Simulation authoring tools for interactive e-learning courseware development

Maeve Paris

Summary

Simulation authoring tools are at the heart of the next generation of e-learning courseware development products. They enable the creation of interactive, rich-media simulations which have the potential to engage the user in immersive, experiential learning. Authors can use these tools as a new means of expression, while users will benefit from the opportunity to interact with applications and practise at the same time. This paper presents an overview of simulations for e-learning, reviewing the authoring tools currently available, and focusing on one product, Qarbon’s ViewletBuilder, with particular application to academia.

Biography

Maeve Paris is a lecturer in Computer Science at the School of Computing and Intelligent Systems, University of Ulster, specialising in natural language processing, object-oriented systems development, and advanced learning technologies.

Keywords

Simulations, e-learning, authoring tools, interactive multimedia

Simulations for e-learning

Simulation software is not new, but what is new is the application of simulation technology to the area of e-learning: this is at the core of the next generation of courseware development tools. It has been estimated that by 2006 70% of all off-the-shelf as well as custom e-learning content will include some application of simulations (Brandon-Hall, 2002), and the US market for e-learning simulation products and services will be worth in excess of $6 billion (Adkins, 2002). This market is being driven by customer demand for advanced e-learning products, and by the availability of specialist authoring tools for PC systems which enable non-programmers to create low-cost simulations in short timeframes.

The e-learning industry is in the early stages of development, and much online course content is still based on paper models, or what is often referred to as ‘page-turning courseware’: typically, tutors upload Microsoft Word or PowerPoint files to Virtual Learning Environments (VLEs) or websites, and HyperText Markup Language (HTML) files display a set of hyperlinks to these documents. Such content is effectively static, and demands no interaction in any real sense from the user. Indeed, it is difficult to create interactivity using conventional Web tools: HTML is best for static content, and providing dynamic content requires programming skills in languages such as Java or VisualBasic. So many webpages are repositories of passive objects (just like a play reading, they fail to exploit the expressive potential of the medium), and this has repercussions for e-learners: there is evidence to suggest that much of today’s e-learning does not adequately engage learners, as it is text-based, low on interactivity and relevance, and short on context (Trondsen, 2001).

The benefits of using simulations for educational purposes are myriad:
• they offer low-risk environments in which to practice, and more complex and timely feedback, with high levels of learner engagement (Allen Communications, 2002);
• they provide opportunities for accelerated learning, scalability, ‘anywhere’ access, lower costs, and increased attention span (Lundy et al, 2002);
• and they promote experiential learning, or learning which arises from reflection on experience.

Until relatively recently, there were few tools available to support the development of e-learning simulations: courseware had to be custom-built, and this had a tendency to be costly and time-consuming. The average ratios for development time versus finished hours were from 750:1 to 1300:1 for such tailor-made solutions (Brandon-Hall, 2002). However, there has been a recent growth in the number of tools available which enable non-programming instructors to develop simulation-based content, and the reduction in ratio of development time to lesson time has been estimated at 25:1 (Wilson, 2002).

**Authoring tools**

Authoring tools have been in existence since the early days of computer-based learning, but by the 1990s, five key players had come to dominate the market for development of multimedia CD-ROMs for learning applications: Director and Authorware (both from Macromedia), Click2Learn’s ToolBook, Quest Net+ from Allen Communication, and IconAuthor (AimTech). Director was created for the development of animations and interactive presentations, but the other four products were designed specifically for education and training applications. These tools were mainly used to create standalone executable CD-ROMs, but the emergence of the Internet as the medium of choice for the delivery of e-learning led to a shakeup in the market. By the late 1990s, e-learners and tutors wanted networked delivery of content through a browser. The three main players (by then Director, Authorware and ToolBook) delivered content in proprietary formats with large file sizes, usually requiring plug-ins. A dislike of plug-ins combined with bandwidth limitations may have contributed to the emergence of the new generation of e-learning authoring tools, designed specifically for the purpose of e-learning content development.

Tools such as RapidBuilder from XStream, i-Canvas (formerly IST Tool) from EDT Learning, and ViewletBuilder from Qarbon are examples of such products, and there is evidence of a growing market. Table 1 below lists some of the main products and providers.

**Simulation authoring tools**

<table>
<thead>
<tr>
<th>Product</th>
<th>Company</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forio Broadcast</td>
<td>Forio</td>
<td><a href="http://www.forio.com/broadcastoverview.htm">http://www.forio.com/broadcastoverview.htm</a></td>
</tr>
<tr>
<td>Product</td>
<td>Company</td>
<td>Website</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
<td>--------------------------------------------------------------</td>
</tr>
<tr>
<td>ToolBook Instructor</td>
<td>CClick2Learn</td>
<td><a href="http://home.click2learn.com/en/toolbook/toolbook_instructor.asp">http://home.click2learn.com/en/toolbook/toolbook_instructor.asp</a></td>
</tr>
<tr>
<td>ViewletBuilder</td>
<td>Qarbon</td>
<td><a href="http://www.qarbon.com/">http://www.qarbon.com/</a></td>
</tr>
<tr>
<td>Virtual Professor</td>
<td>Productivity Center</td>
<td><a href="http://www.prodctr.com/vp_overview.htm">http://www.prodctr.com/vp_overview.htm</a></td>
</tr>
<tr>
<td>X.HLP Designer</td>
<td>X.HLP</td>
<td><a href="http://www.xhlp-usa.com/">http://www.xhlp-usa.com/</a></td>
</tr>
</tbody>
</table>

These tools allow users to create their own simulations, and some also offer ready-made simulations which can be adapted to individual needs in the form of templates. There are no comparative studies available on these tools, which vary widely in price and functionality. Some require a certain amount of developer skills, while others are aimed at non-programmers. Some require plug-ins, while others produce files which can be embedded in web pages and run through standard browsers. The only comparison to date can be found in the Software Simulation Shootout, hosted by the Online Learning Europe Conference in 2002 (Online Learning Europe, 2002). This exercise invited eight teams representing eight products to build an e-learning simulation to be delivered through a browser, based on a script outlining the steps to be taught and the level of interaction required. The exercise resulted in fairly subjective ratings on ease of use, speed of development, robustness of simulation (including feedback and guidance), and an overall rating for each product; OnDemand was rated most highly overall, with ViewletBuilder in second place, and RADAuthor third.

**Qarbon’s ViewletBuilder**

ViewletBuilder 3 from the Qarbon Company is a useful starter application for developing simulations. In the Software Simulation Shootout, ViewletBuilder was rated first for ease of use, first for robustness, and second overall (Online Learning Europe, 2002). It is used to produce Viewlets, which can be offered as an interactive presentation embedded in a Web page or Website, and run on any operating system. The main applications of Viewlets have been in business presentations, or in the area of technical support or customer service, but the company has developed a ViewletBuilder 3 Lite version, specifically targeted at schools and universities, and academic applications are beginning to emerge (Pennsylvania State University’s AECT project, and the University of Calgary Library, for example).

Viewlets are based on Projects, composed of screenshots. The instructor chooses a hotkey (like a shutter button on a camera) and captures screenshots from within the selected application. Once finished, the slides are displayed as thumbnail images.

The instructor can work on each individual slide, by clicking on the image. There is a toolbar which offers a variety of communication methods, through the addition of balloons, notes, and text. All of these can be customised in terms of size, colour and font.

The instructor can also add recorded sound to a slide, and choose interactive zones to engage the viewer. User input can be checked for error and hyperlinks can be added. ViewletBuilder decides how long each slide should be shown, depending on the amount of information which is added in the balloons or notes. The instructor can reduce this timing very slightly, or increase it significantly. Once the instructor has finished, the Viewlet can be compiled, and then embedded in a web page or placed on a website. A sample Viewlet developed for a final-year undergraduate option in Natural Language Processing can be viewed at http://www.infm.ulst.ac.uk/~maeve/prolog.vp/Viewlet/prolog_viewlet.html.

**Conclusions**

Simulations can engage learners in immersive, interactive situations, bringing them closer to real experiences which are not mediated by a book or tutor. From the instructor’s perspective, there is now widely-available technology to build complex rich-media simulations at a lower cost (since there is no longer a need to buy the services of custom content providers). These cheaper, flexible tools enable non-programmers to create their own simulations, which can be run as standalone applications or embedded in web pages. Learners in turn will benefit from the opportunity to interact and practise in a low-risk environment which offers complex and timely feedback.

**References**
Brandon-Hall.com http://www.brandon-hall.com/simmarket.html


Lundy J, Logan D, and Harris K (2002) ‘Simulation may be the e-learning killer app’, TechUpdate
http://techupdate.zdnet.com.techupdate/stories/main/0,14179,2878649-1,00.html

