Simulation and Scenario-Based Learning

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Introduction

Every summer, during the first week of the International Ocean Institute-Canada’s (IOI-Canada) Ocean Governance Training Program, each participant is asked to select an unmarked envelope. Opening it introduces them to an imaginary world in which they become members of diverse organizations creating an ocean and coastal policy for an imaginary country. For the next two months these mid-career professionals from a wide range of nations, cultures, and languages will engage in an immersive experience that illustrates the benefits, challenges, and opportunities of simulation as a learning and skill-development tool.

Origins

Techniques such as physical simulators, games, and practical learning exercises are nothing new. When ancient Rome committed its army to challenging the maritime power of Carthage, it taught its soldiers basic rowing techniques on simulated ships ashore. That idea evolved through Second World War analog flight and aerial gunnery simulators to today’s digitally-powered, sophisticated mock-ups of ships’ bridges and engineering spaces. Even board games have had serious uses; chess being the best example. Evolving from a sixth century Indian game called *chaturanga* (Sanskrit for a particular battle formation), it became known in medieval Europe as the ‘royal game’ because it sharpened strategic thinking.

At a more complex level, ‘war games’ (*Kriegsspiel* in German) began in 1812 with an ingenious tabletop game to train Prussian army officers. Navies soon adopted the idea, beginning with the United States in 1887. Today, 130 years later, its Naval War College employs approximately 40 full-time civilian and military professionals in its War Gaming Department, conducting an average
of 50 national and international games per year.\textsuperscript{1} The technique is useful not only for learning, but also for problem solving. Several navies incorporated gaming into campaign planning in the Second World War. In the United States, the war with Japan had been re-enacted in the game rooms [at the College] by so many people and in so many different ways that nothing that happened during the war was a surprise—absolutely nothing except the kamikaze tactics...\textsuperscript{2}

**Maritime Governance Applications**

Each of these techniques has evolved into today's wide range of powerful and diverse uses. The sophisticated physical simulators at the Canadian Coast Guard College include a Joint Rescue Coordination Centre that not only trains search and rescue personnel but also contributed to international confidence-building when Arabs and Israelis conducted exercises together during the Middle East Peace Process and the subsequent Canadian-led Maritime Safety Colloquium for the Middle East and North Africa in the late 1990s. Board games are used to practice for complex and challenging real-world situations. One example, *Aftershock: A Humanitarian Crisis Game*, has been used in Canadian and American universities, as well as by Canadian, Chilean, and US military and police preparing for peacekeeping and humanitarian and disaster response (HADR) missions.\textsuperscript{3}

Despite its bellicose name, ‘war gaming’ has been adopted and adapted by disciplines ranging from health care to education, ranging in complexity from ‘tabletop’ discussions to immersive role-play. In higher education, ‘reacting to the past’ exercises, produced by a consortium of forty universities and colleges, immerse students in historical events in a way that mere lectures or movies never could.\textsuperscript{4} IOI-Canada’s exercise is another example, but with broader functions and different objectives.

\textsuperscript{1} Naval War College, *War Gaming* (Newport, RI: Naval War College, n.d.), https://www.usnwc.edu/getattachment/e32b4fba-9daf-4462-9d32-d8a7875f2abb/War-Gaming-Brochure.aspx.

\textsuperscript{2} Chester W. Nimitz, quoted in *War Gaming*, id, p. 3.

\textsuperscript{3} “Aftershock: A Humanitarian Crisis Game,” PAXsims, https://paxsims.wordpress.com/after shock/.

\textsuperscript{4} “Reacting to the Past,” Barnard College, https://reacting.barnard.edu/reacting-home.
A Curriculum Integration Exercise

For the past 37 years, IOI-Canada has been conducting a training program, ‘Ocean Governance: Policy, Law and Management’, for mid-career professionals. During eight intensive weeks, participants are exposed to all the themes reflected in this book through exercises, field trips, and over 100 lectures. How, then, to help them absorb, integrate, and retain all that fact and theory, especially those working in a second or third language?

What began as a simple addition to the program some years ago has evolved into something quite different. Rather than a supplement to the curriculum, it has become an ‘integration exercise’, a framework for exploring all ideas generated by the program and incorporating them into a coherent whole. Participants become members of a simulated task force creating an integrated ocean and coastal policy for political approval, playing roles as senior officials from all levels of government, the private sector, advocacy groups, and Indigenous peoples. Roles incorporate both complementary and competing policy objectives and are assigned randomly to challenge individuals beyond their familiar experience. This approach even engages lecturers, who are no longer simply speakers but also players in the game—‘advisors’ to the task force.

The geography is entirely fictional for several reasons; primarily to avoid prejudice or political debate over real situations, but also to create a world in which anything can happen if required to make a point. In an imaginary world, ice floes can appear at the same latitude as tropical mangroves if necessary. The fictional region includes three countries (four counting a failed state over the horizon), which allows the flexibility of varying the scenario each year, or taking a regional approach if the number of participants increases.

As the exercise has evolved, lecturers have gradually drawn upon it for their individual uses. Communication specialists who expose participants to a videotaped interview by a real journalist now pose challenging questions based on the participant’s role. Maritime security professionals who conduct an exercise on developing integrated maritime security policy include that as an integral part of the task force’s work. Speakers on topics including science, law, aquaculture, energy, fisheries, and marine transport, can all draw on the scenario’s geography and socio-economics for hypothetical examples.

The methodology is different from most educational simulations. First and foremost, it is a self-directed learning tool, not a teaching device. Players receive

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5 “Training at IOI-Canada,” International Ocean Institute-Canada, http://internationaloceaninstitute.dal.ca/training.html.
6 Bob Edwards, “We Need a Navy, Right?” Canadian Naval Review 13, no. 1 (Spring 2017): 31–32, http://www.navalreview.ca/volume13-issue1/.
geopolitical facts and details of their role, and are then free to advance the pro-
cess wherever their collective deliberations take them. There is no director or
umpire; only an exercise coordinator playing the role of ‘Cabinet Secretary’, the
senior bureaucratic advisor to government who knows nothing of maritime
matters. He or she provides guidance on process, but for purposes of the game
reminds task force members that they are the knowledgeable authorities and
must rely on whatever they have learned from the curriculum, their colleagues,
and their own experience. As mature professionals, they are encouraged to
work out how to function as a multinational team and do whatever they would
do if they were placed in the real-world situation. The deliverable of the exer-
cise is not a graded policy; it is the process itself. Success equals a diverse group
of professionals working as a multicultural team to increase their knowledge,
develop their personal and interpersonal skills, and master the challenges.

But if the product is the process, how can success be measured? Traditionally,
the annual two-day finale of the program invited guest commentators to
assess the policy produced by participants, but as the ‘integration exercise’ con-
cept evolved, so has that format. The first day is now a simulated conference,
with participants, in their roles, playing panelists addressing topics that high-
light some of the conflicting issues encountered. Not only does this add to the
participant’s skill set by being a ‘conference speaker’ it also enables the com-
mentators to observe the knowledge, abilities, and confidence that they have
developed over eight weeks. The final day is for open, unstructured discussion.

Digital Dimensions

Complex, scenario-based interactive learning exercises require creating, man-
aging and displaying a lot of data and information. Consequently, traditional
paper-based approaches can be enhanced by incorporating the best of digital
technology. That does not necessarily make things easier—using digital tools
well requires training and time—but certainly makes the process far more
efficient, comprehensive, and effective.

IOI-Canada’s first step was using a geographic information system (GIS) to
present the geography (Figure 1). This is not just a matter of making credi-
ble simulated maps (although that is certainly an asset). Spatial planning is a
fundamental tool for ocean and coastal governance, so leaders and managers
should at least be familiar with the capabilities and limitations of GIS, as well
as the time and effort required to fulfill requests for GIS products. Using GIS to

7 The IOI-Canada Training Program uses ArcGIS (https://www.arcgis.com/) for which Dalhou-
sie University has a license, although participants are advised that there are other options.
establish a readily accessed, maintained, and adaptable geographical database was a first step, but much more is possible.

Increasingly sophisticated digital tools, many freely available, offer significant opportunities for enhancing realism, versatility, visualization and collaborative learning. Vivid digital visualization, for example, harnesses the power of visual perception for understanding and discovery. Collaborative software not only helps participants work together, but also helps them gain confidence in advanced computer skills. A collaborative platform is also an excellent tool in developing complex scenarios.

Developing Integration Exercises

Prominent educators have long understood that techniques for educating adults are different from educating children (the technical term is andragogy versus pedagogy). Adults learn differently, being more self-directed, drawing

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8 “The Digital Humanities: Digital Visualization,” University of Southern California Libraries, last updated 11 December 2015, http://libguides.usc.edu/c.php?g=235247&p=1560835.

9 A good French language example is Framapad (https://framapad.org/).

10 The term originated in Europe in the 1830s and was popularized in the United States by Malcolm S. Knowles in the 1960s.
on life experience, and preferring active, application-focused practical work. That is why ‘serious games’ are so useful in educating professionals. Engaging adults in a realistic, dynamic, interactive, yet risk-free environment lets them think creatively about complex issues, experiment with new concepts, practice skills, and learn from mistakes without judgment—often the most effective way of reinforcing lessons. Consequently, participants come away with a good understanding of managing the complex challenges, risks and opportunities of, in this case, ocean and coastal governance, as well as the confidence to apply those lessons.

A curriculum integration exercise differs from many teaching simulations in several ways. No advance preparation is required because its purpose is to build on curriculum material as it unfolds. There are no limiting rules, algorithms or outcome definitions: the product is the process, and where that goes after roles are assigned is wherever participants choose to take it. There is no moderator, umpire or referee; only an unobtrusive guide to process, encouraging players to think critically, to do their own research, and to play the role as if it were real. This makes particular demands on the facilitator since each iteration will unfold differently depending on the makeup of the group and the issues, which mean most to them. The common feature with other complex simulations is that it must evolve continuously or lose relevance. Feedback from participants is essential, and a good facilitation team will always be adding improvements to keep up with curriculum developments and the benefit of experience. To that end, educators and trainers should seek opportunities to participate in other people’s simulations to stay abreast of new techniques and technologies, share ideas and, not least, experience what it feels like to be a participant.

Summary

An integration exercise has proved to be an effective self-teaching and skill development tool for adults learning a complex subject. The process can be significantly enhanced with the increasingly sophisticated digital tools; not only to improve the learning process, but also to work with those used in reality. But, just as there is no ‘royal road to learning’, there is no easy road to creating a complex exercise scenario. Not only is a huge amount of work required to create the geography, socio-economic detail, policy factors, and role descriptions, but all that must be checked and double-checked for consistency, credibility, and continuity. That effort is measured in person-months, not days. If done professionally, it is expensive: if by volunteers, it must be a labor of love. But the benefits are well worth it.