Simulated Worlds: Rapid Generation of Web-Based Role-Play

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Abstract

This paper describes and discusses the pedagogical foundations and the technical features that enables rapid generation of role-play simulations on the Web. The pedagogical approach of this learning technology is based on the principles of dynamic goal-based learning, and learning by doing within the context of authentic educational settings where students are allowed the opportunity to acquire the intended learning outcomes by making mistakes in safe environments. Based on this clearly articulated and proven pedagogical design, we are able to develop a process by which a designer can quickly create a web-based role-play simulation. Incremental modification is an essential feature in this rapid cyclic development process allowing further refinement to the simulation as it progresses. The technology used to support this environment is Fablusi™ Role-Play Simulation Generator (see Fablusi™ Website at http://www.Fablusi.com/authoring/).

Introduction

If George W. Bush were to toughen the foreign policy stance of the United States towards North Korea because the North Koreans continued to develop and test their missile program, how would the Chinese leadership in Beijing react? Would Australian history look any different if the convicts who arrived on the shores of Australia with the first fleet were able to establish a cooperative defense group that successfully challenged the authority of the British marines and their officers who were guarding them? Could the Second World War have been avoided if Chamberlain did not cave in to Hitler's demands over Czechoslovakia? These are questions confronted by students of politics and history to which they would probably like to have answers. To answer these questions would require them to set up thought experiments in order to analyze the different variables. Alternatively they could set up some sort of role-play simulation in order to explore these futuristic and historical scenarios.

The work described in this paper represents an innovative approach to the use, design and creation of role-play simulation in web-based learning environments. It can enable students and researchers to explore precisely these sorts of questions by creating simulated worlds on the World Wide Web appropriate to their fields of enquiry. Use of online role-play simulation dates back to the early 1990s with the work of Andrew Vincent in Middle East politics which used a makeshift application of email on a Unix system. In 1997, the first and second authors started an implementation of a web-based fully-integrated role play simulation environment that was, and still is, used as a tool for students to learn about world politics and as an alternate assessment in courses such as the World Politics in Transition course, The Australian Foreign Policy course and the Asia-Pacific Politics course in the Political Science Department at the University of Melbourne. Prior to 1997 for the first of these courses, and prior to 2000 for the others, students learned through the traditional means of lectures, tutorials and library research and were assessed via a combination of 3,000-word essays and/or two-hour exams at the end of the course. The new approach that supplemented this conventional practice (for those students who chose this option) provided a learning environment for the students to experience the political process, apply their acquired political theories and be formally assessed on it.

Theoretical and Pedagogical Foundations

The idea that learning must begin with a goal arises from observations of how people learn naturally. People learn something because it helps them achieve some goal (Schank, 1997). Situated

approaches to learning environments (e.g., Anchored Instruction) share a common emphasis on how learning should take place - namely, via the exercise of skills and knowledge within an authentic context. The role of the student in anchored instruction activities, for example, includes observing some events (e.g., watching a video or reading a newspaper report), verifying the accuracy of some information, looking for clues, and applying those clues to solving a problem (The Cognition and Technology Group at Vanderbilt, 1990). The importance of goal pursuit to learning though, suggests that students should be given opportunities to put into practice the skills being taught. This approach has two benefits. First, practice facilitates skill acquisition (Anderson, 1983), second, applying skills toward achieving a specific goal provides a context in which those skills are useful (Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990; Collins, Brown, & Newman, 1989). The first steps in constructing a learning episode then, are articulating the target skills, and selecting a goal for the student to pursue which is appropriate to those skills. The learning environment must be able to support the pursuit of such articulated goals and skills in an authentic context.

The learning environment must also be designed to include a meaningful context for pursuing that goal, in which the student's activities are both engaging and plausible with respect to the goal the student is pursuing. Goal-Based Scenarios (Schank, 1997) provide an explicit account of instructional environments in which the learner is engaged in pursuing a goal, within a simulated environment, in order to master a set of target skills. The student is an active participant in such a scenario, assuming a role in which resources provided by the program are available to help the student progress toward completing the task. The key organizing principle behind a Goal-Based Scenario (GBS) is that the instructional goals are distinct from the task goals (called the mission) which are set within some activity (called the context). One approach has been to provide resources on demand, which requires a sophisticated ontology to classify different cases and resource into a structure so that the software can pick up the appropriate case or resource for presentation at the appropriate time.

In our Dynamic Goal-Based Scenarios (Linser & Naidu, 1999; Naidu, Ip & Linser, 2000) the task goals are not invented for the student. Rather, it is the student who constructs these goals in accordance with the role as well as the strategies by which these goals are to be achieved. As a consequence, the very activity of constructing task goals requires participants to research facts. In pursuing strategies to fulfill these goals they learn to understand the relations and processes

that they themselves create. Thus the instructional goals of knowledge and understanding are achieved in the course of the participants' activity in constructing and pursuing the task goals. This is implemented in the form of formal writings of role profiles at the beginning of the simulation in which the students are asked to articulate the goals of the role/character they were playing. These role profiles were made available to other role players so that a dynamic mechanism could be set into action during the simulation as each role evaluated the stipulated orientation of all the other characters in the simulation and keep on adjusting theirs as the simulation progressed.

Learning Design Architecture

The four essential ingredients of this learning and teaching design are goal-based learning, role-play, and online web-based communication and collaboration and the traditional lectures and tutorials.

First, goal-based learning is acknowledged as a strong motivator of learning. Typically, goal-based learning comprises a scenario or context, which includes a trigger or a precipitating event. This event may be presented as a critical event and usually requires an immediate response from students.

The second critical ingredient of this learning architecture is role-play, both in the sense of playing a role, playing with possibilities and alternative worlds, and playing to "have fun". The strategy of learning through playing is significant, not the least because 'having fun' in the process of learning is an extremely useful motivator. More importantly, it gives students a personal stake in the proceedings. A distinction is sometimes drawn between a "simulation" and a "game". A game will have a sense of "winning" or "losing". The work described here is a "simulation" in that at the end of the activities, there is no "game to win or lose". Students in this web-based simulation are organized into teams playing particular roles. Students play out their assigned roles within the context of the given crises or situation. In order to play out their roles effectively they need to do research. Data for this research is available via a large number of links on the role-play website but it is also necessary for students to do traditional library research as well as attend lectures and tutorials. The provision of resources by this mechanism serves to simplify the simulation generator software in that no elaborated schema is necessary to classify the resources to provide "resources on-demand".

This simulation is designed to create a safe and authentic environment to situate student learning in the area of political science. It has sufficient richness in it to reflect the complexity and authenticity of the "real world" as well as additional 'fictional' or 'what if' type of variables. The "authenticity" in the simulation is necessary in order to ensure that there is a "personal stake" in the decisions taken in the simulation. However, it is particularly important to recognize that some students could suffer intense psychological stress during the simulation exercise because the complexity of the roles they play puts pressure on the students to act in unfamiliar ways. Students ought to know that they are able to "escape" from this artificial world and return to the "real world". The simulation generator used for this simulation makes this possible. It provides a clear separation of the simulation from the real world. This is considered to be an important contribution of this simulation generator in comparison with the use of generic email or text-based conferencing systems. This escape from, and re-entry into the simulated world is an important element for situating learning by providing distinctly different environments for experiential learning and reflective thinking.

The third critical ingredient of this learning architecture is the Web. The Web houses the virtual space for the role-play, enables communication and collaboration among students, and between the students and the lecturers. The Web also enables access to "just-in-time" resources by making available to students resources (such as up-to-date news from electronic newspapers and web-sites etc.), from all over the world as and when they need them. Without this capability the content of the role-play would be significantly weaker.

The fourth critical ingredient is the traditional teaching method of face-to-face lectures and tutorials. The importance of incorporating these techniques into the learning architecture is not only for their utility in the presentation of facts, cases and theories. They also provide communicative events that stimulate reflection about actions undertaken and strategies pursued by comparing real world events with the simulated ones.

Modeling of the simulation

The Fablusi™ Role-Play Simulation Generator generates the role-play simulation described in this paper (see Fablusi™ Website at http://www.fablusi.com/authoring/)[HREF 4].

Roles and Participants

In Fablusi™, the lecturer who creates the simulation is denoted as "simulation creator" (*creator* for short), in the simulation. The creator creates an initial scenario, *roles*, *meeting places* in the form of sim-conference areas and the *parameters of the role interaction* and *hierarchy* of the roles. Multiple Worlds can have the same role-interaction structure or set up in different relations to each other. The term "World" refers to the grouping of participants into smaller parallel groups instead of running a simulation with many more roles.

A "simulation moderator" supports the creator in running the simulation. The simulation moderator is a tutor or a lecturer who does not have a playing role in the simulation. However, the moderator is able to modify the information presented to the roles, monitor the messages and jump in to support a particular role. The messaging system allows the role players to send messages to each other and to the moderator for help and of course receive assistance (via the same channel) from the moderator.

The lecturer or tutor, acting as creator or moderator, sets up a participant list, groups the participants into different Worlds and then, assigns participants (either in small groups or as individuals) different roles. Participants play the simulation as the assigned roles. The real identity of each participant can remain anonymous throughout the simulation. Freeman and Capper (1999) have argued for the need for anonymity in simulations. If there is collaboration outside the simulation (e.g., having more than one participant playing the same role within a World, such as is the case in the simulations of the courses described above), the simulation does not distinguish between different participants playing the same role. However one of the tools available to the participants is the "NotePad" where private communication between participants of the same role may be shared without fear of leaking to other players. Another tool is the "Chat-Room" for both inter and intra role communication.

Different roles have different rights in the sim-conferences reflecting the hierarchy and parameters of interaction as discussed later. Special types of roles such as the moderator role are "hidden" in the Role-Play Simulation. The moderator has the ability to read all messages within the World where the moderator lives. The moderator may also have full participation right in conferences.

Information Types

Fablusi™ is based on the abstraction that human interactions are communicative events requiring information exchange. By providing a safe, controlled and authentic simulated communication environment, students can play different roles in a complex social situation.

There are four types of information interacting in the simulation:

- *The information provided to each role by the lecturers*. The initial game scenario is typically setup by this type of information. There are four sub-types of such information:
    - Information presented to the students before login. Everyone who knows the URL and the simulation ID will see this information and hence can be used as general orientation of the game.
    - General information after login. To reduce the amount of repetitive work by the creator, this is the material presented to all participants. The overall goal of the group, or the initial scenario itself, may be established at this point.
    - Information to specific World: When required, different Worlds may run slightly different scenarios which are set up using this subtype of information.
    - Information specific to the role: By creating different information for different roles, there will be genuine need for the students to communicate in order to achieve a common goal. However, this information type may be used to create individual learning goals for the student. In the politics simulations for the courses described above, the creator used this type of information to give specific instructions to particular roles in order to steer the direction of the game.
- *Structured and prepared information by roles (in the form of formal writing)*.
  Initial role positions can be set up either by the creator or provided by the students through the composition of their "role profiles". This information may be made available to all roles in the same World. The simulations for the courses described above required the students to provide the role profile as a starting point for the simulation and as part of the assessment. There is yet no provision for sharing role profiles across the Worlds in our current implementation. That the students are asked to write the role profile at the start of the simulation is an important design of this learning environment in line with the Dynamic Goal-Based Scenarios described above. This establishes the need for

conducting research, formulating the position of the roles and acting as the bases for the continuous evolution of the goals throughout the simulation.

- *Information entered and/or read by the participants in sim-conferences* (more detail later), and
- *Information exchange between participants via sim-mail, an email-like subsystem of Fablusi™ and the 'private Chat-Rooms'.*

Interaction Types

Participants in the simulation played out their roles' action and strategies via information read from, and written to the sim-conferences and messages to other participants using the sim-mail and 'chat-room system. Sim-mail is very similar to email. However, since it is not a "real" email system, participants can only communicate with other participants by selecting role names in the recipient list. The real name of the participant is not recognized by the system. Note that the moderator can monitor all messages passing through the sim-mail system. The sim-mail system operates within the context of the role-play simulation. Unlike other generic email-based simulations, the simulator removes the risk of confusing the participant with his/her real life email, which is an important aspect of this simulation environment. The anonymity requirement is enforced by the sim-mail system automatically.

The sim-conference is implemented to reflect the various kinds of forums found in politics, commercial and other environments like the UN Security Council or the "White House". Messages in the sim-conference do not address a particular role, however the sender of the message will be identified automatically. The conference in the simulator has a special feature not found in most conferencing software, and this incorporates the notion of different document types.

For instance, it is possible to set up a "News Agency" as a sim-conference in which there are three types of documents: *draft*, *submitted* and *news*. Every role in a World may have the "read" right of the document type *news*. There may be several roles called "Reporter A", "Reporter B" etc. who will have "read", "write" and "create" rights for the document type *draft*. Reporters also have the right to convert *drafts* into *submitted* form. "Reporters" can work on their *draft*s, discuss such *draft*s among the reporters without any other roles looking at the *draft*. When satisfied and/or agreed among the reporters, the *draft* may be converted to *submitted* form. The role of "Editor" may have "read" and "write" access (but not "create" right) to

submitted form. Hence, the Editor can only work on the *submitted* document. The Editor may also have the right to convert the document type *submitted* to *news* effectively broadcasting the *news* to the rest of the World.

Tasks

This simulation is driven by "tasks". The creator can pre-set "tasks" for specific roles and the moderator can also add tasks. These tasks can serve as scaffolding for the students guiding them progressively towards the final overall goal of the learning experience. When necessary, such as in the case of the political science simulations, these tasks were used for assessment purposes.

These tasks can have time limits. When a role acts on a task, the output of that action may become a task for other rolesCurrent Fablusi™ implementation supports the following types of tasks:

- Participant writing to be read by other participants,
- Participant writing to be submitted to the moderator via normal email,
- Special instruction to roles by the moderator or creator, and/or
- Linkages to other resources including reading material, news sites, and so on.

Using Fablusi™ for rapid role play simulation generation

The task of setting up simulations has proven to be beyond the interest and technical ability of many, if not most teaching academics. There may indeed be many reasons for this including fear of using new and unfamiliar technologies, reliance on technical staff to provide the means for teaching, funding issues, and the time it takes to learn the technology and use it.

Fablusi™ has encapsulated in it a sound and robust pedagogical design. We have designed a worksheet (later to be incorporated into Fablusi as a type of wizard-helper) that guides any interested academic/trainer to apply our pedagogical design in many different content areas. The worksheet includes the following major tasks:

- identify the potential activity as a role play simulation,
- articulate the learning objectives,
- identify the major stakeholders and different stakeholder perspectives involved in the activity,

- create the scenario and identify learning opportunities in the scenario for different stakeholders,
- select appropriate stakeholders to become playing roles,
- identify the meeting places,
- design the learning episodes, which have learning goals and tasks in line with the overall learning objectives, and
- identify resources for each of the playing roles.

Like any group process, role-play simulations have different stages: formation, development, and closures. During the formation stage, players get to know the system, the characteristics of their roles, understand the goals of the simulation (not necessarily the same as the learning objectives) and start the communication process.

The development stage may consist of several learning episodes, each triggered by events either created from communication in the previous stage or injected into the simulation by the moderator (and designer). A lot of learning experience occurs at this stage. Usually, this is the longest stage.

The closure stage (or debriefing stage) is equally important, if not the most important stage. Closure does not mean a natural end to the activities in a simulation. At some point, the moderator has to ask the learners to stop, step out of the simulation and reflect upon the experiences in the simulation to draw conclusions, compare it to the real world, apply different theories to explain the activity and develop understanding and insight. It is true that the players will routinely reflect upon their actions during the simulation in all stages. It is the "closure stage" that **formally** consolidates the experience into concrete understanding - the "a-ha" phenomenon. The potential of behaviour modification and learning is a combination of the experiences AND consolidated reflection.

Fablusi™ was designed to reduce the dependence of teaching academics or trainers on technical staff in both the simulation creation and running stages. Fablusi™ role-play simulation can be created incrementally and continuously refined with little or no technical expertise.

After the main conceptual design, the next step is the write up and putting the ideas into Fablusi™ for execution. The advantage of Fablusi™ is that any educator can design and implement a web-based simulation as easily as navigating through a website. Both teaching staff and learners have come to accept the web browser as a common

and reliable technology. Figure 1 is a screen shot of Fablusi™ showing how to set up the welcome screen's graphical information, general setup and copyright message in the simulation. This Do-it-yourself approach gives back the creative power to the teaching academics and trainers.

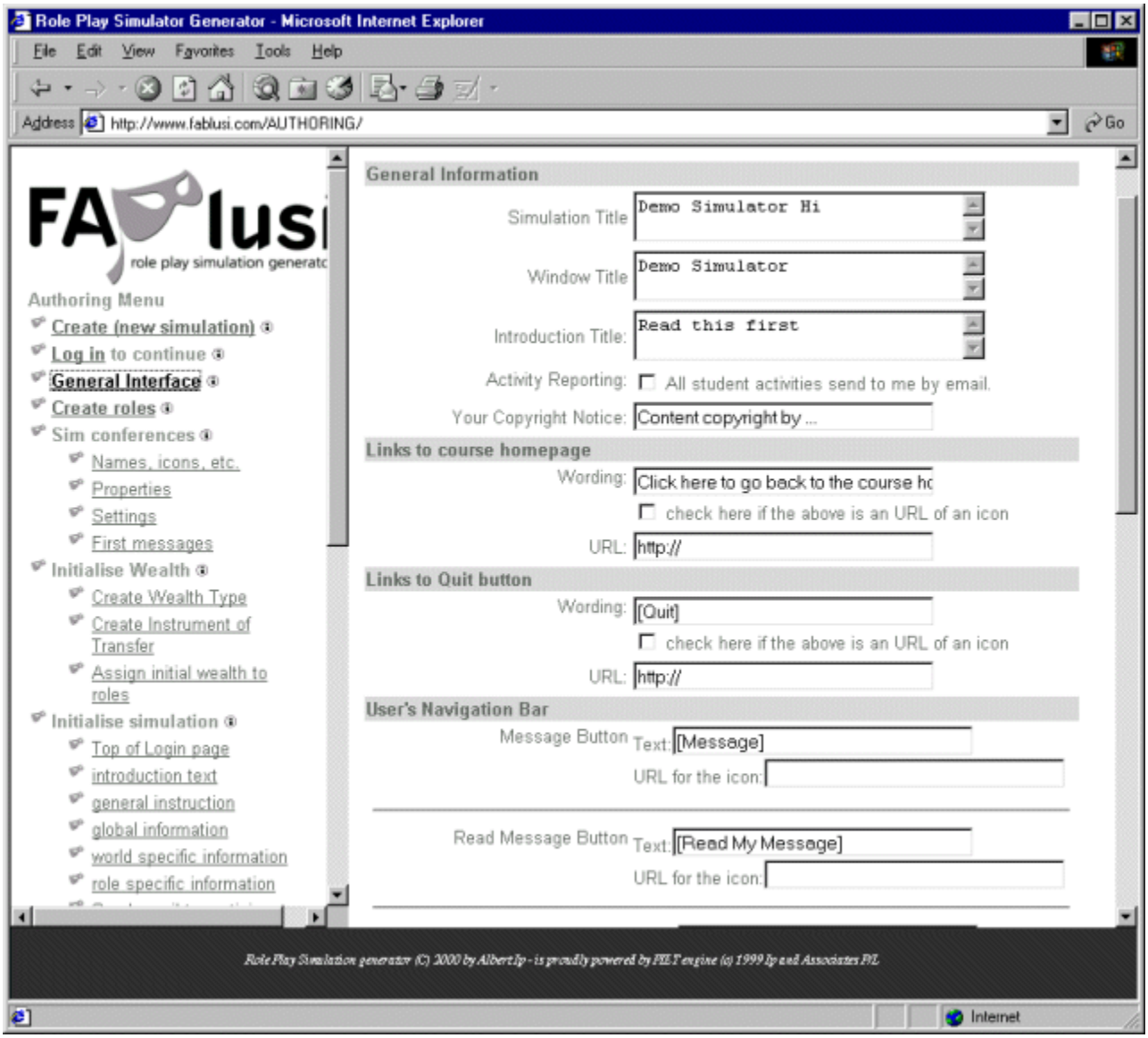

Figure 1. Screen shot of Step 2 of generating a Simulation using Fablusi™.

After creating the simulation, the teaching academics and trainers create the participant lists, group the participants into "worlds" and match the participants to roles. Again, these are done via the web interface without any reliance on technical staff.

The use of Fablusi™ empowers innovative teachers to experiment with creating meaningful role-play simulations and getting their students to interact, collaborate, discuss, lobby and practice the skills and theories demanded by their field of study . Fablusi™ empowers educators by reducing their dependence on the technical elements of mounting role-play simulations on the Web. The generator itself is a simulation experience for educators adopting a new innovative approach to learning.

Conclusion

In this paper we have sought to articulate the theoretical and pedagogical foundations, and innovative uses of role-play simulations. This paper does aim to describe and demonstrate any specific application of the technology. For various applications of role-play via Fablusi™ see Naidu, S; Ip, A; Linser, R. (2000); Linser, R., & Naidu, S. (1999). The development of role-play simulations on the Web comprises a challenging task, and we have described the technology (Fablusi™ Role-Play Simulation Generator) that enables us to rapidly generate role-play simulations on the Web. The context of a pilot implementation of this technology was the political science courses at the University of Melbourne. Results of summative evaluation show that the move from the traditional lectures, seminars, tutorials, paper-based exams, essay writing and reliance on printed books and articles, to this simulation significantly transformed the learning and teaching processes of these courses in a number of ways Although the students were not explicitly aware of the pedagogical design behind the simulation, the overall experience has been very positive. Firstly, it has brought students to the center of the learning process rather than putting them in passive and receptive role. Secondly, it has transformed the way students and teachers carry out research by emphasizing communication and collaboration rather than individual activity. Thirdly it has allowed for flexibility in the delivery of material in terms of the number of participants, the timing and spatial location of the teaching and learning process. And fourthly, it has taught everyone new skills and competencies, not only about teaching and learning but communication and collaboration. The use of the simulation generator (Fablusi™ Role-Play Simulation Generator) has transformed the previously tedious, technically complicated process of creating a simulation into a rapid cyclic development environment for academics to design and experiment different learning episodes and transform learning into an goal-directed activity. Finally, a point that has been emphatically articulated by participants in simulated worlds,

it is also a lot of fun, both for the students AND the creators of the simulations.

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