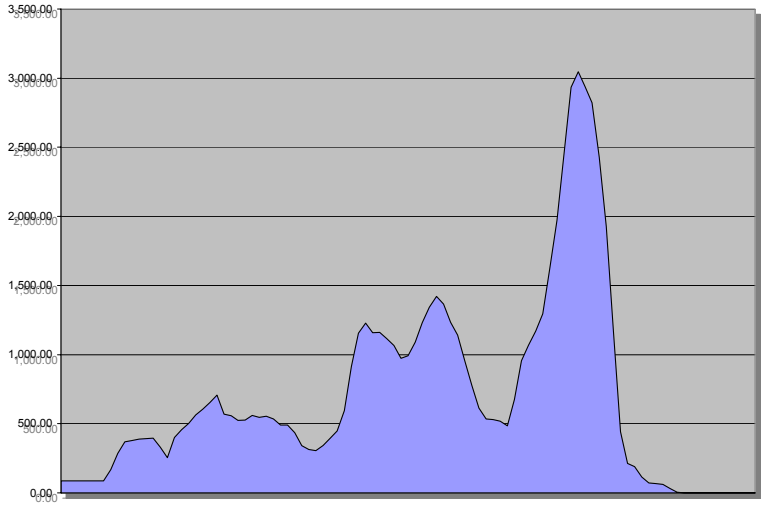


Figure 2. LegSim submission (posts) by week of quarter in a single course (smoothed)



The extended opportunities afforded by web-accessibility seem to have the effect of making the simulation experience an important part of students' day to day lives, if only for a semester (for more on the sustained impact of political simulations (c.f., Bernstein and Meizlish, 2003). As one student wrote, *" I know that I'm not a real representative, but I have gotten myself so into this class that I feel like I have become one! It's really frustrating to put your heart into something you feel so passionate about and have no ability to help it, but I guess it's all part of the game."* Many students have told us that this was the best class of their college careers. Many other instructors also report similarly high levels of enthusiasm among their students. But what about

learning? What does a simulation offer that lectures and books do not, and what do students learn in a simulation that is different from what they might learn in a typical lecture course?

Simulation as Learning Environments

The LegSim environment includes features that scaffold information gathering, support written discourse and coalition-building, and provide regular peer-to-peer feedback on the effectiveness of student efforts, in contrast to traditional classes where the transmission of information is almost exclusively from teacher to students. These features foster agency, engagement, and authentic learning experiences by enabling students to 1) become active members of a community of professional practice, 2) develop expertise about a subject, 3) employ different modes of communication, and 4) track changes and progress over time (Brown & Campione, 1996; Lave & Wenger, 1991; Shaffer, 2004).

However, because so much student activity is beyond the instructor's direct control, their LegSim experiences have to be explicitly connected to the course learning objectives. Our approach has been to construct assignments that ask students to apply what has been covered in readings and lectures to specific simulation-related tasks or events. For example, one assignment asks students to discuss "the electoral connection" (Mayhew, 1976), before proceeding to describe the politics of the district they represent and how their own legislative agendas will be shaped by their reelection goals. Students' responses to such assignments assure that they are attending to the course material and thinking beyond immediate goals, as well as providing an opportunity to assess their thinking and learning.

Advancing Operational Knowledge

LegSim is designed to be academically comprehensive in the sense that it seeks to build conceptual, procedural, and operational knowledge. Conceptual knowledge refers to what citizens and practitioners alike need to know about the theories and principles on which the structure of government is based. For example, federalism and separation of powers are abstract principles, but understanding them is important because of how they affect the broader functioning of government. Procedural knowledge refers to rules and norms that are central to the day-to-day governing, such as the mechanics of the legislative process, where information can be obtained, or even mundane practices such as how to prepare a "dear colleague" letter or address fellow legislators on the floor. Simulations advance conceptual and procedural knowledge by combining content (e.g., parliamentary procedures) with assignments or activities that give students experience with the content. In these respects, the benefits of a simulation may be similar to those of an engaging lecture, a report, or in-class exercise.

Operational (or expert) knowledge, in contrast, is dynamic, strategic, and adaptive (Bransford et. al., 2000; Kay, 1995). This is where simulations have the potential to shine as pedagogical tools, because their features support dynamic processes: multiple modes of communications, web-based research, instant feedback, and tracking of student interactions over time. These affordances enable LegSim to scaffold a community of practice in which students can experience the legislative process on the deepest structural level. Operational knowledge in a legislative

context entails not only knowing the rules but also how to work successfully with others to advance legislative priorities.

Ann Brown coined the term *communities of learners* to refer to learning environments where "independently purposeful" individuals form coherent functional systems for knowledge building (Brown & Campione, 1996). LegSim fits comfortably within this framework. It promotes communities of learners where participants *unintentionally* instruct each about constitutional principles such as federalism, and also about effective strategies and behaviors. Research has shown that peer-to-peer interactions can be more powerful learning experiences than teacher-student interactions in some circumstances (Hogan et al., 2000). Shaffer (2002) advocates technology-based learning environments that provide "epistemic lenses" (insider perspectives) through which students can experientially acquire critical thinking skills centered on the norms of a professional community (e.g., architecture, journalism). Computer-mediated communities enable students to be actively engaged in knowledge construction in ways that are not possible with traditional didactic methods, and have long been advocated in science education (Bruner 1960).

Textbook and lecture-based presentations of distilled content are neither engaging nor accurate reflections of how things really work in practice. Congress does not legislate according to a cookbook, even though this is what many textbooks presentations would lead students to believe. Legislating is more like playing an "open-ended" game: the bill that gets passed emerges over time through a dynamic, complex process. The best players are the ones who understand the game (conceptual knowledge) and the rules (procedural knowledge), but are also able to adjust in the face of adversity and respond to unanticipated opportunities. This ability to adapt to changing circumstances is highly valued in all professions as a sign of expertise, but it is not typically emphasized in traditional education (Bransford et. al., 2000).

No one can predict what thousands of student legislator interactions will produce. However, patterns of behavior have emerged from using LegSim in college level classes: students confront the same collective action problems that real world legislators encounter; coalitions form and then evaporate; rules are read for their strategic implications. Disagreements and time pressures lead to compromises that no one could have anticipated. Caucuses meet in the wee hours of the morning to plot the next day's activities. In the end, only a small proportion of bills are enacted into law. Students begin to get it, as evidenced by one high school student's comment, *"In readings & on TV they make it seem so easy. But when you actually try it, it's a lot harder.*"

Discussion

Simulations have a long history in education, as the Model UN demonstrates, but in the last few decades, international relations simulations have begun to incorporate computer technologies and the Internet (e.g., Shellman & Turan, 2005; Starkey et al. 2005; Vincent & Shepard, 1998). Computer simulations designed to help convey the complex and dynamic nature of legislative and electoral processes are less common (e.g., Bernstein & Meizlish, 2003; Endersby & Webber, 1995). This is not surprising considering the extraordinary effort required to design and coordinate complex simulations, and the need for research to determine their efficacy. Although student surveys suggest role-playing simulations provide meaningful learning experiences

(Endersby & Webber, 1995), some research indicates that political science simulations may not improve learning basic content in the short-term compared to traditional teaching and testing methods (Bernstein & Meizlish, 2003). However, our experience with LegSim, as well as other research findings, suggest that the pedagogic value of simulations is in their ability to foster operational knowledge, long-term retention, and more accurate perceptions of the political process. In a longitudinal study designed to determine the impact of a legislature simulation three years after the classroom experience, improved retention of key processes and a reduction in political cynicism were found among the students who used the simulation compared to the control group who did not (Bernstein & Meizlish, 2003).

With each media transformation comes new ways of perceiving and communicating, and therefore, of thinking and learning (Kay, 1995; Latour, 1990). Books, games, and simulations are media in which content is physically or electronically embedded for different purposes. A book's purpose can be strictly to entertain, or it can be to convey some of our most profound thoughts and ineffable feelings. Similarly, a game's purpose can be entertaining or deadly serious (Dorner, 1996). As McLuhan pointed out in 1964, the medium is the message in the sense that the meaning and impact of content cannot be divorced from how that content is conveyed. Computer-based simulations, as media, offer promising new opportunities for learning. They can advance modes of instruction to promote the operational, process-oriented knowledge that is particularly difficult to advance in traditional classroom settings. Moreover, much of the operational knowledge acquired in a simulation centering on one professional community (e.g. agenda control, interpersonal communications, negotiation) may be applicable or intersect with others.

Much of the recent attention concerning the value of games for education has been misdirected in our view. This attention has largely focused on whether games of entertainment advance skills, and what those skills might be. However, educators have specific learning objectives grounded in their subjects. Effective educational simulations must be designed around these objectives, first and foremost, as well as around what is known about how people learn. We anticipate this situation may change rapidly as students demand more interactive and meaningful learning experiences, research clarifies the affordances and constraints of games and simulations for education, and as technological advances make it easier for educators with limited programming experience to incorporate technology into instruction (e.g. wikis and blogs). Finally, teachers and publishers are becoming more comfortable with the notion that simulations are valuable media for advancing learning. As educators, we are looking forward to following these developments.

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