

Developing Business Simulation Games for a Mainstream Audience

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Abstract

Over the past several years, the use of simulations in management education has advanced from an activity performed by a relatively small number of early visionaries to a mainstream offering provided by top business schools. Harvard, MIT, Wharton, INSEAD, London Business School and others offer simulations for use by their own students and by other universities. Harvard Business School Publishing currently features its simulation offerings above those of even its case studies and in the past five years has developed over twenty simulations.

The most popular of these simulations have been adopted by hundreds of schools and have been played by hundreds of thousands of students (Abelli, 2012). While many of these simulations are based on system dynamics, faculty use them because they fill a need in their courses not because they use a particular modeling approach. This paper addresses the key factors for simulation adoption in MBA programs, how the simulation development process differs for simulations that are widely used, and future opportunities for system dynamics simulations.

INTRODUCTION

Universities throughout the world are publishing simulations to be used by students and faculty at their own institutions and reselling them for use at other institutions. A sample of some of the schools currently producing online simulations include Boston University, Carnegie Mellon, Delft University of Technology, Harvard Business School, IMD, INSEAD, London Business School, MIT Sloan, Northwestern Kellogg,

University of Bergen, University of Las Vegas, University of Rhode Island , University of St. Gallen, University of Michigan, and The Wharton School of the University of Pennsylvania.

Among these simulations offered, Harvard Business School Publishing has been among the most successful in terms of usage by student and faculty. Harvard Business School Publishing has developed over twenty simulations during the past five years and sells subscriptions to over 200,000 simulations to universities worldwide from its catalogue each year (Abelli, 2012).

In 2011, 173,000 students applied to an MBA program (World Geographic Trend Report, 2012). There are roughly 350,000 students currently enrolled in an accredited MBA program worldwide (World Geographic Trend Report, 2012). Thus, 200,000 simulation subscriptions represent a substantial market penetration. The exact number of students playing a Harvard Business School simulation is difficult to estimate because many students play more than one simulation per year, but Harvard Business Publishing believes their market penetration to exceed 50% (Abelli, 2012).

Most of the popular simulation titles that Harvard Business Publishing distributes rely on system dynamics modeling to perform the calculations and drive the simulation behavior. Some of the simulations using system dynamics models include "Marketing: Managing Segments and Customers," "Strategic Innovation: Back Bay Battery," "Pricing: Universal Rental Car," "Finance: Capital Budgeting," "Strategy: Competitive Dynamics and Wintel," "Project Management: Scope, Resources, Schedule," "Finance: M&A in Wine Country," and the "Supply Chain Management: Root Beer Game." Three of the top five most popular simulations offered use system dynamics models (Harvard Business School Publishing, 2012).

The case study method has been the primary teaching method for Harvard Business School faculty since 1908 (Corey 1998). However, since 2011, Harvard Business Publishing has emphasized web simulations on their main page over their case study content (Harvard Business School Publishing, 2012).

FACTORS THAT INFLUENCE ADOPTION OF HIGHER EDUCATION SIMULATIONS

Some of the key factors that influence faculty adoption of business school simulations include: the time required to play the simulation (short versus long format simulations), the specificity of the subject matter covered in a simulation, ties to well-known faculty or popular material, and acceptability and enthusiasm of student participation.

Short Format Simulations

Historically, one of the most successful business school simulations, MarkStrat, originally developed by Professors Jean-Claude Larréché and Hubert Gatignon at INSEAD, took several weeks to play a single complete game (MarkStrat History, 2012). This approach, combined with the high quality of the simulation, was successful in achieving buyer lock-in among faculty because the simulation required major alterations to the curriculum. Once the course adapted to work with the simulation, faculty were reluctant to remove it, especially if the simulation were successful. But, as is often the case with buyer lock-in strategies, the course overhaul requirement that leads to buyer lock-in also produces a significant barrier to entry. Faculty were cautious about adopting the simulation because of the major alterations to the curriculum it required.

An alternative approach, used at Northwestern, MIT, Harvard, London Business School and elsewhere, is to produce short format simulations that can be played and debriefed in one or (at most) two class periods. This limits the actual student play time of the simulation to sixty minute or less since time is also used to introduce the simulation and debrief student results.

Short format simulations are easier for faculty to adopt because the simulation doesn't require revisions to existing courses. Short format simulations are analogous to case studies since the time students spend playing, analysing, and debriefing a simulation is similar to that of a single case study. Short format simulations also permit the possibility of multiple simulation purchases per course. While a multi-week simulation

will often be the only simulation used during a semester long marketing course, short format simulations allow for the adoption of multiple simulations per course.

Short format are often the only possible choice during executive MBA programs where time with students for all course material is limited to a few days or hours. As a consequence, there has been a recent trend to ultra-short format simulations that can be completed in less than thirty minutes. Some of these simulations take under ten minutes and start to cross over into interactive data visualization.

The simulation should fit in an existing syllabus and provide useful learning on a topic that is being addressed during a particular week in the course. For example, a pricing simulation can easily fit into a one week in a core marketing MBA course. Simulations that are broad or are generally about business strategy are less popular.

Subject Matter Specificity

Specificity of the subject matter covered in a simulation also helps with ease of adoption. That is, simulations that are targeted to a specific topic in an MBA course are easier to adopt. A simulation that can be used during the one or two days in that pricing is covered in a marketing course is more likely to be adopted than a simulation that includes a large set of marketing topics because faculty have a clear understanding where they can fit into the syllabus.

Conversely, capstone simulations that include a wide range of techniques within a simulation or are cross disciplines are more difficult to adopt because these type of simulations require that the faculty have taught all the concepts in the manner that the simulation was designed in order for the faculty's students to be successful at playing the simulation.

This trend toward topic specificity also reflects the maturity of the simulation market in higher education. As the higher education simulation market becomes more mature, the emphasis of in courses becomes less about the fact that a simulation is being used to teach material and more about the material being taught.

Ties to Other Popular People or Material

Simulations that are tied to a well-known author, a popular subject (such as a popular MBA paper-based case study), or both are more popular than simulations developed by less recognized authors or subjects. One example of a simulation produced by a well-known author is the Innovator's Dilemma simulation developed with Clay Christensen, author of the best-selling business book *The Innovator's Dilemma*. Professor Christensen's simulation on innovation uses classic system dynamics structures such as limits to growth and diffusion dynamics and is one of the top five most popular simulations sold at Harvard Business School Publishing (New Simulations, 2012).

An example of a popular subject supporting the sales of a simulation is the Harvard Business School case Benihana of Tokyo. First written in 1972, Benihana of Tokyo is one of the most popular cases that Harvard has produced (Ernst 2005). The large installed base of faculty using the case and their familiarity on how to debrief the case has helped faculty feel comfortable adopting the simulation.

FACTORS THAT AFFECT STUDENT ADOPTION

Higher education web simulations have two customers: faculty and students. A failure to address the needs of either faculty or students can inhibit the adoption of a simulation. Faculty and students have overlapping requirements, such as high accessibility and compatibility on a variety of platforms and browsers.

Faculty and students also have unique requirements. For example, class grading tools are important to faculty but not directly important to students. The simulation is a component of a larger pedagogical experience. The faculty guide that accompanies a successful simulation should include example class agendas and debriefs of the simulation in much the same way that a teaching note accompanies a case study. Most faculty are attracted to built-in ways to evaluate students who play the simulation so scoring mechanisms are important. Short videos by well-known authors or others that the faculty can run during class can help make a simulation more popular. For example the Mt. Everest simulation includes a video of an actual high altitude climber who

describes his personal challenges climbing Mt. Everest (Leadership and Team Simulation: Everest V2).

Finally students and faculty conflict on some desired features. For example, students frequently request the ability to undo decisions after they have advanced forward in time but adding this capability undermines the need of faculty to a coherent story when debriefing the simulation and the perception of fair scoring among all students in a class.

Unlike other software that is permanently installed on their computers, both students and faculty interact with web simulations for a short period of time. As a consequence, both students and faculty have a strong preference for commonly used browser idioms that make it easy to understand how to use the simulation successfully without reading a manual. The simulation should provide reports that are in a format that MBAs are familiar with and include decisions that are easy to understand. The students should spend little or no time learning how to navigate the simulation but instead focus on the content.

Surveys we have conducted during user tests and field tests have consistently shown the importance for students that simulations be fun and engaging. Harvard Business School Publishing has seen multi-player simulations more widely adopted than single player simulations, despite the increased difficulty in administering and debriefing multi-player simulations (Harvard Business School Publishing, 2012).

Faculty reviews of multiplayer simulations have reported a willingness to invest the extra effort to administer the simulation because students enjoy the social aspect of playing together (Leadership and Team Simulation: Everest V2, 2012).

Simulations that have a clear winner are more popular than simulations that have no clear winner because students enjoy competition. Simulations with high score lists are popular. Students react positively to rankings when they are being ranked against a group of know peers and they have an opportunity to change their rankings after the first ranking appear.

PRICING AND POPULARITY

Harvard Business School Publishing has priced their online simulations relative to paper case studies and set the price for online simulations slightly higher than the cost of case studies. Harvard Business School Publishing simulations cost USD 12.50 per student for higher education and USD 37.50 per student for corporate and executive education (New Simulations, 2012). Other schools have followed HBS's lead and match these prices for simulations they distribute.

However, not all schools have copied Harvard Business School Publishing's pricing strategy. Some schools have taken different approaches than Harvard. For example, MIT Sloan has provided several simulations as part of its MSTIR program. Unlike the Harvard Business School Publishing simulations, the MIT Sloan MSTIR simulations are all freely available for faculty at accredited universities (MIT Sloan Teaching Innovation Resources, 2012). All of the MIT Sloan MSTIR simulations are developed using system dynamics models.

The Wharton School of the University of Pennsylvania takes a third approach. Instead of redistributing its simulations, it has chosen to keep all its simulations for use within the school. Wharton believes its simulations provide a core differentiation advantage that it has over competing MBA programs (Barsade, 2009). Each fall, all of Wharton's 850 incoming MBAs play a multiday simulation that combines an elaborate system dynamics model with leadership and teamwork challenges. The details of this simulation are considered proprietary and are protected by the faculty that run the program.

SIMULATION DEVELOPMENT PROCESS

Developing a simulation that has wide adoption requires resources and effort similar to that of any commercial software. Faculty guides for popular simulations can run as long as sixty pages (Leadership and Team Simulation: Everest V2, 2012). Many simulations include instructor and student videos that explain the use of the simulation as well as instructional material from subject matter experts (Online Simulations, 2012). And like other commercial software, these widely adopted simulations require

several months of development and a diverse team including modellers, user interface developers, server developers, graphic designers, subject matter experts, and a quality assurance team. In addition, ancillary involvement by sales people, marketing, technical support (who support the simulation after launch) and others influence development decisions. These simulations are tested in the field and then revised multiple times before being released. For many of the simulations described above a full-time quality assurance team that focuses entirely on testing simulations on different browsers and reporting bugs to the developers was required.

The development for the Harvard Business School Publishing simulations required a team of between eight and twenty people including user interface developers, modellers, user interface designers, simulation engine server developers, QA testers, instructional designers, content integrators, subject matter experts, and project managers. Simulations take anywhere from four to eighteen months to produce.

CONCLUSION

Harvard Business School Publishing, MIT Sloan, Wharton and other schools have already popularized the idea of using web simulations with MBA faculty and students. Simultaneously there has been a trend toward casual games and simulations that makes now an ideal time for expanding awareness of system dynamics through MBA simulations (Gamers Shifting From PCs, 2012).

Based on our experiences developing widely used simulation for use at MBA programs, the following techniques appear to improve adoption of simulations from our historical sample:

- Look outside of system dynamics for topics. Either develop a simulation around a popular MBA textbook, article, or case study or collaborate with a subject matter expert outside of system dynamics.
- Make the simulation easy to adopt for both students and faculty. There is a market opportunity for ultra-short format simulations that can be completed in less than thirty minutes. These short simulations are easier for faculty to adopt

than simulations that take weeks to run.

- Make the simulation engaging and fun. With the growth in game design over the past ten years there are several excellent books on how to design engaging casual games that directly apply to simulation.
- Test the simulation in a real class for at least two semesters and refine the model, student interface, faculty interface, and faculty guides before attempting to publish the simulation to a wider audience. As noted above, developing a simulation that has wide adoption requires resources and effort similar to that of any commercial software.

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