Australian National University

The role of simulations in the authentic learning for national security policy development

Implications for practice

Dr. Henk Eijkman

National Security College Occasional Paper
No 4 May 2012

A joint initiative of the Commonwealth Government and The Australian National University

National Library of Australia Cataloguing-in-Publication entry

Author: Eijkman, Henk, 1948-

Title: The role of simulations in the authentic learning for national security policy development: Implications for Practice / Dr. Henk Simon Eijkman. [electronic resource]

ISBN: 9780987221087 (ebook : pdf)

Series: National Security College occasional paper (Online), 4.

Notes: Includes bibliographical references.

Subjects: National security--Australia.
Education--Pedagogy
Australia--Politics and government--21st century.

Other Authors/Contributors:
Australian National University. National Security College.

Dewey Number: 355.030994

Editors: Dr David Connery

Email address: david.connery@anu.edu.au

Published and distributed by:
Leading Edge Learning
National Security College
Building 69, 5 Liversidge St
Australian National University, Acton
ACT 0200
T: (02) 6125 6480
E: **national.security.college@anu.edu.au**
W: http://nsc.anu.edu.au/

The role of simulations in the authentic learning of national security policy development:

Implications for Practice

Acknowledgements

Special thanks are due to the senior staff of the National Security College both for their vision for this project and for inviting me to prepare a contribution. I am particularly grateful to Dr David Connery.

Dr Henk Eijkman
May 2012

About the Author

Dr Henk Eijkman is currently an independent consultant as well as visiting fellow at the University of New South Wales at the Australian Defence Force Academy and is Visiting Professor of Academic Development, Annasaheb Dange College of Engineering and Technology in India. As a sociologist he developed an active interest in tertiary learning and teaching with a focus on socially inclusive innovation and culture change. He has taught at various institutions in the social sciences and his work as an adult learning specialist has taken him to South Africa, Malaysia, Palestine, and India. He publishes widely in international journals, serves on Conference Committees and editorial boards of edited books and international journals.

CONTENTS

Glossary

As with any discipline, education too has its own terminology. While this Summary Report aims to make the case for authentic learning in ways fully intelligible to those not familiar with educational terminology, this glossary will assist readers to explore key issues in the wider educational literatures.

Term	Definition
Authentic learning	Learning in environments that immerse learners in research into, and the collaborative solving of, complex real world problems open to multiple responses
Constructivism	An approach to learning that gives primacy to research-oriented activities that enable learners to construct knowledge themselves rather than having to accept knowledge generated by others
Epistemology	Refers to the different explanatory principles we construct about the nature of knowledge: how we come to know, what ways of knowing are privileged & disprivileged, and the legitimate methods for making valid knowledge claims (Bryant & Usher, 1997; Gubba, & Lincoln, 1994).
Experiential learning	An approach to learning and teaching that rejects learning 'by telling' in favour of 'learning by doing' which may to various degrees be linked to real-world practices
Foundationalism and anti-foundationalism	Two opposed ways of thinking about knowledge & learning. Foundationalism assumes all knowledge reflects an objective reality making knowledge universally true and valid. Anti or non-foundationalism claims that all knowledge is socially constructed by specific communities and so reflects their cultural perspectives and languages. Knowledge construction (learning) is therefore a communal activity and even when learning is individual its goal is always social; to become a competent member of a community
Modernism	An intellectual movement that originated in the era of (European) 'Enlightenment' and characterised by belief in the homogeneity of the universe and in rational scientific progress
Positivism	A 'Modernist' theoretical framework focused on the discovery of objective and universally valid 'truths' in the service of human progress
Postmodernism	A 'Post-Enlightenment' theoretical framework, opposed to modernism because it is based on the socio-cultural construction of 'reality' with all its complexities and uncertainties
Simulations	Broadly defined as inquiry-based, virtual or face-to-face, high-end experiential learning activities that expose learners to the complex realities and demands of work-like environments such as in scenario-based research-led learning.

Executive summary

The National Security College of the Australian National University ('the College') has commissioned this report to examine the following areas:

1. The place of authentic learning in postgraduate education.
2. The methods used to simulate policy development, and related activities like strategy planning, in educational environments relevant to national security policy-making.
3. Policy simulation methods that could enhance learning at the College and similar institutions, including teaching skills, technology and resource implications.
4. The roles of technology in enhancing learning in policy development simulations.
5. Ways to assess learning effectiveness through simulation.

The aim of this report is therefore to provide the College with an evidence-based case and examples of practice that illustrate the use of authentic learning and simulations in post-graduate and *on-campus* learning environments relevant to applied national security policy education.

This report presents the findings of a literature review alongside a set of selected examples of authentic and simulation-based learning. The main conclusions are as follows.

There is a place for authentic learning in postgraduate education

Although authentic learning is widely taken up in many western education systems, there is little by way of a *systematic and consistent institution-wide deployment* in higher education, especially in Australia. This ad hoc and random approach is even more evident in regards to the use of simulations as a high-end form of authentic practice. The simulation and gaming literature recognises Australian scholars more by their absence (See for example the last five years in Simulation & Gaming[1]). The lack of take-up in Australia, particularly at post-graduate level, is also marked. Resistance to change is coupled with—or makes use of—a cultural ethos among university academics that rejects 'hands-on' experiential and authentic forms of learning by conflating these approaches with vocational training. These forms of learning are thereby relegated to the realms of technical and further education.

At the same time, the authentic learning and simulation literature is replete with theoretical contributions, insights, and case studies that cover the entire disciplinary spectrum. Additionally, university learning and teaching departments have been unstintingly supportive of, and committed to, the learner-centred paradigm. No informed educator can have missed the swing to experiential and authentic learning and the concomitant rise of the various forms of constructivist theories and practices.

The report finds authentic learning and constructivist approaches to be especially appropriate for the applied learning of national security policy-making; both are products of the postmodern era, which dispenses with the certainties of the past and calls for new conceptual resources that make sense of the contemporary conjuncture and the place of post-graduate learning within that.

There is a host of methods that over many years continue to be successfully used to simulate policy development in areas relevant to national security policy-making

The voluminous literature on simulations covering over 40 years of experience and practice across the disciplinary spectrum, major organisations, and the public sector, clearly indicate that:

[1] http://www.unice.fr/sg/

- Simulations are a well-established high-end form of authentic learning. The field of simulation/gaming has seen spectacular development: in the variety and richness of game types; in the spectrum of applications and users; and exponential growth in the scholarship on simulation, games, and gaming. While simulation offers educators a rich palette of methods, it does represent a worldview which is very different from conventional approaches to education, and which invites new ways of seeing, modelling and presenting the world of learning.
- Simulations are a proven learning method in the messy complexities of policy-making. Whether in analog or digital form, they have the unique capacity to realistically emulate—and immerse learners in—national security policymaking's engagement with messy and unpredictable Complex Adaptive Systems and their multi-actor networks. It is indisputable that simulation gaming has been particularly useful to public policy-making, a point that will be examined in detail below.
- Simulations are a serious learning method for public policy development, even though they struggle for legitimacy in tradition-bound academic circles. Long-time users of simulations such as commerce, defence, health etc., support the notion that not only are simulations serious games, they are also serious and exciting learning tools.
- As a learning method, the use of simulations occurs within a specific conceptual framework or discourse. Within the combinations of simulation and game, such use features four educational functions: demonstration, learning, motivation, and arousal. Moreover, it simultaneously addresses the five categories of strategic decision-making, namely: complexity, communication, creativity, consensus, and commitment to action. Educators can view these processes through different frames. For example, policy simulations can be oriented towards learning, innovation, persuasion or culture change.

There are a number of proven policy simulation methods that could enhance learning at the College and similar institutions which, like all learning methods, have their own resource and professional development implications

These proven high-end examples of simulation methods are in use in the public policy sector generally, but specifically within the area of national security, although in national security the literature begins to thin appreciably. In addition to tabletop, functional and full simulation exercises, popular forms of policy development simulations include policy exercises, scenario thinking/planning, and crisis simulations. The report also offers examples of simulations used in higher education, such as two Middle-eastern conflict scenario role-plays.

Specific examples of policy development simulations in national security settings include a range of simulations conducted by the National Defense University in Washington and FEMA, the Federal (US) Emergency Management Agency.

As with all methods, there are implications in terms of teaching skills and resourcing, particularly for on-campus programs, and less directly for technology; nonetheless, the report treats aspects regarding technology in detail below.

The implications vary depending on the complexity and fidelity of the simulation. Naturally, the more complex and the higher the fidelity, the more time-consuming and the higher the skill levels required. With mid- to high-complex simulations, implications fall mainly into the categories of time—especially for planning—and the need for good design, planning, facilitation, debriefing and assessment skills. This implies the need for simulation-focused staff development

The roles of technology in enhancing learning in policy development simulations

The scope of the report is governed by a focus on on-campus teaching. This focus—plus the nature of the College and similar environments (in terms of small student cohorts

etc.) and the huge costs involved in digital simulation games—makes the use of digital technologies prohibitive and educationally unnecessary. However the literature indicates that digital technologies can play a powerfully supportive role in authentic learning in general and simulations more specifically. The exponential growth of social media and the increased sophistication of Learning Management Systems to embed or link with social media and virtual worlds effectively extend the possibilities of participation, interaction, and sociability provided by analog (face-to-face) simulations. There is much to be gained by linking analog simulations to appropriate digital technologies to enhance the simulation experience. Such a move is also highly beneficial for assessment purposes.

Ways to assess learning effectiveness through simulation

Teaching is slow to change: assessment even more so. Assessment of authentic learning provides a major challenge, but primarily only for practitioners and educators locked into the traditional and outmoded teacher-centric paradigm. The literature demonstrates a major longitudinal shift not only towards authentic learning but also to authentic assessment. These forms of assessment typically ask students to perform authentic real-world tasks that demonstrate meaningful application of essential knowledge, skills, and attitudes. Students can be assessed (directly) on their performance in a role-play or simulation or (indirectly) by way of critical self, peer, and facilitator reflections. The report identifies a number of assessment practices that are indicative of tasks with a proven record of accomplishment in the field.

In conclusion, the report makes seven recommendations that indicate the significant opportunities that authentic learning and simulations offer to the College as well as some of its challenges.

Recommendations

1. That the National Security College formally articulate a generic set of authentic learning principles in the College Learning framework to guide practice
2. To develop a reputation in the field not just on the basis of its content, that is, national security policy development, but equally on its cutting edge approaches to the processes of effective learning
3. To develop a 'Strategic Authentic Learning Plan' with a goal of establishing the College as a lead Australasian institution in the business of designing and facilitating (analog) simulations
4. To host an 'Authentic Practice with Simulations' seminar to which world leaders in simulations are invited as key speakers (and at which its 'Strategic Authentic Learning plan' can be launched)
5. That as part of this Strategic Plan, the College begins to gradually and systematically introduce simulations into its suite of courses
6. That the College introduce a 'simulation-focused' academic development plan to skill academic staff in all aspects of conducting high level simulations, including the supportive use of digital technologies
7. That the College enhance its use of digital technologies to serve authentic learning and simulations, and include this use in its 'Simulation-focused' Academic Development Plan

Acknowledgements I wish to acknowledge the input of Dr. David Connery, Deputy Director (S&D), National Security College, Australian National University, to this report. His valuable guidance, feedback, and advice have added greatly to the quality of the final product.

Introduction
Preface

Preface

As Bruner (1960/1977:14) reminds us, in authentic learning, post-graduates learning national security policy-making *are* policymakers. Behaving like policymakers makes it is easier for them to learn policy-making compared to other approaches. Traditional learning approaches that emphasise the acquisition of factual knowledge present these learners with the conclusions of policy-making research. Authentic learning, however, actually involves them in doing such research. This view first propounded by Bruner as early as 1960 fired one of the first shots in the battle for constructivism; it is an approach that gives primacy to learners constructing their own knowledge. This was later to become one aspect of a broader field of educational practice known as 'authentic learning': it is this approach to learning that is the focus of this report.

Although widely adopted by schools in many western education systems, the use of authentic learning practices in higher education has been ad hoc and random. One reason is that it irrevocably changes the role of lecturers and the design of classrooms. In fact, it makes the term 'lecturer' obsolete. The approach of authentic learning suggests that educators are creative facilitators of knowledge construction rather than transmitters of knowledge created by others. In addition, classrooms become 'learning spaces' that enable learners to act in ways that more closely approximate real-world working environments. In other words, transmitting information to passive individuals sitting in neat rows is an outmoded practice: research-oriented learning, reflective of real life learning such as in national security policy-making is a bold and powerful alternative.

The significance of the post-modern turn

It is perhaps not coincidental that authentic learning is especially appropriate for the applied learning of national security policy-making. Both are products of the postmodern world. In this world, the certainties of the past have disappeared: no more the security of fixed reference points. Once solid groundings are increasingly disconnected and questionable. There is a serious questioning, if not rejection, of modernist confidence in progress and faith, in technical-instrumental reason, scientific rationality, objectivity, and monolithic worldviews. A key characteristic of a postmodern worldview is the abandonment of the search for certainty and a deep questioning about doing more of the same (Burbules, 1995). Thus, as Usher, Bryant &Johnston, (1997: 1) point out, 'new conceptual resources are required to make sense of the contemporary conjuncture and of the place of adult education within that'.

To paraphrase Usher et al. (1997: 8-9), the challenge of policy-making *and* adult learning in a postmodern world is to embrace uncertainty. This requires interrogation of comforting

Preface (cont.)

foundations, questioning the efficacy of hierarchical opposites, and refusing to accede to positions that claim to be definitive or natural. Such scepticism questions the canonical forms of universally applicable knowledge and is deeply suspicious of the search for unifying truth and certainty and a definite discourse that makes our world coherent, meaningful and masterable. A postmodern worldview accepts that knowledge has been decentred, that fixed references and traditional anchoring points are no longer available. Knowledge is now increasingly detached from its objective, universally valid foundation in the real world and from traditional specialist disciplinary bases. The result is 'a valuing of different sources and forms of knowledge and a corresponding devaluing of specialist discipline-based knowledge' (Usher et al., 1997: 9). One example is the rise of experiential or authentic learning that begins to privilege local, subjective, practitioner-based knowledge rather than universalist, objective, specialist discipline-based knowledge.

Thus, both national security policy-making and adult learning operate in postmodern conditions in which 'knowledge is not only constantly changing but becoming more rapidly, almost overwhelmingly, available, mirroring a world of rapid change and bewildering instability' (Usher et al., 1997: 9).

It is clear that in this postmodern era a traditional curriculum and teaching approach based on the dissemination of true and certain knowledge, as, for instance, in applied national security policy-making, is increasingly unsustainable and untenable. This is not a recipe for an uncritical, indiscriminate approach to post-graduate learning and teaching but, as Usher et al. (1997: 12) point out, it 'highlights the contested nature of knowledge and the need for knowledge which is locally grounded and efficacious in relation to local [national security] struggles'.

Not surprisingly—especially given long-held profound disagreements over the forms curricula and learning should take and a paucity of teacher training—higher education has not readily adapted itself to the postmodern world and its undermining of traditional power/knowledge practices (Usher et al., 1997; Eijkman, 2011). In addition, though research forms a key aspect of academic life, research-oriented learning has not yet fully penetrated the sphere of teaching, which continues to be seen as a separate and often secondary aspect of academic life (Jenkins & Healey, 2005).

For all these reasons, authentic learning practices still present a major challenge for educators who have little or no exposure to developments in the field of education or social theory. This is not wholly unexpected, as the higher education sector does not generally demand professional qualifications in teaching. This report therefore aims to provide academics at the College with key insights into authentic learning in general and simulations more specifically, and to locate these practices firmly within the wider context of the postmodern turn in both the world of national security policy-making and that of adult learning.

Preface (cont.)

Consequently, this paper, commissioned by the National Security College of the Australian National University, explores key questions around the notion that, in the postmodern era, learning to *be* a policymaker is vastly different, and more effective, than learning *about* policy-making. These questions focus on the nature and key features of authentic learning, and its uptake, especially in the postmodern world of post-graduate education. Following on from this is an in-depth focus on relevant high-end forms of authentic learning (broadly identified under the term 'simulations'), their effectiveness and their resource implications vis-à-vis on-campus and digital environments.

The discussions around post-modernity and the issue of epistemology (the nature of knowledge) may appear at first somewhat obscure. However, the issue is this:

> As professionals, we surely have a duty to be fully aware of the ontological and epistemology [*sic.*] basis of our practice, since this will inevitably have implications for both how we understand our practice and, importantly, the nature of the relationships we have to those with whom we work, colleagues and "clients" alike (Moore, 2007: 107).

A primary consideration is to make these discussions accessible to all. However, the highly technical nature of a few topics may occasionally require willingness on the part of readers to engage in some close reading and make the required interpretive efforts.

Henk Eijkman

Canberra

16th March 2012

Introduction: aim, background, expected results, and the structure of the report

Introduction

This section covers the aim of the report, provides an overview of the its background, states the results the report is expected to deliver, and outlines its structure.

Aim of the report

This report intends to provide the College with an evidence-based case and examples of best practice, in support of the use of a range of simulations in the authentic learning of applied national security policy development.

Background: towards an authentic learning framework

The National Security College at the Australian National University in Canberra is Australia's first dedicated post-graduate national security education establishment. It was founded in 2010 to enhance 'the capacity of national security practitioners to manage effectively in a rapidly changing and increasingly challenging strategic environment' (NSC, 2010: 3). The College aims to enhance the capacity of national security practitioners by way of a learning framework based on strong relationships, openness to critical analysis, open intellectual exchange and professional collaboration (NSC, 2010; Connery, 2010).

The development of such a practice-oriented learning framework is of considerable significance. It points to an approach to learning and teaching that, given the available alternatives, is theoretically informed, evidence-based, and founded upon a robust record of effective learning outcomes. In this respect, discussions with senior College staff indicated that the current framework for learning focuses on real-world policy analysis and development, thus directing the College's interest in the potential of simulation-based learning approaches. Such learning strategies combine, in various ways, learning-by-doing (experiential learning) with learning that reflects the practical realities of real-world practice (authentic learning), as in applied national security policy development.

Despite limited adoption in on-campus and virtual learning, of simulations constitute a form of authentic learning that is still a contested field, in terms of actual practice and at a deep philosophical level (Anderson & Herr, 1999). Authentic practice, and especially its higher-end forms, such as simulations, continue to challenge the conventional orthodoxies of adult learning (Usher, Bryant, & Johnston, 1997; Anderson & Herr, 1999) and take us into the deeper and less visited realms of philosophy.

The College has commissioned this report into the role and effectiveness of simulations in authentic, research-oriented, learning of policy development in order to identify the implications of using such methods at the National Security College and its partner institutions. This report therefore delivers on the expected outcomes based on four research questions (see

Introduction (cont.)

1.1.3 below).

The results

This report was written to provide solutions measured against five result areas defined by the College. To address these result areas satisfactorily, the report has been structured into two parts:

Part I of this report delivers on result (outcome) 1:

1. *'The place of authentic learning in postgraduate education'*

Part I provides a scholarly foundation for the effective use of simulations in applied policy development. Building on an extensive review of the field, it highlights the accommodation of authentic learning within on-campus settings relevant to the post-graduate studies of national security professionals. It provides an evidence-based case in support of a range of simulation methods in a learning framework built on "open intellectual exchange and professional experience" that enables "best-practice analysis and teaching on national security policy issues" (NSC, 2010: 1).

The report situates authentic learning in the postmodern worlds of education and national security policy-making. It explores the term 'authentic' to provide a robust conceptual base upon which to construct authentic learning strategies. Authentic learning and simulations cover a multitude of approaches (see 'Constructivism' in Table 2, p. 18, Figure 2, and Part II). Therefore, for the purpose of this paper, 'simulations' refers to a spectrum of learning practices that embrace proximal representations of the real world and actual real-world practices.

Part II focuses on simulations. It explores the various methods used, the roles of technology, and the assessment of effective learning relevant to applied policy development at the National Security College. This includes teaching skills, technology and resource implications. This will cover the following results:

2. The methods used to simulate policy development, and related activities including strategy planning in educational environments (with reference to national security policy-making);
3. Policy simulation methods that could be adopted to enhance learning at the National Security College and similar institutions, including the teaching skills, technology and resource implications of each;
4. The role technology plays in enhancing learning experience in the area of policy development simulations; and
5. Ways to assess the effectiveness of learning through simulation.

The report's methodology

Methodology

The social realities that are the subject of simulations in authentic learning, especially in applied national security policy-making at the level of postgraduate higher education, are extremely complex and multi-faceted. For this reason the methodological point of departure for this paper is the question: 'What kind of knowledge can be accepted as credible evidence to justify the efficacy of authentic learning in general, and of simulations in particular? This report addresses this complexity by taking a postmodern pragmatist, rather than positivist perspective to the research questions. This question—and its answer—is important, as academics used to the rules of evidence of the natural sciences (positivism) will expect accurate, objective evidence which this field of the social sciences is unable to provide. Therefore, this paper relies on a postmodern, pragmatic approach to the research questions and the provision of evidence. The ongoing debate concerning modernist/empiricist and postmodern/qualitative research paradigms warrants a short explanation of the approach taken and the kinds of evidence offered here.

The traditional approach to research as used in the physical sciences (positivism) relies on the ability of empirical research to capture real, objective knowledge (Toulmin, 1990; Usher et al. 1997; Crotty, 1998). On the other hand 'within the social sciences there increasingly appears to be an acceptance that the social world and social reality, at least, might not be readily characterised by universally applicable and transcendent laws such as the naïve realism of positivism proposes' (Moore 2005: 106). Furthermore, the rejection by postmodern researchers of the discoverability of universal truths via objective empirical evidence is also part of a sweeping intellectual and cultural shift based on 'a growing ontological appreciation of the complexity of the world' (Moore, 2005: 109).

This theme is evident in the pragmatist rejection of the notion that 'social inquiry was able to access the 'truth' about the real world solely by virtue of a single scientific method' (Mertens, 2005: 26). Pragmatist researchers make choices around data collection and methods of analysis based solely on the criterion of fitness for purpose. They choose methods that provide the best responses to the research questions, rather than because of loyalty to a philosophic paradigm (Darlington & Scott, 2002; Creswell, 2003; Tashakkori & Teddlie, 2003; Somekh & Lewin, 2005). Pragmatist research is a robust, methodologically pluralist approach oriented to real-world practice, is problem-centered and focused on consequences (Mackenzie & Knipe, 2006; Armitage, 2007; Melles, 2008). Pragmatists see research not so much as accounting for what is objectively present in the world, but as offering useful responses to research questions that provide possible 'lines of action' that meet the particular needs of the project's sponsor (Badley, 2003). Consequently, given the

Methodology (cont.)

social nature of the research questions, this project links the choice of research methods directly to the purpose of the research questions: as a consequence it therefore uses multiple research methods, such as literature reviews, interviews etc. (Ryan, 2006; Armitage, 2007). This stance rejects, as Moore (2005) points out, the (modernist) notion of empirical research as the unquestioned foundation for practice because of its superior ability to provide accurate objective evidence of the true nature of the world—in this case, the world of authentic learning as, for example, in simulations.

In regards to data collection, the report relies on an environmental scanning approach to identify the key features, usages and effectiveness of authentic learning—especially at the high-end level of simulations—in educational settings relevant to the College. Environmental scanning appropriately refers to 'the acquisition and use of information about events, trends and relationships in an organization's external environment, the knowledge of which would assist management in planning the organization's future course of action' (Choo, 2001: 1).

Within this pragmatist perspective, environmental scanning entails data collection and analyses that rely predominantly on comprehensive and critical-analytical literature reviews of authentic learning and simulations relevant to the post-graduate learning of national security policy development in under- and post-graduate higher education and similar institutions.

It is important in environmental scanning always to consider the range, availability and quality of information, and other factors such as the scanner's knowledge or cognitive style and time-frame limitations (Morrison, 1992; Voros, 2001). In line with good practice in qualitative research, both the selection and analyses of the literature are conducted so as to produce credible and trustworthy results.

Nevertheless, both the construction of a report and its reading are always a product of the lenses through which the researchers, and the report's readers, view the world (Maxwell, 1992;
Patton, 1990). This includes their view of the world of learning, of learning effectiveness, and their view of what constitutes evidence of effectiveness.

It is important here to note that the notion of essentially contested categories and practices also extends to educational research methodologies. Traditional quantitative and postmodern qualitative research methods rely on very different ideas about what constitutes acceptable evidence of learning efficacy. It is of course necessary to mount an evidence-based case to support a given learning framework. Hence, given the social nature of educational research, there has to be a basic agreement as to what constitutes acceptable evidence.

What constitutes evidence of efficacy?

To complicate the learning framework decision-making process

Methodology (cont.)

even further, any determination about which learning paradigm to adopt for a learning framework also ought to be informed by available evidence of effectiveness. Here, for better or worse, longer-term empirical evidence of efficacy—in the positivist sense—may be limited (Kincheloe & Berry, 2004; Yates, 2004). In addition, from a traditional (positivist) perspective, much educational research may be of limited value due to a predominant use of short-term (e.g. 1 semester) case studies with small sample sizes.

The traditional (positivist/modernist) approach to research privileges empirical/quantitative analyses of educational practices. It uses research methods that aim to produce evidence that is objective, impersonal, and is universally generalisable.

However, as pointed out by Smeyers & Depaepe (2006), educational research is social research that cannot ignore the distinctively social nature of what it studies and the crucial context of interpretation and judgement in which questions of meaning and value cannot be ignored. This becomes more challenging as theories of learning begin to depart from traditional psychological perspectives into newer, more sociological—and therefore less familiar—ways of thinking (Eijkman, 2004; Healey, 2005).

In response, the postmodern perspective on research offers an alternative view of what constitutes evidence of learning effectiveness. Postmodern perspectives such as constructivist, interpretivist and ethnographic approaches (Denzin & Lincoln, 1998) eschew technical/rationalist approaches. While the latter are dichotomously opposed to particularity, to the personal and to the subjective, postmodernist approaches specifically value practitioner knowledge (Moore, 2005; Bryant & Usher, 1997).

In the College context, which is prevailingly concerned with situating learners in the real-life and complex experiences of policy-making, 'The writing of a research text which downgrades or even ignores the experiential dimension becomes in effect an exercise in the construction of a particular kind of self, an abstracted reasoning machine, that adult education students find dissatisfying' (Bryant & Usher, 1997: 1). For postmodernist researchers, research is a reflexive practice which privileges the local, the personal and the particular, and therefore incorporates the experiential dimensions of specific situations (Bryant & Usher, 1997: 1).

The notion of 'effective' learning thus depends largely on the practitioner/researcher's appreciation of the philosophical complexities embedded in each perspective. The bottom line is that evidence of effectiveness of authentic learning in general, and simulations more specifically, may not necessarily conform to traditional expectations of evidence according to positivist, empiricist research. This calls for an evaluation of learning effectiveness that accepts a much broader range of evidence collected by interpretivist, constructivist, ethnographic and other qualitative research methods.

Part I: Authentic learning in post-graduate higher education

In authentic learning, post-graduate students learning public policy making are public policy makers[2]

1.1 Authentic learning in policy development in a postmodern world

The first part of this report builds on a literature review of authentic learning. It provides a scholarly foundation for the effective use of simulations in applied public policy development. This part of the report highlights the role of authentic learning in facilitating the effective applied learning of national security policy development in on-campus post-graduate settings relevant to national security professionals studying at a leading edge, research-intensive university.

1.1.1 From teacher to learner-centred practice

1.1.1 Towards learner-centred practice

The question this section will confront is: why use authentic learning as the basis for the learning framework at the ANU's National Security College ('the College')?

The College seeks a learning framework geared to real-world policy analysis and development. In so far as it is discernible from the literature and the College's evaluations of its own practices, such a learning framework must be demonstrably theoretically informed, evidence-based, and referable to a robust record of effective outcomes. This paper is a response to the College's desire to provide its post-graduates with an applied learning experience such as that provided through authentic learning approaches. Authentic learning comprises multiple methods that combine hands-on learning within life-like learning environments.

There is a significant problem in deciding on a specific learning framework. To those not familiar with education as a professional field in its own right, the literature on learning and teaching appears as a confusing set of disparate discourses. Making informed decisions regarding a learning framework that best suits a field such as applied national security policy-making requires sound knowledge of the different learning paradigms and an appreciation of the fundamental differences between them. This is particularly important if the choice is directed towards simulations. Simulations are a specific form of authentic

[2] With apologies to Jerome Bruner (1960/77:14)

Towards learner-centred practice (cont.)

learning which in turn sits within a distinctly learner-centred constructivist/ constructionist learning paradigm. The need to adopt a defensible and coherent approach for a learning framework is therefore important for a number of reasons.

First, it means choosing between contested perspectives and practices regarding learning. Teaching, learning, and research are best thought of as 'essentially contested categories', in which each category has its own 'essentially contested practices' (Patent, 2001; Gallie, 1956). This means that the concepts used to underpin the various approaches to learning and teaching by their very nature invite profound disagreements and on-going disputes. By way of introduction, the major division among learning paradigms may be conveniently summarised as being between what are commonly termed the 'teacher-centric' and 'learner-centric' approaches, as shown in Table 1.1.

Table 1.1: Comparing teacher and learner centric approaches[3]

Teacher-centric paradigm	**Learner-centric paradigm**
e.g. behaviourism, cognitivism	e.g. constructivist approaches
Theories about knowledge and Learning	
• Knowledge exists in the minds of autonomous individuals and is a representation of the real world • Knowledge comes in chunks, is delivered by teachers, and is taken in by students • learning is about eliciting a desired response from the student using reinforcement and cues to ensure a strong stimulus-response association • Learning is cumulative and linear and is about the gradual strengthening of the learned relationship between cue and behaviour (reinforcement) • The learner mirrors objective reality by using external reality as a mental model	• Knowledge is embedded in specific social contexts and does not exist in the world independently • Knowledge is open to multiple perspectives: there are many ways of structuring the world and its entities • Knowledge is contextual: people create situation-specific meanings by assembling knowledge from diverse sources appropriate to the problem • Learning is an active process of knowledge construction in supportive, collaborative, meaningful, and realistic settings • knowledge is the property of knowledge communities; that is, of cultures and subcultures
The structuring of teaching/learning	
• The teacher is the primary source of knowledge for students • The focus is on the teacher-controlled transmission of content (lecturing) • the design of the learning environment and the nature of activities is determined by that which works best for the teacher • Teachers accept responsibility for the achievement of learning • The focus is on how best to use teaching methods to transfer subject content • Learning results when information is	• The teacher is the facilitator of inquiry-based learning • The focus is on the learner-centred achievement of outcomes (inquiry-based learning) • the design of the learning environment and activities is determined by the needs and learning preferences of learners • Learners accept responsibility for learning • The focus is on how the learning, which should take place, can be best facilitated and optimised • Learning is the result of active participation in a community in which

[3] This table draws on numerous sources including Barr & Tagg (1995); Brown (2005); San Diego State University (1996); Instructional Design Knowledgebase (2012).

Towards learner-centred practice (cont.)

stored in memory in an organised, meaningful way • Any subject matter expert can teach	new meanings are co-constructed by learners and their community • Empowering learning is challenging and complex
Criteria for success	
• Learning is indicated by a change in the observable and measurable behaviour of a learner • Mastery of content: the focus is on the quality and quantity of the subject matter learners can reproduce	• learning is indicated by the ability of learners to construct productive meanings • Mastery of outcomes: the focus is on what learners are able to do on completion of the learning process

As Table 1.1 shows, although not exhaustively by any means, both approaches point to very different ways of thinking about the nature of learning, and therefore to different learning and teaching practices. Teacher-centred approaches emphasise the transmission of information to passive individuals, while learner-centred approaches are distinctly process- rather than content-driven. The latter also focus much more on learner directed, social and inquiry based activities. One example is that of the behaviourist and constructivist perspectives respectively. The point is that ultimately a learning framework must be able to justify its choice of any paradigm.

Second—and as can be seen from Table 1.1 above—choosing a learning paradigm means accepting a specific set of views about the nature of knowledge and what constitutes effective learning. Different learning theories draw on different ideas about the nature of knowledge (epistemology). They will therefore have divergent views about what constitutes effective learning. Thus, each major learning paradigm: objectivism, behaviourism, cognitivism, humanism, constructivism, and social constructionism, will have its own perspective on the nature of knowledge, and therefore its own distinctive ideas about learning and its own approach to what it sees as 'effective' learning (Merriam & Caffarella, 1998; Smith, 1999).

In order to enable effective learning and teaching, any discussion about authentic learning and simulations has to tackle these contested ways of thinking about knowledge and the knowledge construction process. This is because authentic learning and simulations, even though they comprise a broad range of strategies, deploy a distinctly learner/process-centred approach.

Teacher and learner-centred paradigms comprise a wide range of internally compatible theories and approaches (see Table 1.2, p. 18). However, there is no inherent compatibility between the dichotomously opposed teacher- and learner-centred approaches. This is a crucial consideration if a learning framework is to be internally coherent. Any consistent learning framework by definition must send consistent messages about learning, curriculum and assessment. A consistent learning framework must make paradigmatic choices and orientate their practices one way or the other. (Usher, Bryant & Johnston, 1997; Eijkman, 2004, 2010, 2011). As is obvious from Tables 1.1 and 1.2, learning

Towards learner-centred practice (cont.)

and teaching practices cannot be randomly selected from either paradigm in a given learning framework due to incompatible ideas about the nature of knowledge, the learning process and the aims and outcomes of learning.

Thus, a third reason for working towards an internally coherent learning framework is that, once constructed, provides a broad set of guiding principles which everyone can work with. This is highly valuable in an educational environment replete with contesting philosophical approaches and educational aims and outcomes. Here a broad, agreed-upon and principled framework provides an internally consistent approach to the three message systems of education: curriculum, pedagogy, and assessment (Bernstein, 1973). More specifically, it provides for consistency around the complex, dynamic, and real-world, research-led learning of applied national security policy-making.

A clearly articulated learning framework is highly valuable in professional contexts that do not always readily understand fundamental differences in approaches to knowledge and learning and their practical consequences. An approach which takes for granted philosophical issues about knowledge and learning in academia makes it very difficult to raise the deeper issues at play in different learning paradigms and the ways in which they shape everyday learning and teaching practices and their outcomes (Moore, 2005). Modernist educational practice fails to draw attention to itself as having a specific approach to knowledge. Moreover, it is unable to recognise other ways of understanding knowledge. This non-reflexivity makes it difficult for practitioners to identify the deeper origins of the decisions that shape their teaching practices (Moore, 2005; Eijkman, 2009a).

It is important therefore to understand the implications of both teacher/information-centred and learner/process-centred practices in a postmodern world that resists routinisation and universal solutions. Here both national security policy-making and learning operate under conditions of ephemerality, fragmentation, complexity, uncertainty, and the possibility of multiple rationalities (Usher et al., 1997). Thus, the assumptions of the modernist discourse—'that the world is orderly and knowable through the discovery of universal laws'—may bear little resemblance to the realities on the ground of both national security policy-making and of learning (Usher et al., 1997: 126).

1.1.2 Learning paradigms and their impact

1.1.2 The impact of learning paradigms

This section explains the position authentic learning occupies on the broad canvas of educational paradigms and theories. This section is useful to practitioners as it provides an explanation of the rich backdrop of educational practices out of which authentic learning emerges.

Adopting a broad-based authentic learning framework means engaging learners in realistic multi-disciplinary and collaborative problem solving. This requires educators with a sound understanding of the learner-centred paradigm and its postmodern context, out of which simulations operate. It also means being aware of how this approach contrasts with the teacher-centred paradigm. Ultimately, each paradigm's view about the nature of knowledge influences its learning and teaching practices, including its use of digital technologies (Eijkman, 2010, 2011).

The postmodern condition also features pivotal advances in digital communication technologies. Social media now provides unparalleled opportunities for authentic learning participants to engage in collaborative multi-disciplinary problem solving. Furthermore such media can increasingly do so with far less reference to the physical location of participants. Learners as both team members and individuals can now collaborate easily in real-world problem solving using a new array of participatory digital technologies. This applies equally to on/off-campus and mixed modes (Eijkman, 2011; Herrington, 2006).

Given current research emphasis on collaboration and the opportunities provided by social media, authentic learning, and simulations particularly, this report is well-placed to respond to two contemporary trends in postmodern higher education practice:

- the *social turn in learning theory* from individualistic to socially-oriented learning theories; and
- the *participatory turn in digital technologies* from information-centric to social networking-centric practices

Both these social and participatory turns resonate with the postmodern, learner-centred approach to learning. However, while these trends fit well with authentic learning, they are also responsible for some unease among many educators.

Many educators immersed in mainstream practices are familiar with modernist teaching practices. Their commitment to this traditional paradigm may be due to unawareness of—or disagreement with—viable alternatives. Some may be unaware of current socio-cultural developments in the scholarship of learning and teaching. Others may seek but cannot find convincing empirical evidence. Such practitioners may not

The impact of learning paradigms (Cont.)

want to change their teaching practices drastically. Nevertheless, with an increasing population of academics and learners raised within a postmodern world, demographics alone will sooner rather than later force changes towards postmodern oriented learning practices (Eijkman, 2009).

This shift to the postmodern and its implications for authentic learning warrants an explanation. The aim here is to expose the usually hidden philosophic basis of authentic learning *vis-à-vis* more traditional practices. It also invites educators to develop a more questioning attitude to both modernist (traditional) and postmodern ideas and practices (Moore, 2005). As Usher et al. (1997: xiv) point out, we cannot simply assume that because a practice is anti-modernist it is unproblematic and automatically more appropriate.

The major learning paradigms

As indicated earlier, there are a number of different learning paradigms, each with its own subset of theories and models[4]. However, even categorising these learning paradigms presents challenges. Different scholars and practitioners conceptualise these somewhat differently by including some and/or excluding others.

For example, in terms of major learning paradigms, Dabbagh (2012) lists Objectivism, Behaviourism, Cognitivism, Pragmatism, and Constructivism/Interpretivism, while the 'Learning Theories Knowledgebase' (2012a) cites behaviourism, cognitivism, constructivism, and humanism. The point is that each major learning paradigm has its own approach to the nature of knowledge and therefore its own distinctive ideas about what constitutes effective learning (Merriam & Caffarella, 1998; Smith, 1999).

As shown in Table 1.2 below, there is however a consensus in the field that there are at least three mainstream learning paradigms. These are behaviourism, cognitivism, and constructivism (of which there are multiple forms), with the more recent addition of social constructionism in later and more critical literature (Gergen, 1994, 1999, 2003; Gergen & Gergen, 2003; Usher et al. 1997; Merriam & Caffarella, 1998; Hruby, 2001; Moore, 2005; Eijkman, 2004, 2009, 2010, 2011; Kincheloe, 2005).

Of course, as Table 1.2 indicates, each paradigm acts as an umbrella term as it covers a range of theories within its domain. While each paradigm has its own characteristics, there is an emerging division (shown as a red dividing line in Table 1.2) between paradigms and their theories, depending on their views about the nature of knowledge and about how knowledge is constructed. More specifically, the division is between two radically different ways of thinking about knowledge ('epistemology').

[4] Each category has multiple theories: one could count up to fifty. For example see http://www.learning-theories.com/

The impact of learning paradigms (Cont.)

Table 1.2: Comparative summaries of learning paradigms [5]

Paradigm	Central tenets	Learning approaches
Teacher/information/individual centred; focused on psychological processes		
Behaviourism	A theory focused on behaviour. Emphasises observable, measurable learnt behaviours, their consequences and reinforcement. Uses a 'black box' metaphor: what occurs within the learner's head is unknown. Behaviourists view the learning process as a change in behaviour	• Computer-based Instruction • Contract Learning • Individualized Instruction • Programmed Instruction • Information Processing Model • Systems Approach • Training
Cognitivism	A theory focused on mental processes. The learner is an active participant in the learning process which is a mental activity that entails internal coding and structuring. The emphasis is on how learners structure, organize and sequence information to facilitate optimal processing	• Collins & Stevens Inquiry Teaching Model • Keller's ARCS Model of Motivation • Merrill's Component Display Model
Learner/process/socially centered: focused on learning as social processes		
Constructivism	A theory of social learning. Believes there are many ways of structuring the world - meanings are not independent of the world but are imposed by individuals who build personal interpretations of the world through their interactions with it. Knowledge is embedded in the context in which it is used. Learning is effective when collaborating on authentic tasks in meaningful realistic settings that facilitate novel, situation-specific understandings through the assembly of knowledge from diverse and appropriate sources	• Action Learning • Anchored Instruction • Authentic Learning • Case-Based Learning • Cognitive Apprenticeship • Collaborative Learning • Intentional Learning Environments (CSILEs) • Discovery Learning • Distributed Learning • Epistemic Games • Generative learning • Goal-Based Scenarios (GBSs) • Inquiry-Based Learning • Problem-Based Learning (PBL) • Reciprocal Teaching • Situated Learning
Social constructionism	A social theory of learning. The social milieu is pivotal. Believes knowledge is socially constructed and resides within socio-culturally specific communities. Hence knowledge is multi-faceted, fragmented and tentative. Learning is inherently social because its aim is always competence within a community of practice. Learning is a process of acculturation in such a community.	• Acculturation into Communities of Practice • Consensus group collaborative learning • Microworlds • Simulations • MOOs and MUDs • (May also employ constructivist strategies but using criteria of indeterminacy, polyvocality, contextualization and pragmatics (Gergen, no

[5] Informed by Merriam & Caffarella, 1998; Ertmer &Newby, 1993; Wenger, 1998; Illeris, 2002; Eijkman, 2004, 2008, 2011; Smith, 1999)

		date)

The impact of learning paradigms (Cont.)

The traditional and dominant modernist view is: (a) that our observations of the real world grounds our knowledge, which is therefore universally valid, objective and true; and (b) that the construction of knowledge occurs in the minds of autonomous individuals. This is more or less the position of behaviouralism, cognitivism, and some constructivist theories.

There is however, an opposing view. The newer social-constructionist paradigm, and its theories such as critical constructivism (cf Kincheloe, 2005), offer a radically different postmodern perspective. From this viewpoint, our knowledge of the world is always culturally constructed and bounded, and therefore contextual. This means that knowledge is always partial, subjective, and open to different interpretations. Additionally, it views knowledge construction as primarily a social process. Learning is something that occurs mainly between, rather than within, people (Hruby, 2002). The traditional perspective of learning is associated with modernist, positivist approaches to knowledge, learning and research. The traditional modernist approach we call 'foundationalist' because it builds on a view that the real world is the foundation of knowledge. The opposing postmodern perspective we refer to as anti-foundational because it holds that knowledge does not have a foundation in the real world, but instead is socially constructed.[6]

For example, foundationalism is the theory of knowledge that underpins behaviourism, cognitivism, and some constructivist theories.[7] These also focus on psychological theories of learning that emphasise mental processing. On the other hand, newer anti-foundationalist theories, such as social constructionism, perceive learning as primarily social, either in terms of its processes or its purpose (Hruby, 2002; Eijkman, 2004, 2011). Many learning theories used in constructivism (such as radical and social forms of constructivism) flow into social constructionist approaches. However, social constructionism is strictly postmodern and anti-foundational in its epistemological underpinnings, and therefore employs learning strategies with much more open expectations about the facilitation of learning and learning outcomes (Bruffee, 1999).

The significance of how we can come to know the world and its foundational and anti-foundational explanations may not be immediately evident. However, the adoption, consciously or otherwise, of either of these positions has important ramifications. This is subject to a fuller explanation in the next section. By way of introduction, the main feature of the

6 These are complex and essentially contested perspectives. For more information see Hruby (2002) and Warmoth (2000)

7 For an explanation of foundational and anti-foundational epistemologies see the glossary and the following section, "Authentic learning and simulations as a post-modern practice"

The impact of learning paradigms (Cont.)

traditional modernist foundational approach is *certainty*. This perspective bases itself on the certainty that knowledge is universally valid, objective and true because its reference point is the real—and therefore orderly and knowable (empirical)—world. On the other hand, postmodernists hold the opposite. A defining trait of anti-foundationalism is *ambiguity* because it asserts that knowledge is socially constructed our knowledge of the world is always partial, subjective and open to multiple interpretations (Eijkman, 2004).

The compatibility and incompatibilities of paradigms

As to their complementarity it is—or better put, has been—the case that learning paradigms, though divergent in emphases and preferences, can complement one another in practice when there is sufficient commonality in their approach to knowledge and learning. However, the newer social theories of learning, such as some forms of constructivism and social constructionism, are so different in their understanding of the nature of knowledge and how effective learning takes place that they are incompatible with the behaviourist and cognitivist paradigms (Hruby, 2002).

Earlier learning paradigms such as behaviourism, cognitivism, and most forms of constructivism are relatively compatible because they have a common basis in two respects. First, they share the (foundationalist) belief that the nature of the world can be directly grasped and understood via observations, and that we can therefore ground our knowledge on a solid foundation such as through sense experience (empiricism) or a priori reasoning (rationalism). Secondly, they are embedded in psychological conceptions of learning. That is, they focus on learning as a mental process and thus on learning as an individualistic, mentally focused activity. This is in stark contrast to social constructionist approaches that reject outright the presuppositions of foundationalism and psychologism (Bruffee, 1999; Hruby, 2001; Eijkman, 2004).

Implications for practice

The implications for the messy, complex world of policy-making and by extension the learning of policy-making, may now begin to surface.

The question is: are national security policy-making processes and their outcomes certain, predictable, universally valid, objective, and true? Alternatively, are those processes and outcomes more likely to reflect localised and time-bound conditions, and are they therefore partial, subjective, and open to different interpretations? What implications follow from either perspective in terms of choosing a learning paradigm?

Hence, this shift to the post-modern at least warrants a slightly more detailed explanation. The postmodern turn represents a number of distinct paradigm shifts. Among others

it lays open the different, though usually hidden, philosophic underpinnings of both traditional and authentic learning practices. Such an explanation may also assist educators and researchers develop a more reflective, questioning attitude to modernist educational worldviews and practices, and to the viability of alternative postmodern approaches (Moore, 2005).

1.1.3 Authentic learning as postmodernist practice

Authentic learning as postmodern practice

This section focuses on the philosophical underpinnings of authentic learning. Though an issue of great significance, it is seldom analysed. Yet the different approach to the nature of knowledge and to knowledge construction embedded in authentic learning sets it apart from traditional approaches. As this section makes clear, this helps practitioners appreciate the differences and explains the scepticism of traditional educators.

This report positions authentic learning generally, and simulations more specifically, as moving towards—or at minimum, being philosophically comfortable within—a postmodern philosophic perspective of knowledge and learning. In the context of the postmodern turn, as Usher et al. (1997, *x*) pointed out, the traditional world of adult education 'has to accommodate itself to the new social phenomenon of adult learning and find a new role within changing contexts'.

Educators and researchers, among others, confront fundamental intellectual and cultural challenges to their worldviews and practices. Contemporary postmodern complexities touch all aspects of life, including learning and teaching (Usher, Bryant & Johnston, 1997). It is postmodernism and its 'social epistemological revolution' which has caused such theoretical turmoil within the sciences, including education (Moore, 2005).
A detailed exposition is beyond the scope of this report. However, the shift to the postmodern bears some scrutiny, given the centrality of experience in postmodernism and of authenticity in learning. It is of course imperative that we also critically interrogate postmodern practices for their efficacy.

The following description highlights the relevance of postmodernism to authentic learning and simulations. It begins to explain the reasons for the apprehension some academics express towards the postmodern. This we expect, given the overwhelming dominance of the modernist, positivist paradigm. After all, the postmodern turn disrupts long-held positivist epistemological certainties and the traditional discursive repertoire of education and research. It is understandable that from a modernist/positivist perspective authentic learning seems unscholarly.[8] However, off-hand rejections do little to further

[8] It appears that such criticisms are mostly anecdotal. A substantive online search has failed to identify scholarly articles that reject authentic learning because of its unscholarly nature. It is likely that such criticisms are levelled by academics who, for various reasons, are not yet in a position to rethink their allegiance to a Western positivist-empiricist paradigm (see Herrington & Herrington, 2006).

Authentic learning as postmodern practice (cont.)

critical analyses and informed debate. In fact, uninformed objections are, as Moore (2005: 105) suggests, increasingly 'highly inappropriate or even detrimental' in a drastically changed intellectual and cultural landscape (Usher et al. 1997; Herrington & Herrington 2006; Eijkman, 2004, 2010).

The first point is that controversies about the legitimacy and efficacy of authentic learning in academic settings are, in essence, epistemic conflicts. At the root of the shift from modernism to postmodernism is a deep-seated disagreement about the nature of knowledge. At stake are the ideas and rules that govern knowledge production. This includes ideas about what constitutes knowledge, the appropriate methods and procedures for constructing knowledge, and what constitutes legitimise knowledge claims. Postmodernity as a socio-cultural condition, supported by the ICT revolution and globalisation, undermines previously accepted certainties. The secure epistemological foundations of positivist educational practices and their consequent power arrangements are now subject to a thorough critique. Postmodernist thinking turns on its head the long-held beliefs and practices concerning the control of knowledge. Unlike past circumstances, for instance, academics are no longer the gatekeepers of knowledge (Eijkman, 2011).

The second point is that the push for authentic learning also emerges out of the growing incredulity about practices that rely on absolutist foundationalist claims. Postmodernists question beliefs in a solid ground that guarantees epistemological standards such as truth, certainty, universality, objectivity and rationality (Peirce, 1958; Anderson, 1990; Hruby, 2001).

As pointed out before, the main features of modernism are its foundationalist rules about the certainty, universality and objectivity of knowledge. Modernists therefore privilege academic or disciplinary rather than the more experientially informed knowledge of practitioners. In contrast, postmodernist rules, as found in simulations, are anti-foundationalist. These rules have diametrically opposed qualities. Postmodernists accept the ambiguities, particularities and subjectivities associated with an anti-foundationalist view of knowledge. They are therefore much more accepting of practitioner and local knowledges.

Anti-foundationalism and authentic, practitioner knowledge

The third point is that modernism and postmodernism, as pairs of binary opposites, are the primary shapers of the way we perceive, produce, and evaluate knowledge. This applies to both learning and research (Usher et al., 1997). What is important for authentic learning is this. Modernist or traditional education practices elevate positivist scientific knowledge. In doing this they thereby downgrade the value or legitimacy of local knowledge. They discount the personal and the particular, and hence the value of practitioner knowledge. Yet, experiential, authentic, learning values the personal and particular knowledges of practitioners (Bryant & Usher, 1997).

Authentic learning as postmodern practice (cont.)

Thus, the choice of a learning paradigm is a choice about how we understand and respond pedagogically to the nature of knowledge. Questions about the nature of learning can no longer be divorced from questions about the nature of knowledge. This is a crucial issue for engaging learners in authentic learning and simulations. The reason being that authentic learning such as in simulations implicitly relies on an anti-foundationalist approach to knowledge and learning. It is an approach to learning that implicitly embodies a view of knowledge construction that values practitioner experience, and therefore *practical* knowledge and *practical* reasoning [9] (Bryant & Usher, 1997, Usher et al. 1997). The foundationalist belief in certainty, objectivity and universally valid truths do not fit with authentic learning scenarios that deal with particular contexts, subjectivities and experiences. For example, the exact same scenario could not elicit exactly the same response in different cultural and temporal contexts.

The root cause of scepticism about authentic learning being a scholarly approach equal to, but different from, traditional approaches to learning and teaching is epistemological. By this I mean that doubts about the value of authentic learning are essentially doubts about its anti-foundationalist view of knowledge. Authentic learning, as a distinctly postmodern practice, builds on the socially constructed nature of knowledge. As such, it is comfortable with, and responsive to, beliefs about the complexities, uncertainties and contextualities that inhere in knowledge construction. It is therefore also distinctly open to the inherent values of practitioner knowledge and hence multiple forms of knowledge.

Authentic learning practices call into question the very assumptions that traditionally structure learning. This includes the curriculum, the learning process, assessment of learning, and the evaluation of learning effectiveness. Authentic learning practices implicitly question the Western positivist–empiricist paradigm. Learning activities that are truly authentic are activities that do not correspond with a technical-rational model of practice (Moore, 2005; Schon, 1991). That is, authentic learning activities do not equate national security policy-making with the unilaterally applicable:

> solving of technical problems through rational decision-making procedures based upon predictive knowledge. [And] the assumption … that the ends to which practice is directed can always be pre-defined and are always knowable (Usher et al., 1997: 126)

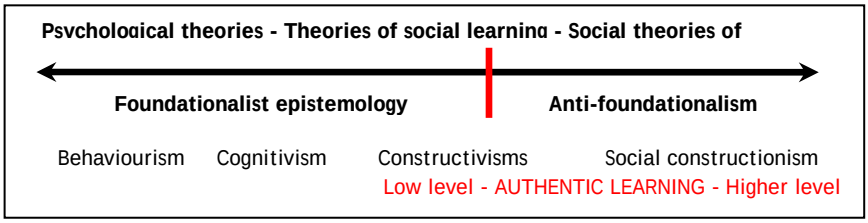
Postmodern educational practices such as authentic learning and simulations represent a general cultural movement away from a belief in, and search for, fundamental truths about reality that have universal validity (Usher et al. 1997; Moore, 2005). This

[9] For a deeper appreciation of the philosophical issues that underpin authentic learning and reasons for skepticism by some traditional academics, Usher, Bryant & Johnston (1997) offer a comprehensive overview of the rupture between the modernist and postmodernist praxis in adult learning and research.

Authentic learning as postmodern practice (cont.)

epistemic rupture occurs most clearly in the shift from *theories of social learning* as found in most forms of constructivism, to social theories of learning found in forms of social constructivism, as shown by the red line in Figure 1.1 (Eijkman, 2004, 2011).

Figure 1.1: Learning theory continuum



Higher-end forms of authentic learning, such as simulations, straddle the epistemic boundary between foundationalism and anti-foundationalism. Authentic learning reflects a worldview that inherently values, rather than devalues, specific cultural, social, political, and economic contexts of knowledge production. This stance legitimises the inclusion of localised and particularised knowledges. It also therefore values, though not uncritically, a multiplicity of practitioner and communal experiences (Usher et al. 1997; Bryant & Usher, 1997).

Hence, as a postmodernist learning theory and practice, social constructionism brings to the surface a view of knowledge that is explicitly anti-foundationalist. Its recognition of the important value of experience in knowledge construction acts to problematise technical-rational models of educational practice such as the transmission mode, content focused and hierarchically organised learning practices of the industrial age. It rejects the notion of a secure universal and value-neutral foundation for knowledge and its associated positivist rules. It greets with incredulity the modernist claim that any method or theory, discourse or tradition, has a universal claim to truth[10] and so constitutes a privileged form of authoritative knowledge (Moore, 2005). As a consequence it exhibits a renewed and much needed interest in the local, the personal and the particular, and thus the valorisation of difference and diversity; be they individual, cultural or contextual. Not surprisingly, simulations reflect a substantive shift in knowledge construction and validation 'increasingly based on specific cultural contexts, on localised and particularised knowledge and the valuing of a multiplicity of experience' (Bryant & Usher 1997).

Therefore, free from the restrictions of a Western positivist paradigm, postmodern authentic educational practices such as

[10] It is important to note that this also applies to Postmodernism. As Usher et al. (1997) point out, postmodernism does not set itself up as another "grand narrative". There is a profound recognition that all paradigms and theories make claims, and that these claims are not truths but "claims which are socially formed, historically located cultural constructs, thus partial and specific to particular discourses and purposes" (Usher et al. 1997: 7).

Authentic learning as postmodern practice (cont.)

simulations shift the focus from *teaching content* to *participation in the processes* of learning. Furthermore, it is participation in the construction of knowledges in a very different way. There is a very different view of both the knowledge to be constructed and the construction process. This enables a much deeper questioning of attitudes, methods, and most importantly, of underpinning assumptions and aims. This includes first and foremost the questioning of scientific objectivity and the significance it attributes to neutral and universally valid knowledge claims.

In essence, post-graduate learning through authentic practices such as simulations—*and especially so in the high risk, high stakes field of national security policy-making*—challenges the positivist myth of the possibility of achieving universally valid knowledge. Authentic learning practitioners much more easily come to an understanding that knowledge is socially and culturally situated and therefore contingent. Practitioners recognize the situatedness of knowledge *and* of themselves as participants in specific contexts. It enables them more easily to explore complex and heterogeneous assumptions, discourses, and experiences that do not fit neatly into pre-established categories. They are empowered to question deeply, to avoid the instinctive following of paradigms often unconsciously and unreflexively held. This is a form of learning hardly possible in traditional learning environments such as in conventional lectures and tutorials (Bruffee, 1999).

The bottom line is that there is a huge difference between knowing something abstractly and being able to make that knowledge actionable. Effective learning is about enabling learners to make knowledge tangible through action (Usher et al. 1997; Siemens, 2004).

Authentic learning practices therefore challenge those educators and researchers embedded in the positivist paradigm to adopt postmodern actions and step outside conventional epistemological boundaries (Bryant & Usher, 1997). This new paradigm is of course also open to critical appraisal. Even so, uninform dismissal of it as an unscholarly approach fails to do justice to a vastly changed intellectual and cultural environment and its new, younger cohort of academics and learners (Dirkx, 2003; Moore, 2005, Bryant & Usher, 1997).

1.1.4 The experiential-authentic learning continuum

1.1.4 The experiential-authentic learning continuum

This section explains how authentic learning forms part of a broader experiential learning continuum. Experiential learning can be substantially, or only partially, authentic. This section explains the location of authentic learning in terms of the wider notion of experiential learning.

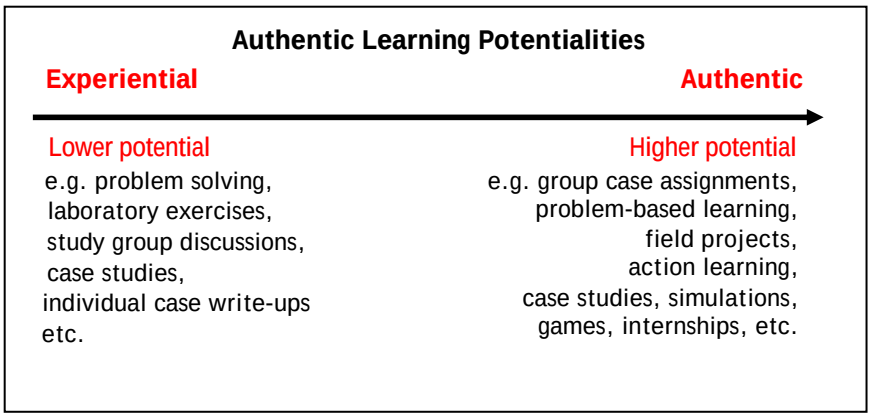
At first glance, we may consign the general orientation of post-

graduate learning at the College under the umbrella term 'experiential.' However, there is good reason for moving away from this highly generic term. Given that it has existed for a considerable time, it is open to a wide range of learning approaches. However the College specifically targets the applied learning of national security policy-making with a preference for simulations, broadly defined.

A representative definition, out of many available, illustrates the point. For Hoover and Whitehead (1976: 25), 'Experiential learning exists when a personally responsible participant cognitively, affectively and behaviourally processes knowledge, skills, and/or attitudes in a learning situation characterized by a high level of active involvement'. Experiential learning thus implies the possibility of a broad range of pedagogies which may or may not involve structured, participative, interactive tasks that incorporate uncertainty and variability. Moreover, experiential learning approaches may or may not involve either actual or representationally accurate engagement involving the whole person (cognitive, behavioural and affective domains). All experiential approaches are also not necessarily critically reflective (Usher et al. 1997; Gentry, 1990).

Based on its key principles of participation, interactivity, real-world contact and variability-uncertainty, experiential learning incorporates a continuum of pedagogies. This ranges from very low to very high levels of authenticity, such as case discussions and game show formats, to studying abroad and service-learning (Gentry, 1990; DePaul University, 2011) as shown in Fig. 1.2 below.

Fig. 1.2: The Experiential-Authentic Learning Continuum



Experiential learning, with its focus on participation, interaction, and exposure to structured learning that features contact with the environment, with all its variabilities and uncertainties, signals a distinct shift from a traditional, teacher-centric content-driven approach to one that is more student/learning and process oriented. This is the case even though 'contact with the environment' as Gentry (1990) points out, whether real or simulated, remains one variable among many. Thus, we can label a wide range of learning practices as 'experiential' even though

The experiential-authentic learning continuum (cont.)

contact with the environment may be minimal. Yet real-world contact, or at very least contact with accurate approximations of the real world, is a core ingredient of the College's pedagogic framework.

It is clear from this continuum, and the learning framework the College wishes to offer its post-graduates, that there is a distinct preference for being able to offer state-of-the-art learning at the high, authentic end of the experiential-authentic learning spectrum. It is here that realistic and professionally meaningful real-world problem-solving useful to practitioners takes centre stage. A core element of constructivist learning approaches is the notion that learners are challenged to construct their own knowledge on the basis of real-life learning experience which, as in real life, involves collaboration with a range of other participants (Honebein, 1996; Galarneau, 2005).

As indicated above, it is useful to conceive of authentic learning as comprising, in various combinations (for no pedagogic practice is either uncontested or homogeneous), a combination of two strands of recent thought in education, namely a focus on real-world practice, and the social turn in learning theory and practice.

Given a desire for such learning spaces, the focus on authentic learning is not only justified but also helpful in constructing, articulating and analysing such spaces for the applied learning of national security policy-making.

1.1.5 Defining authentic learning

1.1.5 Defining authentic learning

This section clarifies the meaning of 'authentic learning', and the notion of authenticity and its implications for practice.

What is 'authentic' in learning? The term 'authentic' is open to narrow as well as broader interpretations. For example, an object such as an antique artefact can be certified as authentic or inauthentic; a social situation can be considered as authentic to lesser or greater degrees. Hence, 'authentic', whether used in regards learning or to assessment, can mean different things to different participants (Palm, 2002, Vos 2011). The point is that various participants may experience a certain task as more, or less authentic depending on their own frame of reference and association with that task as prescribed by its designer/s (Reeves et al. 2002; Vos, 2011). HERDSA considers learning as authentic when

> activities represent the types of complex tasks performed by professionals in the field, rather than decontextualised or contrived activities. Students have access to supporting resources and engage in collaboration, articulation and reflection as they produce outcomes typical of quality performance

Defining authentic learning (cont.)

(HERDSA, 2011: 1).

Authentic learning environments feature:

a. real-world relevance as learning is embedded in social practice;
b. ruthentic tasks, with diversity of outcomes;
c. opportunities for students to examine content and tasks from a variety of perspectives;
d. opportunities for students to collaborate, articulate and reflect; and
e. seamless integration of authentic assessment with tasks (HERDSA, 2011).

Similarly, Rule (2006) proposes the following core principles:

1. the activity involves real-world problems that mimic the work of professionals in the discipline with presentation of findings to audiences beyond the classroom;
2. open-ended inquiry, thinking skills, and metacognition are addressed;
3. students engage in discourse and social learning in a community of learners; and
4. students are empowered through choice to direct their own learning in relevant project work. (Rule, 2006: 2)

Another feature of authentic learning is that, unlike traditional learning, the progress is not linear. As Galarneau (2005: 3) points out, learners 'will play in this environment, encountering both success and failure along the way. Failure may, in fact, be the most critical aspect of this play.'

Nevertheless, creating an authentic environment is not without challenges. For example, we can consider a fully equipped crisis coordination centre as an 'authentic learning environment' (Gulikers et al. 2005). Yet, while it accurately simulates a crisis situation, none of the decisions made will affect anyone. Thus, as Vos (2011) asks, to what extent 'can we still speak of an authentic task, of authentic activities, or of an authentic learning environment?' This question occurs because not all elements of a simulation are necessarily totally, or even partially, authentic. From this holistic viewpoint, if some elements are not authentic, to what degree can we still speak of an authentic learning environment?

The difficulty is resolved when we define 'authenticity' pragmatically rather than holistically. This means recognising that while some aspects of a task or of the learning environment may be authentic, other aspects are, for educational purposes, not authentic. For example, in a crisis coordination centre, all the messages, faxes, requests for interviews, and pressures to make decisions are authentic; yet a simulation will not result in a disaster occurring or being averted as in real life.

This gap between real and realistic means, as Vos (2011:7) suggests, we need to ask 'what are the essential aspects of the original that need to be taken into the definition, and what can

Defining authentic learning (cont.)

be deleted without losing the qualification of authenticity?' For example, decisions made in simulated crisis coordination centres will not result in deaths or injury to persons if errors in judgement are made. Yet this deletion of authenticity does not diminish the value of the simulation as a very effective, and above all safe, learning environment. In fact, deleting certain aspects of authenticity will improve the quality of an authentic learning environment. For example, deleting the consequences of major errors in crisis centre decision-making deletes one aspect of crisis management. However, it is a deletion that enhances its value immeasurably as a learning environment.

As Vos (2011) points out, authenticity therefore only applies to certain aspects of an 'authentic' task rather than to the total learning environment. This is necessary because the educational setting inevitably requires adaptation. Therefore, while some aspects may not be authentic, they can be highly realistic.

Following from this, Barab, Squire and Dueber (2000: 38) note that authenticity is not a feature of the learner, the task, or the environment. Authenticity, they point out, resides 'in the dynamic interactions among these various components … authenticity is manifest in the flow itself, and is not an objective feature of any one component in isolation'. Hence as Vos (2011) concludes, 'Fortunately, not all aspects in a task need to be authentic, but tasks are more engaging if a number of aspects are'. Herrington and Herrington (2006: 3), reflecting on earlier work by Herrington, Oliver and Reeves (2003) and Barab et al. (2000), take this logic even further by arguing that 'it is the *cognitive authenticity* rather than the *physical authenticity* that is of prime importance in the design of authentic learning environments' (original emphasis). However, a dialectic (both/and) rather than dichotomous (either/or) approach may be more productive. From this perspective we can perceive a learning environment as authentic when in our design considerations we pay due attention to:

- *both* cognitive authenticity *and* physical authenticity
- *both* the dynamic interactions among components *and* the objective features of individual components

This approach goes a long way in addressing the problem of 'pre-authentication' as identified by Petraglia (1998a, 1998b). Pre-authentication refers to 'the attempt to make learning materials and environments correspond to the real world *prior to the learner's interaction with them*' (Petraglia 1998a: 53, emphasis added). The point is that what educators see as 'authentic' may not be experienced as such by learners. In other words, educators, in designing an authentic task of necessity pre-determine those elements that are deemed by them to be authentic, or at least realistic.

However, learners may see some aspects of an authentic task as more or less authentic or realistic (Herrington et al. 2002; Reeves et a. 2002). This is important because, ultimately, authentic learning tasks inevitably invite participants to suspend their

disbelief. Moreover, this suspension of disbelief does not impact negatively on the power of a specific authentic learning task. As stressed by Herrington et al. (2002: 60) 'There is increasing evidence that in order to fully engage with an authentic task or problem-based scenario, students need to engage with a process that is familiar to moviegoers throughout the world—the suspension of disbelief.' Moreover, potential problems associated with pre-authentication can also be minimised by including learners as much as possible in the design and conduct of authentic learning tasks (Hsui-Mei, 2002).

With the above point in mind, we may, in closing this section, summarise authentic learning as follows:

> Authentic learning embeds learners in inherently process focused, participatory, and multidisciplinary environments. These environments, whether in real or virtual mode, focus on complex, open-ended, real world problem solving tasks and produce outcomes that have meaning beyond the learning environment (Reeves, Herrington & Oliver, 2002; Lombardi, 2007; Newmann & Wehlage, 1993; Rule 2006).

Having clarified the concept of authentic learning, we now turn to its development. As can be seen from the above discussion, defining authentic learning is challenging given the broad range of options from low to high levels of authenticity. However, it is easier to identify widely accepted criteria, standards and elements of authentic learning that offer practical guidelines to assist educators in the design of genuinely authentic learning tasks.

1.1.6 The development of authentic learning as a practice

1.1.6 The development of authentic learning

This section elaborates on the development of authentic learning as a practice. The aim is to enable readers to locate authentic learning as an educational practice with a substantive history. As such this section provides implicit evidence of the efficacy of authentic learning. Although not in the form of positivist empiricist evidence, we can draw upon a long history of evidence based on practitioner knowledge and experiences (Usher et al. 1997).

The term 'authentic learning' may be new, the concept not necessarily so. As pointed out by Lombardi (2007), authentic learning has a long history dating back to the time of medieval, apprenticeship-based on-the-job training. That said, authentic learning is popularly seen as a pedagogic practice that emerged from its experiential roots around the late 1980s and early 1990s. This, as indicated above, is only one aspect of its antecedents however: other forces in the field of education were also at work. While many educators were increasingly focusing on the value of real-world learning, there was a corresponding questioning of behaviourist and cognitivist individualistic, teacher-centric and content-driven thinking and practice.

Authentic practice in learning and assessment arose from a distinct interest in fostering learning with a real world connection. This is evident from the popular emergence of more high-end experiential pedagogies. These focused more specifically on immersing learners in environments that simulated their worlds outside the classroom. Although the term 'authentic learning' is relatively recent, the idea of learning in contexts that promote real-life applications of knowledge goes back at least four decades (Bruner, 1960). One example is the ways in which Resnick's (1987) bridging apprenticeships connected theoretical learning in the classroom to application of knowledge in the work environment. Another example is that of 'situated learning.' This refers to 'learning knowledge and skills in contexts that reflect the way the knowledge will be useful in real life' (Collins, 1988: 2). Other classic texts heralding the development of authentic learning as a distinct pedagogic practice include, for example, Brown, Collins & Duguid (1988); and Collins, Brown & Newman (1989). Jonassen, a key figure in the development of constructivism, believes that learners need interesting, relevant, and meaningful problems to solve. Such real world problems must be ill-structured. This allows learners to seek out solutions to a problem for which there is no single right answer or single solution. Constructivist learning environments engage the learner in complex thinking exercises that require reasoning and investigation of the problem to be undertaken. Learners must construct their own theories to make sense of the situation (Jonassen, 1999a). Similar concepts underpin Problem-Based Learning (PBL), which has also a long and proven history of effectiveness, especially in medical education (Boud & Feletti, 1991).

Many recent instructional theories focus on authentic tasks. Their design helps learners to integrate knowledge, skills and attitudes. This includes coordinating discrete skills to perform complex tasks, and transferring learning to real-life settings.

We can describe many approaches developed or popularised in the 1970s–90s as authentic tasks. These include, for example: project-based learning; the case method; Problem-Based Learning (Boud & Feletti, 1991); cognitive apprenticeships (Collins, Brown, & Newman, 1989); situated learning (Lave & Wenger, 1991); constructive learning environments (Jonassen, 1999), collaborative problem solving (Nelson, 1999); action learning (Revans, 1980); and scenario planning (Schoemaker & van der Heijden, 1992; Schank, Berman, & MacPherson, 1999). These and similar approaches in higher education and organizational learning play a major role in highlighting the benefits of working on real-life or simulated real-life problems. Part 2 will further explain a number of these methods.

At approximately the same time, and beginning with figures such as Bandura (1986) and Vygotsky (1978), there emerged a growing critique of—and resistance to—the dominance of psychology's individualist thinking in education. From around the early 1990s there surfaced a new epistemic paradigm, one centred around

The development of authentic learning (cont.)

the *social* construction of knowledge, known alternately as constructivism (Jonassen et al., 1993; Jonassen, 1997, 1999), social constructivism (Palincsar, 1998; Pinch, 1996; Hacking, 1999) and, later, social constructionism (Gergen, 2003; Hruby, 2001; Eijkman, 2004). This broad church exemplifies the adoption of social theories of learning. The point of this swing to the social (as elaborated below) is that it does not necessarily negate all psychological insights into learning. The turn to the social is, at minimum, designed to place the psychological in its broader socio-cultural context (Eijkman 2004). This phenomenon, now at least two decades old, represents a major challenge to the dominance of psychologism and individualistic decontextualised learning. Moreover, its ongoing global use in all sectors of education and in organisations provides ample evidence, by way of practitioner testimony, of the efficacy of authentic learning.

Hence, the emergence of *theories of social learning* and, more recently, of *social theories of learning* mark a pivotal turning point in the ways in which learning is conceptualised and evaluated (Eijkman, 2004, 2011; Gergen, 2003). The dominant current view of the field is that behaviourist and cognitivist theories possess incomplete and inadequate understandings of learning and how to promote it. The shift to an increasingly social understanding of knowledge and learning highlights learning as highly contextualised rather than context independent. It may become increasingly difficult for university educators, such as Laurillard (2002), to justify their institutionalised teaching of abstract, second order knowledges (Eijkman, 2004). The professional real-life context of learning has gained prominence. Additionally, as in the workplace, the primary agent of learning is no longer the sole individual but the community or network of practice to which they belong or into which they are being acculturated (Wenger 1998; Eijkman 2004).

This has significant implications for educational institutions wishing to be consistent in their educational processes ('message systems'). Authentic learning is fundamentally different from the traditional industrial-age learning paradigm that still implicitly informs a considerable amount of higher education practice at both under- and post-graduate levels.

Central to traditional learning in industrial age, higher education is the classroom. The design and structure of classroom spaces support a traditional modernist approach to learning and teaching. Seating arrangements stress the individuality of learners. The layout betrays the hierarchical organisation of learning and the primacy of content above process. These spaces are intended for the transmission of abstract and fragmented information into the heads of individual learners. These are to various degrees considered to be in a deficit state (Senge, 2000).

Photo 1

The development of authentic learning (cont.)

On the other hand, authentic learning is the product of the convergence of two new and mutually supportive ways of thinking about learning. It foregrounds the professional context that drives learning in the first place. There is recognition of the underlying sociability of both professional practice and learning. In so doing, it problematises and breaks away from the industrial age model of learning. Learning is about acculturation into a community of practice, and is therefore always inherently social, even if only in its core purpose of enhancing one's competence within a specific professional context (Wenger, 1998, Eijkman, 2004). Thus, authentic learning involves a range of people of various status positions in holistic processes of solving multi-faceted and complex, ill-defined problems in collaborative, multidisciplinary settings (Reeves et al., 2002).

Photo 2

Two key points in the shift to constructivism and authentic learning are worth noting. First, it indicates at least one reason for unease in academia. That is:

> authentic learning environments are *not content driven*—they are *process driven*—and require students to complete complex real-world tasks over a period of time in collaboration with others as they would in a real workplace (Parker, 2011, emphasis added).

Second, it highlights and strengthens the nexus between teaching/learning and research. The immersion of learners in real-world focused research transcends the still dominant dichotomous thinking and practice that informs the division between teaching and research (Healey & Jenkins 2005; Healey 2005). Authentic learning practices, especially those at the deeper end of the authentic learning continuum, are actually research-based curricula. This is because they immerse learners in inquiry or research-based learning (Healey, 2005).

It is clear that authentic learning is not a continuation of the old but represents a transformation in learning. It is founded upon a distinctly different set of philosophical beliefs and theoretical assumptions about learning. Authentic learning signals a paradigm shift, a radical departure from traditional educational practices in learning and assessment (Anderson & Speck, 1998). Authentic learning and assessment operates out of a very different set of epistemic

The development of authentic learning (cont.)

principles. Here the conceptualisation of knowledge is inherently social: its associated knowledge construction practices are incompatible with, and oppositional to, traditionalist thinking and practice. Authentic learning and assessment requires educators to adopt a different mind-set, a social, context-driven, process-oriented, mental model of learning. This applies to all three of the message systems of education: curriculum, pedagogy and assessment.

In brief, choosing a paradigm for a learning framework that is coherent means having to choose between two different philosophical perspectives of learning, and hence of the design of curriculum, pedagogy, and assessment. The orientation might be traditional, hierarchical, teacher-centric, and focused on teaching fragmented, abstract content to decontextualised individuals. On the other hand, the orientation can be post-modern. This entails opting for a much more collaborative, learner-centric, process-oriented, inquiry-based model. This orientation focuses on facilitating more holistic context-driven problem-solving processes. Here the primary agent of learning is not the individual but the community or network of practice to which participants belong, or into which they are being acculturated (Wenger 1998; Eijkman 2004).

Photo Acknowledgments Photo 1 p.37: 123RF royalty free stock photos: http://www.123rf.com/photo_8606829_3d-rendering-of-a-classical-school-classroom-with-mathematic-formulae-in-the-blackboard.html

Photo 2, p.37: Good Design: http://www.good.is/post/the-design-difference-using-design-to-conduct-a-problem-solving-workshop/

1.1.7 Key attributes of authentic learning

Key attributes of effective authentic learning

This section signals a shift from the theoretical to the practical aspects of authentic learning. It begins to put flesh on the bones of authentic learning. The focus here is on the development of authentic learning as a grounded practice.

The last part of research question 1 invites us to consider *'ways to make [authentic] learning most effective'*

According to Lombardi (2007: 2) the immersion of students in authentic learning enables them to practice a set of five 'portable' skills required in any professional context, namely:

1. distinguish reliable from unreliable information (make accurate or reliable judgements);

Key attributes of effective authentic learning (cont.)

2. follow long arguments across multiple modalities (the ability to synthesise);
3. discover and share relevant information in a credible manner (engage in research);
4. learn abstract concepts by applying them appropriately in real-world contexts (the ability to engage in practice); and
5. generate alternative solutions that work across disciplinary and cultural boundaries (collaborate and negotiate).

However, this begs the question of what is required to optimise the learning of such skills. What conditions best promote the effective learning of such professional knowledge, skills and attitudes, and especially so at post-graduate level?

Despite the vast literature on authentic learning, only a few scholars have generated a widely accepted set of criteria, standards or guidelines for the design of effective authentic learning. To identify key features of authentic learning, this section relies on four sets of scholars: Rule, (2006), Newmann and Wehlage (1993), Herrington and Kervin, (2007) and Reeves, Herrington and Oliver (2002). While there are some variations in emphasis, there is a clear thread of common characteristics.

Rule (2006) reviewed forty-five articles chosen by faculty members in the School of Education at the State University of New York (Oswego). These constituted the best practices of authentic learning in their disciplines. Based on a content analysis of these articles, Rule (2006: 2) found that effective research-based learning is promoted when activities involve:

1. real-world problems that mimic the work of professionals in the discipline with presentation of findings to audiences beyond the classroom;
2. open-ended inquiry, thinking skills and metacognition;
3. engagement in discourse and social learning in a community of learners; and
4. student empowerment strategies that enable self-directed learning in relevant project work.

Succinctly put, the key criteria of authentic learning at minimum comprise four elements: (1) participation and collaboration in working on (2) open-ended (3) real world problems via (4) self-directed project work (Rule, 2006).

Newmann and Wehlage (1993), at a much earlier time and focused on school education, proposed a set of three criteria for initiating restructuring towards authentic learning. Their three principles are equally applicable to the restructuring of traditional higher education courses. Effective authentic learning environments must enable learners to:

1. construct meaning and produce knowledge;
2. use disciplined inquiry to construct meaning; and
3. aim their work toward production of discourse, products,

and performances that have value or meaning beyond success in school (Newmann & Wehlage 1993: 8).

To complement these three principles, Newmann and Wehlage (1993: 9-11) recommend the use of an evaluation tool in which the potential effectiveness of authentic learning activities can be rated according to five standards:

Key attributes of effective authentic learning (cont.)

1. **Higher order thinking:** student immersion in learning environments where there is some degree of uncertainty and unpredictability. This requires students to engage in higher-order thinking by having to 'manipulate information and ideas in ways that transform their meaning and implications' Newmann and Wehlage (1993:10).
2. **Depth of knowledge:** students demonstrate depth of knowledge when they can make clear distinctions, develop arguments, solve problems, construct explanations and otherwise work with complex understandings.
3. **Connectedness to the world beyond the classroom:** authentic learning will gain in effectiveness the more there is a connection to the larger social context within which learners operate. This may include influencing an audience beyond their academic learning environment, such as sharing their knowledge with others, advocating solutions, or creating performances or products that have value outside the classroom.
4. **Substantive conversation:** the three indicators of substantive conversations are:
   a. considerable interactivity around issues that involve higher order thinking;
   b. sharing ideas in unscripted and uncontrolled situations; and
   c. dialogue that builds coherently on participants' ideas to promote improved collective understanding of a theme or topic.
5. **Social support for student achievement:** the social support scale involves high expectations and respect for, and inclusion of, all students in the learning process. Social support is high when facilitators convey high expectations for all learners. This includes impressing on them the importance of taking risks and creating a climate of mutual respect among all participants to promote success by all. Social support is deemed strong when the learning environment is characterised by high expectations, challenging work, strong effort, mutual respect and assistance in achievement for all learners (Newmann & Wehlage, 1993: 9-12).

Even at this point, it is clear that the personal and the subjective, the centrality of experience and of collaboration in social and real-world contexts are already writ large. Also, as Herrington and Kervin (2007) point out, a critical reading of principal theorists of constructivism and authentic learning

'reveals a number of important characteristics which have added to the evolving theory of authentic learning.'

By way of a substantive summary that builds on the above indicators, on the basis of the work by both Herrington and Kervin (2007) and Reeves et al. (2002) and the criteria listed above, we may usefully consider effective authentic learning environments to be those that:

Key attributes of effective authentic learning (cont.)

1. provide real-world relevance that reflect the ways in which knowledge is used in real life (e.g., Brown, Collins, & Duguid, 1989; Collins, 1988; Gulikers, Bastiaens, & Martens, 2005; Lebow & Wager, 1994; Cronin, 1993; Oliver & Omari, 1999; Cognition & Technology Group at Vanderbilt, 1990a; Jonassen, 1991; Resnick, 1987; Winn, 1993; Young, 1993);
2. provide complex and ill-defined problems (e.g. Sternberg, Wagner, & Okagaki, 1993; Lebow & Wager, 1994; Bransford, Vye, Kinzer, & Risko, 1990; Young, 1993; Cognition & Technology Group at Vanderbilt, 1990a; Winn, 1993; Brown et al. 1989; Jonassen, 1991);
3. engage students in sustained investigation (Lebow & Wager, 1994; Bransford, Vye et al., 1990; Cognition & Technology Group at Vanderbilt, 1990b; Jonassen, 1991);
4. *Provide access to expert performances and the modelling of processes* (e.g. Collins, Brown, & Newman, 1989; Lave & Wenger, 1991)
5. provide multiple sources and perspectives (e.g., Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990; Bransford, Vye et al., 1990; Honebein, Duffy, & Fishman, 1993; Lave & Wenger, 1991; Spiro, Feltovich, Jacobson, & Coulson, 1991; Sternberg et al., 1993; Young, 1993; Cognition & Technology Group at Vanderbilt, 1990b);
6. support the collaborative construction of knowledge (e.g., Bransford, Sherwood et al. 1990; Brown, Collins, & Duguid, 1989; Lebow & Wager, 1994; Young, 1993; Gordon, 1998; Wenger, 1998);
7. promote reflection to enable abstractions to be formed (e.g., Boud, Keogh, & Walker, 1985; Norman, 1993; Young, 1993; Myers, 1993; Gordon, 1998);
8. promote articulation to enable tacit knowledge to be made explicit (Lave & Wenger, 1991; Pea, 1991; Vygotsky, 1978);
9. provide coaching by the facilitator[11] at critical times, including the scaffolding and shadowing of teacher support (e.g., Collins, 1988; Collins, Brown, & Newman, 1989; Greenfield, 1984; Harley, 1993);

[11] The term 'facilitator' is used instead of lecturer, as the latter term is incompatible with authentic learning; the term 'lecturer' fits the positivist, teacher-centered, content-driven approach. In postmodern oriented authentic learning educators take on the role of coach, mentor or guide (Herrington & Kervin, 2007). In authentic learning academics are first and foremost process facilitators, not deliverers of content (cf Part 2).

10. provide for the seamlessly integrated assessment of learning (e.g., Gulikers, Bastiaens, & Kirschner, 2004; Herrington & Herrington, 1998; McLellan, 1993; Reeves & Okey, 1996; Young, 1993, 1995);
11. enable the creation of whole, polished products valuable in their own right (Barab, Squire, & Dueber, 2000; Gordon, 1998);
12. allow competing solutions and diversity of outcomes (Duchastel, 1997; Bottge & Hasselbring, 1993; Young & McNeese, 1993; Bransford, Sherwood et al., 1990; Bransford, Vye et al., 1990).

Annexure 1.1 outlines this set of criteria in the form of a checklist provided by Herrington and Oliver (2000: 4-6) that includes an extended set of references as evidentiary support.

In closing this section, two points need to be made. First, these twelve characteristics—whether transposed in lists of nine (Herrington & Kervin, 2007) or ten (Reeves et al., 2002)—reflect the characteristics of real-life professional practice. The important implication here is that learning is not primarily a cognitive activity but rather involves acculturation into a community of practice (Wenger, 1998; Bruffee, 1999; Eijkman, 2004). Learning is therefore a trajectory of participation in which newcomers are mentored and coached by experienced seniors and acculturated into the genres and practices of their respective disciplines. The aim of learning is to become competent members of a specific community of practice (Wenger, 1998). It is, as Brown (1999: 11) points out, through immersion in these 'ways of being' that competent members of a community of practice 'recognize whether a problem is an important problem, or a solution an elegant solution, or even what constitutes a solution in the first place.'

Second, as Reeves et al. point out,

> Learning environments designed according to these guidelines can be offered successfully in a variety of modes. On-campus courses can be well accommodated, and there is a history of the success of this approach in modern applications of the apprenticeship system, work-based learning and internships (Reeves et al., 2002: 565).

Part II: The role of simulation/gaming in applied policy devlopment

'You Can't Learn to Ride a Bicycle from a Book'[12]

2.1 Introduction

This section provides the definitional and conceptual basis for outcomes 1, 2, 3. & 4

Following on from Part I, this section introduces the topic of simulations for policy development in on-campus, post-graduate education. Beginning with an overview of the structure of this part of the report, this section will help you to appreciate:

2.1.1 the importance of a common conceptual framework and terminology and a well-defined vocabulary; and more specifically

2.1.2 the definitions of simulation, its methods, modes and forms; and distinctions between game/gaming, play, and fidelity.

Introduction to Part II

In terms of national security, the events of 9/11 in the United States 'propelled simulations to the top shelf of the crisis management toolbox' (Boin, Kofman-Bos, & Overdijk, 2004: 378). One of the reasons for the popularity of simulations, at least in some government and organizational circles, is that they can effectively bridge the gap between theory and practice. Simulations provide participants with real-life settings and experiences that enable them, in a two-way process, to directly link theoretical insights to policy development and crisis dilemmas (Boin et al. 2004).

This second part of the report builds on the theme of the first part, and demonstrates how simulations as forms of authentic learning are well placed to bridge the complex relationship between knowledge and professional action in policy development at post-graduate level.

The learning framework focus of the National Security College ('the College') is on *applied* policymaking in on-campus settings. It therefore already deploys various forms of authentic learning in support of applied policy development. This includes time-honoured and conventional authentic methods such as case studies, hypotheticals, policy briefings, etc.

Part II of this report explores the ways in which well-designed and facilitated simulations can provide valuable opportunities for the College to broaden its suite of authentic learning methods and provide its post-graduates with opportunities for deeper immersion in the applied learning of public policy development.

The part of the report therefore provides the College with the opportunity to reflect on and extend its current repertoire of

[12] From Aldridge, C. (2009: 12)

Introduction To Part II (cont.)

authentic learning methods, bring a new dimension to the concept of applied policy-making, and thus assist in producing outstanding graduates in national security policymaking.

Accordingly, Part II aims to enhance familiarity with and knowledge about these four outcomes:

1. the methods used to simulate policy development and related activities like strategy planning in educational environments, with special reference to the development of national security policymaking (NSPM);
2. policy simulation methods that could be adopted to enhance learning at the National Security College and similar institutions, including the teaching skills, technology and resource implications of each;
3. the role of technology in enhancing learning experience in the area of policy development simulations; and
4. ways to assess the effectiveness of learning through simulation.

Discussion points:

1. *What is your perception of simulations, games and videogames as potential sources of learning in national security policy development?*
2. *What informs your perceptions?*
3. *Have you had experience in role-plays, case studies, scenario planning, and digital gaming? If so, how would you rate these activities as learning experiences?*
4. *What, if any, are your reservations about simulations and gaming in academic settings, especially at the post-graduate level?*

The scope of Part II

Given the directive to focus on simulations in the context of authentic learning methods, this second part will not address the historical development of simulations and gaming, nor the field of computer modelling. The references provide ample resources to point readers in that direction. Moreover, the scope specifically demands a focus on simulations dealing with, or relevant to, national policy development. Therefore this report does not give—nor is intended to give—an exhaustive overview of the field of analog and digital simulations. What this report does deliver is an informative and accessible overview of key issues around simulations and gaming relevant to national security policy development.

Introduction To Part II (cont.)

The structure of Part II

Part II consists of six Sections.

- *Section 2.1 – Introduction:* this section provides the definitional and conceptual basis for outcomes 1, 2, 3, & 4. Following on from Part I, this section introduces the topic of simulations for policy development in on-campus post-graduate education. Beginning with an overview of the structure of this part of the report, this section will help you to appreciate:
  - 2.1.1 the importance of a common conceptual framework and terminology and a well-defined vocabulary; and more specifically,
  - 2.1.2 the definitions of simulation, its methods, modes and forms; game/gaming; play; and fidelity.
- *Section 2.2 - Simulation methods in public policy development:* this section addresses outcome 1. It addresses the methodological issues of analog simulations in on-campus learning of public policy development. This section enables you to appreciate that:
  - 2.2.1 simulations are a well-established high-end form of authentic learning;
  - 2.2.2 simulations are a proven learning method in the messy complexities of policymaking;
  - 2.2.3 simulations as a serious learning method for public policy development; and
  - 2.2.4 as a learning method, simulations have a specific conceptual framework or discourse.
- *Section 2.3 - Simulation methods in national security policy development:* this section addresses outcome 2. It identifies the policy simulation methods that could be adopted to enhance learning at the National Security College and similar institutions, including teaching skills, technology and resource implications. This section enables you to appreciate;
  - 2.3.1 the proven high-end examples of simulation methods in public policy development (PPD) and related fields, including examples from higher education for each, that specifically include:
    - policy exercises;
    - scenario thinking/planning; and
    - crisis simulations.
  - 2.3.2 specific examples of policy development simulations in national security settings; and
  - 2.3.3 teaching skills, technology and resource implications.
- *Section 2.4 – The roles of technology:* this section addresses outcome 3. It identifies the roles of technology

Introduction To Part II (cont.)

in enhancing the learning experience in the area of policy development simulations. This section will help you to appreciate:

2.4.1 how digital technologies are reshaping the world of simulations and gaming; and

2.4.2 the ways in which digital technologies can support the analog simulation learning experience.

- *Section 2.5 - Simulation methods in national security policy development:* this section addresses outcome 4. It examines the effectiveness of learning through simulations. This section will help you to appreciate:

  2.5.1 the debates about evaluating the learning effectiveness of simulations and how new assessment and evaluation processes will support practice and research.

- *Section 2.6 – Assessing learning effectiveness in simulations:* this section also addresses outcome 4. It examines the effectiveness of learning through simulations, and will help you to appreciate:

  2.5.1 issues about the learning effectiveness of simulations and how new assessment and evaluation processes will support practice and research.

- *Section 2.7 – Recommendations:* this section contains recommendations for the potential use of authentic learning in general and simulations more specifically

The report also contains an extensive bibliography (Parts I and II) and *Annexures* to support further reading and research.

2.1.2 Key concepts and definitions

2.1.2 Key concepts

Developing common conceptual ground

The field of simulations and gaming is replete with fluid and controversial definitions, conflicting concepts, multiple ambiguous taxonomies, and contested typologies (Breuer & Bente, 2010; Becker & Parker, 2011). This means that while there are some commonalities, there are many different ways in which to use key terms, for example, 'simulations', 'serious games', and 'play'. Users of these and other key terms associated with the fields of simulations/gaming and education will have different mental models, and attribute different meanings, to many of those terms (Aldridge, 2009; Klabbers, 2006; Crookall, 2010).

Under these circumstances it is imperative that from the outset we proceed with a common conceptual framework, clear terminology, and a well-defined vocabulary. As Shaw and Gaines (1989) point out, the problem occurs when people use the same terminology and concepts that have varying meanings for different people (in different disciplines). Continuing—sometimes heated—debates indicate that achieving this is not a matter of merely providing a glossary. A key issue is that the field of simulations and gaming is itself diverse and fragmented because its practitioners come from a wide range of different disciplines, as do the readers of this report. Each discipline brings to this field its own culture and vocabulary (Becher & Trowler, 2001). The resultant and often persistent communication problems invariably hinder good dialogue (or 'multilogue', as Richard Duke, 1974, would say) among participants in a given project or, more importantly here, the readers of this report. This becomes patently clear later in this report when we look at the evaluation of effectiveness.

Clarifying and defining key terms establishes the context for the descriptions, concepts, and explanations used in this report and pave the way for a constructive conversation. While these definitions may not be the familiar ones, they are the most useful for the purposes of this report. For clarity, the major concepts and definitions, such as simulation, game, play, and fidelity are important enough to warrant a relatively substantial explanation and working definitions where applicable, especially when some terms are used interchangeably or may have negative connotations for some educational practitioners.

Simulations

In education, up until the 1980s the terms simulation, games, and gaming were used interchangeably. This, however, is no longer appropriate. The upsurge of digital games has introduced a whole new dimension to simulations. Even today the field is

Key concepts (cont.)

often referred to synonymously as simulations/games, even though while all games are simulations, not all simulations are games (Becker & Parker, 2011).

Drawing primarily on Mayer (2009: 825) this report uses the following working definition:

> Simulations refer to a broad genre of experiences gained through experi(m)ent(i)al, rule-based, interactive environments, whether analog or digital, that capture and model some parts of reality, and the roles of people in it, and where players learn by taking actions and by experiencing their effects through feedback mechanisms that are deliberately built into and around the simulation.

The field of simulations

The field of simulations is extensive, and covers a wide array of theories, methods, and practices. For the purposes of this report the focus is on three general methods or categories: *analog, digital,* and *hybrid* simulations (Bogost, 2007; Crookall, 2010; Becker & Parker, 2011):

- **analog simulations** refers to the traditional live-action simulations in which real-world situations are played out in safe environments. This includes live-action role-play activities, such as in educational role-plays and operational and strategy games in military-political war games, etc. Even currently in educational circles, the term 'simulation' usually refers to analog or live-action activities (Becker & Parker, 2011);
- **digital simulations** refers similarly to the playing-out of real world situations[13] involving one or more persons, but in this case with the aid of a digital device, usually a computer or game console, but that too is rapidly changing with mobile technologies (De Freitas, 2007).
- **hybrid simulations** refers to simulations that make use of various combinations of analog (live-action, human-to-human) and digital (computer-based) simulations.

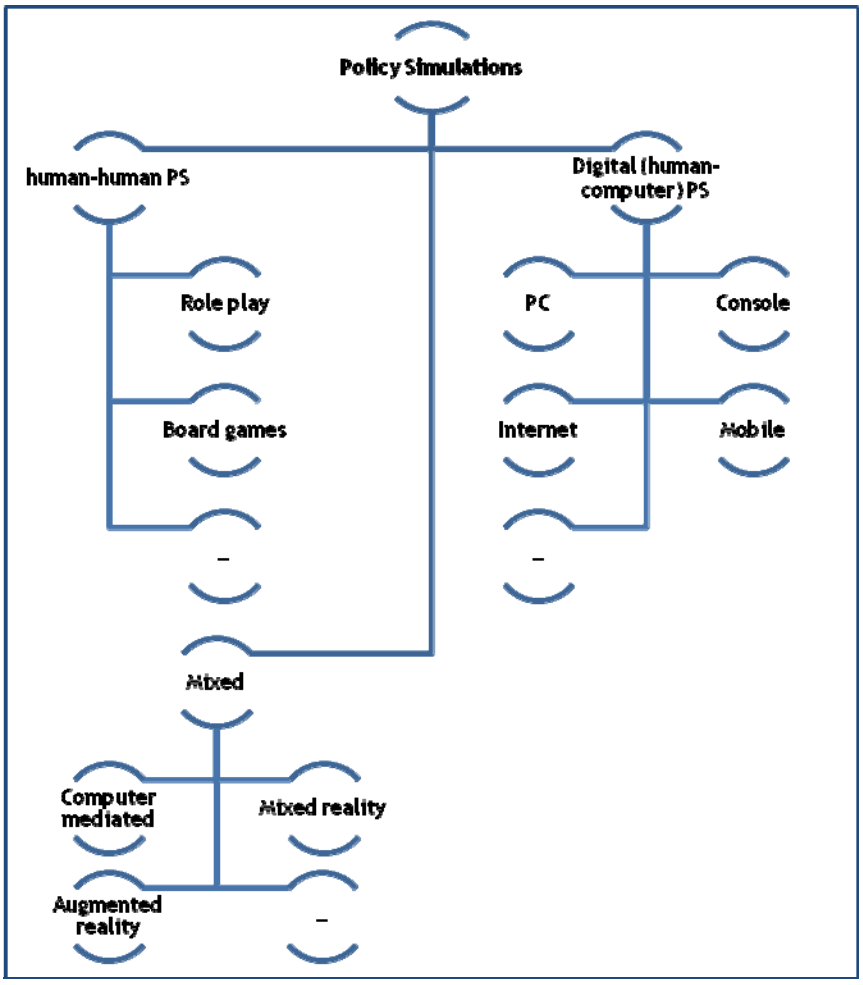
Modes of policy development simulations

It is clear from developments in the field that there is a growing category of policy development-related simulations designed to assist those engaged in the policy development process to enhance their knowledge about, and their skills in, strategic negotiation and decision making. The technological push factor, in particular, makes for ongoing expanded opportunities for digital simulations and combinations of digital-analog interaction simulations, such as in virtual worlds and 3D simulations, as shown in Figure 2.1.

[13] Though simulations can also involve fantasy worlds. For a discussion see Becker & Parker (2010)

Key concepts (cont.)

Fig. 2.1 Modes of policy simulations (PS)



(Adapted from Mayer (n.d.: 30) with permission)

Forms of simulations: the rules of the game

The essential components of any simulation are (1) the actors, (2) the rules, and (3) the resources. While of course all three are critical, it is the decisions about the form of the rules that has a major bearing on the shape a simulation takes (Boin et al., 2004; Klabbers, 2006; Mayer, 2009). Hence, the critical distinctions are between rule-based, principle-based and free-form simulations:

- In *rule-based* simulations, participants have to play by a set of rigid rules. These are unchangeable and therefore cannot be questioned. These simulations typically begin with the instruction, 'This is the problem: how will you solve it?' This form of simulation is geared towards a convergence of ideas and/or actions (Klabbers, 2006).

  The initial emphasis on military games lay on what was characterised as rigid (rule-based) gaming. 'The rigid-form

Key concepts (cont.)

game is characterized by the pre-specification of objects and rules that, taken together, determine the legitimacy of play and rigorously define the game' (Mayer, 2009: 829).

While reasonable for some contexts, this is certainly not compatible with public policy development processes which deal with messy and complex soft systems and socio-political complexities. Moreover, if simulations conform too rigidly to set scenarios and rules, participants soon realise that they cannot seriously affect the final outcome because the situation is predetermined. 'An overload of pre-formulated messages and predesigned interventions by the simulation staff almost guarantees that the participants will act and decide in accordance with the preconceived outcome of the scenario' (Boin et al. 2004: 383). This rigidity easily undermines the success of policy development simulations. In response, different forms of gaming have emerged that offer more opportunities for input to participants.

- In *principle-based* simulations participants, before acting, can interpret the rules based on underlying norms. Though they have the freedom to explore and act on the meaning of the rules and the principles upon which they are based, the rules themselves are unchangeable.
- *Free-form* simulations only feature a small number of ground rules, such as the start and end rules, the location in which the scenario takes place, and the role of the facilitator or facilitation team etc. Though a simulation director or team guides and monitors the process, participants can challenge, create and improve positions, roles, objects, and rules. Hence all other applicable rules 'evolve during the game and are being negotiated and shaped by the actors themselves. Therefore free form games are self-organising or self-reproductive systems' (Klabbers, 2006: 18). Because free form simulations are less formalised, they depend more heavily on the subject matter expertise and experience of the participants, the simulation director/team, and the quality of the scenario (Mayer, 2009). Free form simulations tend to begin with, 'This is the situation: how will you deal with it?' and as such are more open to divergence and an acceptance of multiple realities.

The decision at the level of rules is a major game-play determinant. It is the linkages between the rules and resources that define differences in simulation forms. It is an important distinction, though underplayed in the literature, according to Klabbers (2006).

Again these are not a matter of either/or decisions, but where on the 'rigidity-freedom continuum' a simulation is best placed to meet simulation-game expectations of the participants as well as the desired learning outcomes set by the simulation team. The choice, as Klabbers (2006: 46), point out 'depends on purpose, context of use, and the intended audience.'

Games/gaming

Key concepts (cont.)

To grasp the meanings and potentials of gaming and play is an important goal for many disciplines as each has different theoretical backgrounds and methodologies. This diversity results in a many-sided image of gaming and playing, which makes building bridges between different perspectives both necessary and difficult. This is especially the case with the discipline of education where, in many quarters, games, gaming, and play still have negative connotations.

There is a substantial quantity of literature on this topic, clearly out of scope of this report, but it will nonetheless suffice to make two points.

When Wittgenstein (1953) observed that it is almost impossible to define the term 'game', his point was that we do not possess a clear-cut definition of a game *and we don't need one*! 'The meaning of the term 'game' shows itself in its use. A 'Game' does not exist in a cultural or social vacuum … Everybody in a certain cultural setting understands what we mean when we talk about playing a game' (Klabbers, 2006).

Second, the reason why the terms game, gaming and play are problematic is, to be blunt, because in conservative academic circles these are seen to be antithetical to serious academic learning. Again, the voluminous academic literature on the value of games and play in human existence—let alone in informal and formal learning—is clearly out of the scope of this report.[14] However, there is also a long history in academia that recognises the importance of games and that it is a field serious enough to warrant Nobel Prizes (e.g. for game theory: John Nash in 1994, and Thomas Schelling and Robert Aumann in 2005; cf. Klabbers, 2006: 12).

As for a working definition:

> A game is any contest or effort (play) among adversaries or teammates (players) operating under constraints (rules and resources) for an objective (winning, victory, prestige, status, or pay-off). The exercise, or activity, should involve overt competition, or cooperation between the individuals or teams, who are competing against each other, or together (while jointly conquering circumstances) fighting the odds. (Klabbers, 2006: 28)

Play

The term 'play' and the diversity of forms of play make for multiple connotations and ambiguities (Huizinga, 1950; Sutton-Smith, 2001). Again, this term is a problem made by academics who wrongly juxtapose play as a lightweight frivolous activity against the gravitas of the seriousness of learning. However, as Huizinga (1950) stressed, while the terms 'play' and 'serious' are not mutually exclusive, the play concept is much wider and of a higher order. 'Players can be both playful and serious while

[14] For useful and accessible introductions see Makedon (1984) and Klabbers (2006).

Key concepts (cont.)

playing … Seriousness seeks to exclude play, whereas play can very well include seriousness' (Klabbers, 2006: 4). Becker and Parker (2012: 61) therefore correctly stress that 'the way we delineate the borders defining what is and is not a game does have implications for practice'.

Because 'play' is a cultural form, it is never open to a neutral interpretation. There are always differences between how games are experienced and how they are perceived (Sutton-Smith, 2001). Hence, play, as a working definition, is considered as

> a voluntary activity or occupation, executed within fixed limits of time and place, according to rules freely accepted but absolutely binding, having its aim in itself and accompanied by a feeling of tension, joy, and the awareness that it is different from ordinary life (Klabbers, 2006: 20)

To borrow from Marshall McLuhan, the bottom line is: anyone who makes a distinction between games, play and education clearly does not know the first thing about any of them.[15]

Policy development simulations blend two elements:

Simulation: A purposeful, valid, accurate, and formalised dynamic representation of reality,

Game: An activity based upon a rule-set, imaginative, creative, with engaging social interaction (players), experiential, immersion, etc.

(Mayer, n.d.: 46)

Simulation fidelity

Fidelity is a key concept for public policy simulations. It highlights the importance of providing post-graduate students, with a policy process environment that is realistic and enables them to engage and maintain their suspension of disbelief. It also strengthens the notion that while a simulation may be a game, it is a very serious one, a topic we revisit when dealing with the concept of serious games later in this paper.

For our purposes, simulation fidelity refers to the degree to which a simulation—or aspects of a simulation—corresponds to selected aspects of reality[16] (Allen, Buffardi & Hays, 1991; Rehmann, Mitman, & Reynolds, 1995; Becker & Parker, 2011). The emphasis is on *aspects of* a simulation or reality because fidelity, according to Lane & Alluisi, (1992) is a multi-dimensional rather than uni-dimensional phenomenon.

The key to the effective transfer of learning in serious applications—such as in military-political and public policy development simulations— is a high level of fidelity; that is, close resemblance to actual events, and the ability to modify scenarios

15 The original is quoted in Prensky (2006: 90).

16 It is possible of course to faithfully simulate fantasy worlds like in the now famous fantasy genre role-playing genre game of Dungeons and Dragons. For an accessible discussion see Becker & Parker (2011)

to optimise fidelity (Stone, 2008; Ulicsak, 2010).

Key concepts (cont.)

While the literature identifies many dimensions of fidelity, those particularly relevant to policy development simulations are (1) equipment fidelity, (2) environment fidelity, and (3) psychological fidelity (Lane & Alluisi, 1992; Beaubien & Baker, 2004; Alexander et al. 2005; Ulicsak, 2010):

- *equipment fidelity* refers to the degree to which a simulation behaves like reality and duplicates the appearance and feel of real systems. For example, working in a room with realistic equipment that duplicates a real crisis centre has high equipment fidelity;
- *environment fidelity* refers to the extent to which a simulation replicates motion cues, visual cues, and other sensory information from the task environment. For example a mock-up of a crisis coordination centre with a realistic barrage of telephone calls, messengers, and news bulletins, would be high in environmental fidelity;
- *psychological fidelity* concerns the degree to which participants perceive a simulation to be a believable surrogate for the task. Working in life-like conditions, equipment, and environment, with real-time pressures, on realistic tasks maximises psychological fidelity. For all intents and purposes participants experience the realities of reacting to a real-life situation, except that they do so in a safe environment in which their decisions do not have an impact on the real world (Garris, Ahlers, & Driskell, 2002; Boin et al. 2004; Crookall & Thorngate, 2009).

> Psychological fidelity can be maximised by developing scenarios that mimic the task demands of the real system. Technology that simulates the environmental or equipment characteristics can increase the psychological fidelity of well designed training scenarios, but cannot compensate for poorly designed ones.
>
> Beaubien & Baker (2004: 53)

Of the three fidelity dimensions, psychological fidelity is particularly important. Participants are unlikely to behave in a simulation as they would in the real world if they do not temporarily suspend their disbelief. Nevertheless, simulations always fall short of reality. Because of this, participants not only suspend their disbelief, but they also exercise a creative faculty:

> We do not suspend disbelief as much as we create belief. Because of our desire to experience immersion, we focus our attention on the enveloping world and we use our intelligence to reinforce rather than to question the reality of the experience (Murray, 1997: 110).

Each fidelity dimension consists of a continuum that ranges from low to high. Accordingly, simulations, whether analog or digital, can be situated anywhere on any of the three fidelity continua, depending on how closely they represent reality.

Based on the dictum that 'Anyone who thinks play is nothing but play and dead earnest nothing but dead earnest hasn't understood either one' (Dörner, 1996: 199), this report uses the terms 'games' and 'play' whenever appropriate.

2.2 Simulation methods in public policy development

This section addresses outcome 1.

It addresses the methodological issues of analog simulations in on-campus learning of public policy development. This section enables you to appreciate that:

2.2.1 Simulations are a well-established high-end form of authentic learning;
2.2.2 Simulations are a proven learning method in the messy complexities of policymaking;
2.2.3 Simulations as a serious learning method for public policy development; and
2.2.4 As a learning method, simulations have a specific conceptual framework or discourse.

2.2.1 Simulations as a high-end authentic learning method

2.2.1 Simulations as high-end authenticity

The use of (analog) simulations in authentic learning

Simulations, both real and digital, can encourage course participants to become more effective actors and generate knowledge from their actions in potentially powerful two-way interactions (Crookall & Thorngate, 2009).

The learning-by-doing character of simulations has the heuristic power to enable students to appreciate firsthand the messy complexities of policy development and strategic planning, and simultaneously develop their proficiency in dealing with them. Over time, and across various sectors around the globe, practitioners and students have experienced simulations as an engaging and convincing way to highlight the multifaceted dilemmas of public policy decision-making. They are able to explore and reflect on the consequences of good and flawed decision-making. 'A simulation can work magic in underwriting the real-world relevance of the course' (Boin et al. 2004: 382).

However, the virtual absence of Australian case studies in the simulation literature points to an apparent lack of systematic application of simulations as a method of authentic learning in Australia. Yet simulations have a proven track record in higher education, especially in northern Europe and the U.S. and in large organisations, such as the military, for well over fifty years, or much more in the case of the latter (Mayer, 2009).

Enthusiastic adopters of analog—and more lately digital—simulations include the public and academic sectors in the Netherlands (e.g. Duke & Geurts, 2004; Boin et al., 2004; Geurts et al. 2007; Mayer, 2009); and elsewhere in areas as diverse as the medical, military, and business sectors, to name but three (see Crookall, 2010; Smith, 2010; Issenberg, Mcgaghie, Petrusa, Gordon,

& Scalese, 2005; Faria, Hutchinson, Wellington, & Gold, 2009).

Simulations as high-end authenticity (cont.)

As Crookall (2010: 901) points out, during the 2000s 'the field of simulation/gaming has seen a spectacular development, both in the variety and richness of game types and in the spectrum of applications and users' (Crookall, 2010: 901; see also Prakash, Brindle, Jones, Zhou, Chaudhari, & Wong, 2009). Additionally, the last decade or so has seen an exponential growth in the scholarship on simulation, games, and gaming (Crookall, 2010).

As an authentic learning method, simulations offer greater depth and scope of learning as they operate at the highest end of the authenticity continuum. This contrasts with lower-end methods such as case studies and roleplays. These latter methods provide good but limited opportunities to practice skills. Moreover, coaching and debriefs tend to be subjective and inconsistent. In addition, role plays, and to some extent case studies, especially tend to be low in equipment, environmental and psychological fidelity (Beaubien & Baker, 2004; Aldridge, 2009).

Simulations: big-skills veld & campfire learning

Simulations exemplify the shift from passive, listening learners, to active, doing learners. Aldridge (2009) stresses how this represents a return to a time early in the development of humans, when learning was balanced between learning-to-do and learning-to-know. During the day, people with skills would coach others in *how to do something* in the veld. At night people sitting around a campfire would listen to stories and would *learn to know something* (Aldridge (2009). We have, he argues, become good at campfire-style *learning-to-know*, but have relegated veld-style *learning-to-do* to skill-based college or training institutions. What has been neglected is the *learning-to-do* of *big skills* (commonly called 'soft' or thinking skills).

The use of simulations therefore presents new opportunities to recapture the high ground of *learning-to-do* the *big skills* (e.g. leadership, decision-making, strategic planning etc.) and restore the balance between, and combine the best of, *learning-to-know* and *learning-to-do* the *big skills* (Aldridge, 2009).

Nevertheless, while simulations are often contrasted with traditional education, 'ultimately, simulations will need to build on and be part of traditional education to be successful' (Aldridge, 2009: 43). Much more important, though, is the paradigmatic change that underpins simulations, especially in educational and other serious settings. As Aldridge points out:

> Seeing the world (and modelling it and presenting it) through the approximation of a simulation rather than a book will require new tools and even a new syntax and corresponding style guide, but will mint a new generation of scholars and a new generation of leaders (Aldridge, 2009: xxxiv).

2.2.2 Simulations: powerful learning in messy policy complexities

2.2.2 Simulations and complexity

Learning in and for complexity

National security policy-making is an inherently complex, messy, and dynamic 'process of providing advice to ministers and implementing their subsequent decisions' (Connery, 2010). A sound grasp of its complexity is a necessary precondition for the design and use of simulations in this area. This is because policymaking is a messy functionally and temporally non-linear process. It involves 'sensitivity to small changes, non-equilibrium dynamics, the emergence of complex patterns, and sudden changes in outcome' (Richards, 2000: 8). In other words, we are dealing with Complex Adaptive Systems (CAS) in complex multi-actor settings (Mayer, 2009).

The capacity of public policy development simulations, both analog and digital, to emulate realistically national security policymaking's engagement with Complex Adaptive Systems (CAS), 'offers a rich palette for educators to reach students and help them learn important scientific knowledge and skills' (van Bilsen, Bekerede & Mayer, 2010: 1; Jacobson, 2000).

Public policy development simulations must, at minimum, incorporate the complex dynamics of the Australian policy cycle's logical sequence of actions and the messy, fluid, and often unpredictable context in which it operates (Bridgman & Davis, 2000; 2003; Connery, 2010). However, whilst the inclusion of the policy cycle is necessary, it is not sufficient. The steps in the policy cycle are merely a 'guide amid complexity' as Bridgman & Davis (2003: 98) and Connery (2010) suggest. It is this issue of complexity that is critical for the applied learning of public policy development[17].

The learning challenges of policy development

Glouberman & Zimmerman (2002: 10) draw on the relevant literature (e.g. Wilensky & Resnick 1999; van Bilsen et al., 2010; Mayer, 2009; Jones, 2011) to expand on the challenges that CAS pose. They list the characteristics of complex adaptive systems in more detail, as shown in *Annexure 2.1*. In brief, it means that any learning method must be eminently capable of assisting learners to enhance their policy development knowledge and skills with reference to:

- highly dynamic, uncertain and unpredictable environments;
- non-linearity (inputs and outputs are not directly correlated);

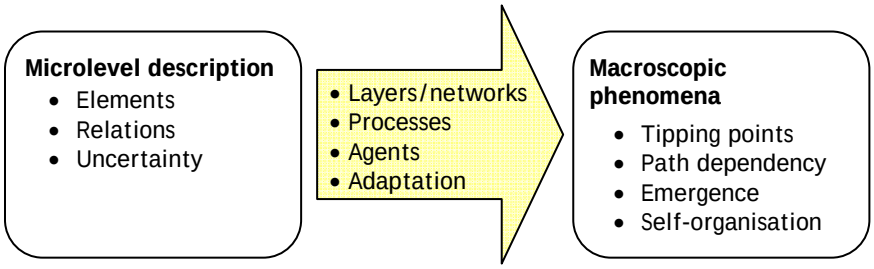
[17] Another issue of arguable importance concerns the impact of different conceptions of the policy-making process. If seen as rational planning, the process is approached very differently than if policymaking is seen as dealing with complex adaptive systems (Zimmerman, 1999; Glouberman & Zimmerman, 2002). Such a discussion is beyond the scope of this paper. At any rate, perceiving policymaking as dealing with Complex Adaptive Systems immediately raises the stakes, as the focus is squarely on the messy swampy lowlands within which public policymaking operates (see for example Connery, 2010).

Simulations and complexity (cont.)

- tensions and fluctuations (which are seen as opportunities);
- mutual causalities and adaptive and emergent outcomes;
- outliers as possible key determinants;
- divergent thinking; and
- developing insights into their practice.

Van Bilsen et al. (2010) propose that the four connecting concepts of CAS, as depicted in the arrow in Figure 2.2, are useful to both educators and participants for addressing policy development learning needs. These connecting concepts aid an understanding of CAS and support the design of learning activities that aim to reveal them.

Figure 2.2: CAS connecting concepts[18]



This means that any learning method dealing with policy development has to encompass and illuminate how the connecting concepts (layers, processes, agents, and adaptation) function to link micro-level descriptions to macroscopic phenomena.

The question is (and it's a fair question): what learning method, or combination of methods, is best suited to enhance the learning of public policy development within the confines of messy multi-actor complex adaptive systems?

This is where simulations have come into their own. The operative word is 'have', as there is a substantive record of success, which will be shown below.

The point is that simulations have demonstrated the capacity either singularly, or in combination with other learning methods, for dealing effectively with the learning demands posed by public policy development; and this is not just at post-graduate level in universities, but at the highest echelons of American military leaders and policymakers (see for example Brewer, 1984; Beriker & Druckman, 1996; Babus, Hodges & Kjonnerod, 1997; Andreozzi, 2002McCown, 2005 and attached reading list in *Annexure 2.10*).

Policy development simulations are effective in meeting the learning needs of both early career and highly experienced practitioners. Simulations help them to deal more proficiently with a complex mix of highly adaptive, interdependent, and interactive socio-technical, political, and economic systems; their often uncertain systemic reactions; and their unpredictable,

[18] From van Bilsen, Bedebreke & Mayer, 2010: 5

unexpected and undesired effects (Glouberman & Zimmerman, 2002; Jacobsen, & Wilensky, 2006; Bekebrede, 2010; van Bilsen, Bekerede & Mayer, 2010).

Simulations and complexity (cont.)

Discussion point:

1. *If you accept the premise that national security policymaking comprises inherently messy and complex processes in uncertain environments, how do learning activities currently convey this messiness, and what teaching techniques are currently used to enhance participants' skills in responding to or addressing these complexities and uncertainties?*
2. *What in your opinion could be done (a) at this point, and (b) in the future, to enhance the teaching of policymaking as inherently messy and complex? What, if any, are your reservations about simulations and gaming in academic settings, especially at the post-graduate level?*

Simulations as complex adaptive games

We can posit at least three substantive reasons why simulations are highly effective.

First, as Igor Mayer (n.d.) suggests, it is useful to view public policy development itself (and non-deprecatingly) as a game. He points out that whether in a policy game or in real life, and in accordance with our definition of 'game' given above, the processes of winning are identical. In both cases participants require strategic insights and skills, they have to know the rules and elements (which are always ambiguous) of a game which is always open and volatile and in which there are multiple objectives. *Annexure 2.2* offers a detailed explanation of how the strategic insights and skills align with policy process and substance.

Second, simulations can effectively address multi-actor CAS because of their capacity to reflect real life policy pressures and environments with appropriate levels of environmental, equipment and psychological fidelity.

Third, this level of complexity within simulations themselves indicates that they themselves are Complex Adaptive Systems in their own right (van Bilsen et al. 2010). It is because simulations are complex adaptive systems that they can so effectively respond to real CAS and so provide ideally effective conditions for learning and understanding their behaviour. According to van Bilsen et al. (2010) and Mayers (2009) for instance, simulations are one of the few tools to accomplish effective high level learning with regard to CAS embedded policy development.

Here learning is not just *campfire mode listening* but is primarily (but not only) *veld mode doing.* Simulations provide learners with complex and adaptive environments *par excellence.* Here participants, as integral and interactive actors in a complex

Simulations and complexity (cont.)

adaptive system/game, can experience the consequences of their decisions and respond to, and in debriefings reflect on, the unexpected and unpredictable, and connect their experiences to game results (scores, statistics, etc.) and real world (van Bilsen et al. 2010: 2).

To conclude this section I draw on Aldridge (2009) and his emphasis on learning the *big skills* (or conventionally termed *soft* or *thinking skills*). As he notes, our educational institutions do not rigorously develop these *big skills.* When they do so, they teach them predominantly in conventional linear, teacher-centred, 'camp fire' rather than 'veld' learning approaches.

If there are *big skills*, public policy development is surely at the forefront. Moreover, it is in simulations that practitioners can engage productively in the *veld* learning of the *big skills.* It is in simulations that:

> Different people with different domain expertise bring different situational awareness to the same situation … Seeing the world as experts do is the hallmark of any domain expertise, and makes problems and appropriate actions more obvious (Aldridge, 2009: xxvii)

Learning these important and most valuable *big skills* demand learning spaces that, in addition to other approaches, allow for effective practice. It is in simulations both analog and virtual 'where participants can repeatedly practice skills, instead of just hearing about them' (Aldridge, 2009: xxx).

2.2.3 Simulations: a seriously powerful learning method

2.2.3 Simulations for serious learning

Ask just about anyone in the military, or the management of Shell, or members of US Congress or top brass in the Pentagon about simulations, and they will tell you about the power of serious gaming[19].

So why are some circles reluctant to adopt a clearly powerful learning method for national security policy development?

The struggle for legitimacy and acceptance

Not unlike the debates about traditional and authentic learning, disputes around the conceptualisation of simulations as a valuable learning tool or mere form of entertainment reflect a struggle for legitimacy. This looks at first sight primarily to be an issue for digital simulations and games. However, the lack of

[19] Shell is famous for its scenario planning (De Geus, 1997), and the National Defense University in Washington conducts regular crisis-simulation exercises designed to give senior government officials insights into the nuances and complexities of policy-making in the current global security environment and to illuminate policy and organizational optionst crisis ("Silent Prairie" Summary Report: http://www.ndu.edu/CASL/SPF/docUploaded/Silent%20Prairie%20Jun02%20Executive%20Summary.pdf)

acceptance in some circles of analog simulations, especially where these can be useful, indicates it is an issue for all simulations.

Simulations for serious learning (cont.)

For this reason, particularly because of the increased prevalence of digital gaming in serious circles of academic and organisational learning, a succinct overview follows. The aim here is to clarify some conceptual and definitional issues and shift the emphasis from serious games as a closed exclusive category (though already with porous boundaries) to a more open and inclusive label. This gives readers a more useful and adaptable framework for locating and making sense of the many simulation and game genres.

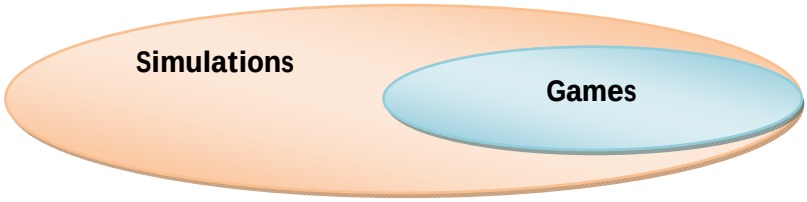
The first point is that in some serious circles simulations face a lack of acceptance because of the misperception that games are for children and are therefore trivial and inconsequential. These misperceptions promote a view of games as trifles that do not have the gravitas of traditional forms of learning (Sutton-Smith, 2001; Newman, 2004; Mitgutsch, 2009).

The push to conceptualise simulations as serious, persuasive educational tools reflects a twofold struggle for legitimacy. There is a struggle for wider acceptance in some institutions of higher learning or some of their departments for simulations as a whole, as well as a wider struggle for greater comprehension of the power and possibilities inherent in a new medium, namely digital games and simulations, which is revolutionising simulations and gaming. Proponents of serious games such as Sawyer & Smith (2008) quite rightly seek legitimacy by stressing the serious nature and the learning power of digital simulations and a wide range of games. Bogost (2007) argues that legitimacy must involve the critical exploration and analysis of the rhetoric embedded in the programming of digital simulations (equivalent to the rules in analog games) and games.

There are many ways to classify simulations and games. The introduction of the game genre called 'serious games' is one attempt to convince sceptics that playing games is not necessarily antithetical to powerful learning.

To make more sense of this issue it is worth recalling an earlier point, namely that while all games are simulations, not all simulations are games. Hence these two terms are not synonymous.[20]

Fig. 2.3: The Simulation-Game relationship



[20] For an example of a simulation that is not a game see "Simulation to lessen PTSD" http://www.nytimes.com/2007/08/28/health/28game.html

Adapted from Becker & Parker, 2011: 64

Simulations for serious learning (cont.)

The reason for this section is threefold. First, though relatively popular, the term 'serious games'—as Aldridge (2009) Bogost (2009), Breuer & Bente (2010) among others, point out—is problematic and contested. It possesses in-built limitations, negative connotations, and has contenders vying for its replacement. For example, Bogost (2009) deems the term 'persuasive games' to be more appropriate.

Discussion point:

1. *This brief video clip is a much more exciting way of making the point about games and learning. Go to: http://www.youtube.com/watch?v=rN0qRKjfX3s and enjoy!*

Second, this issue still resonates with simulation and game practitioners who use simulations and games for serious learning purposes as well as for simulation and game sceptics. Bridges need to be built. As Klabbers (2006) pointed out earlier, this may be difficult, but it is necessary for simulations to gain the recognition they deserve as powerful learning tools.

Third, because Bruer & Bente (2010) call for a shift from serious *games* to serious *gaming*, this leads to a more flexible and open taxonomic system for classifying digital games and their use for serious (educational) purposes. This approach has value for future research and design directions and facilitates the evaluation and comparison of simulations and games in learning contexts.

From serious games to serious [and exciting] gaming

'We are concerned with *serious games* in the sense that these games have an *explicit and carefully thought-out educational purpose* and are not intended to be played primarily for amusement' (original emphasis): so reads the classic definition by Abt (1970) and popularized by Sawyer (2002).

The term 'serious games' used to be associated with analog games on the basis that one can play many games for serious purposes, such as for education and professional development, and one can of course play any game very seriously. Despite the new tag, so-called serious games in the form of simulations, such as in the military, have been used for a very long time (Brewer & Shubik, 1979; Geurts, Duke, & Vermeulen, 2007). However, today this term is more often associated with digital games (Smith, 2009; Thorngate & Tavakoli, 2009), perhaps because analog games increasingly have to compete against digital games for legitimacy.

The term 'serious games' is now used to refer to any game or simulation—either especially created for learning purposes or developed for entertainment—but are for used learning or professional development or other 'serious' purposes, such as

Simulations for serious learning (cont.)

therapy (refer to the PTSD simulation: footnote 11), policy development, and other educational areas such as health care and ecology (Becker & Parker, 2011; Crawford, 2002; Michael & Chen, 2006; Zyda, 2005). Thus, as Michael and Chen (2005) suggest, serious games are games that educate, train and inform.

So the use of the term 'serious' is not only about marketing and acceptance. The serious games genre makes the learning aspects, and the expectation of learning outcomes, explicit, even though it is implicit in all games (Gee, 2003; Prensky, 2006). The use of the term 'serious' also signals a clear learning intent which aids its acceptance by funding agencies and educational institutions that want to be seen as experts in the serious business of teaching and research (Crookall, 2009; Ulicsak, 2010). although there is no uniform approach to learning pedagogy, current simulations in this genre usually incorporate experiential, situated and socio-cultural pedagogical models such as constructivism (Lainema, 2009; Ulicsak, 2010).

Trouble in wonderland

The term 'serious games' appears to fit neatly within a public policymaking post-graduate environment. However, this term is problematic because it creates a dichotomy where there is none. For example, even games specifically designed for entertainment can be put to good use for serious purposes, such as for formal learning (Charsky & Mims, 2008). Consequently, the variety of games that can be used for serious purposes is huge, which also points to overlaps with other labels like edutainment or 'game-based learning' (Prensky, 2001), as shown in Sawyer & Smith's (2008) taxonomy of serious games (see *Annexure 2.3*). Hence, the labelling of games as 'serious' is subject to much debate and dispute. Mayer (2009) and Breuer & Bente (2010) consider the term an oxymoron or a tautology. A detailed discussion is clearly out of scope in this report, but it will suffice to make a few key points regarding how we can view learning using serious games.

Firstly, a substantive body of literature demonstrates that learning is an essential component of all well designed games. At the very least, they all involve 'stealth learning' (Aldridge, 2009), and/or 'tangential learning' (Floyd & Portnow, 2008). While players enjoy a game they are motivated and learn transferable content without necessarily realising it. This also applies to commercial games made for entertainment, and which on the surface appear not to conform to the label 'serious' (Gee, 2003, Prensky, 2003; Sawyer & Smith, 2008).

Secondly, the term 'serious' also stresses qualities commensurate with the use of simulations for learning public policy decision-making at post-graduate level. The term suggests that players consider such games provocative, profound, deep, and powerful. It also implies care and attention to detail where such care may lead to reflection-on-practice and assessable outcomes. It carries the sense of open substantive discourse and of new ways of thinking (Bogost, 2009).

We could, on this basis, (re)define serious games, including

Simulations for serious learning (cont.)

policy simulations, as games that have:

> experi(m)ent(i)al, rule-based, interactive spaces with an explicit and carefully planned educational purpose that promote new ways of thinking and in which players learn by taking actions and by experiencing their effects through feedback mechanisms that are deliberately built into and around the game (Mayer, 2009: 825; Bogost, 2009)

Secondly, serious games make use of procedural representations which provide opportunities to disrupt a situation and reinvent it, wholly anew, under different organising logic (Bogost, 2009: 58; Badiou, 2005: 179). Yet the term does not sit well with many practitioners, even in the military and with organisational practitioners, leading Bogost (2009), to argue that:

> The concept of serious games as a countermovement apart from and against the commercial videogame industry eliminates a wide variety of games from persuasive speech. It is a foolish gesture that wrongly undermines the expressive power of videogames in general, and highly crafted, widely appealing commercial games in particular … many games carry messages, make arguments, and attempt meaningful expression. (Bogost, 2009: 59).

Thirdly, Ratan and Ritterfeld (2009) created a more elaborate approach to classifying serious games for learning to tackle concerns about taxonomic redundancies and the similarity of definitional criteria and application areas. Based on a review of 612 games, they arrived at a classification system that excluded any games that can be used for educational purposes but which are focused on entertainment (Jenkins et al. 2009; Squire and Jenkins, 2003). The growing research on pervasive gaming (Benford et al. 2006), persuasive games (Bogost, 2009), augmented reality gaming (Squire & Jan 2007), and location-based gaming (Broll and Benford 2005), which are excluded from this taxonomy, all have significant potential to expand our understanding of serious games (Breuer & Bente, 2010).

This 'trouble in wonderland' points to the need for an approach to classification that allows educators and players/learners to identify clearly what they are dealing with. As shown in *Annexure 2.4,* to overcome the problem of static, incomplete or classification systems with in-built redundancies, the use of labels or tags is a viable alternative (King and Krzywinska, 2002). This method is already in use in many social media services such as blogs or social networking sites, and even academia has its similar method in the form of 'keywords' (Breuer & Bente, 2010).

Such 'tagging' allows for a significant shift to the concept of serious *gaming* instead of *games.* It enables the seamless inclusion of other recent and future developments, such as that of 'persuasive games', pioneered by Ian Bogost (2009), which is particularly relevant to policy development simulations. Suffice to say here that rather than debate the term's replacement, as

Bogost suggests, persuasive games can be seamlessly accommodated under the umbrella of *serious gaming*, especially considering that one reason why some gaming is serious is because it is persuasive. This confluence of ideas should alleviate the need for zero-sum approaches.

Persuasive games
In conventional media, persuasion relies on the spoken and written word (*verbal rhetoric*), and on images and moving pictures (*visual rhetoric*). Bogost argues that digital games usher in a new form of persuasion: *procedural rhetoric*. This is a form of rhetoric now made possible through the rule-based representations and interactions inherent in digital games.
(Bogost 2007; Murray, 1997).

Discussion points:

1. *Play **Democracy 2** http://www.positech.co.uk/democracy2/ —at least enough to be familiar with some of its rules. How does it reflect the concepts associated with serious and persuasive games (persuasive rhetoric embedded in its architecture and rules)?*
2. *What did and didn't you enjoy about the experience?*
3. *If you have not played a digital game before, how would you describe this experience? Or if you have played other games before, how does this game compare?*

2.2.4 Framing the policy simulation discourse

2.2.4 Framing the policy simulation discourse

> … it is indisputable that games have proven to be wonderful instruments for experimentation and learning and that [simulation][21] gaming has been particularly useful to public policy making and public planning (Mayer, 2009: 825).
>
> The combination of public policy and gaming-simulation is hot, and for good reason: its potential for changing beliefs and influencing the decisions and behaviour of people is growing (Bots, Wagenaar, & Willemse, 2010: 744).

Simulations are not the only way, or even the main way, to learn

[21] In a typical case of different definitional usages, Mayer uses the terms "gaming", "simulation", "games" and "simulation games" interchangeably (as is common in the field) to refer broadly to simulations.

Framing the policy simulation discourse (cont.)

about policy development. Yet, practitioners and researchers such as Mayer and Klabbers have good reasons for being positive about the role of sims. Over decades of use and development in various organisational and other settings, and backed by considerable research, policy related simulations have established themselves as a viable learning method for dealing with the increasing complexity of organisational and political environments and their communication challenges (Duke, 1998; Joldersma & Geurts, 1998; Geurts, Joldersma, & Roelofs, 1998; Duke & Geurts, 2004; Geurts, Duke & Vermeulen, 2007; Mayer, 2008; Mayer, Bekebrede, Bilsen, & Zhou, 2009; Mayer & Veeneman, 2002; Mayer, 2009). This is particularly the case because simulations provide participants with safe spaces in which to combine their own experience creatively with the experiences of others, to find new, original, inspiring and appropriate pathways into the unknown (Geurts et al. 2007).

Why are simulations popular in some organisations and institutions? How do practitioners conceptualise simulation as a specific approach to learning and teaching? What is different about this method? How does it reflect good learning principles? These are the questions this section will answer.

Discussion point:

1. *At this point, what do you see as possible pros and cons regarding the use of policy simulation games as a key teaching strategy for enhancing the proficiency of course participants in national security policy development?*

Why use policy Sims?

The leading question that underpins this report is this: Why use policy Sims for learning purposes in academic settings when we have many other well developed methods and techniques we can use; from expert-led lectures, seminars and case studies, to workshops?

The short answer lies in the four educational functions of Sims:

1. *Demonstration function*: explore concepts, principles, methods, processes and procedures of the social systems involved.
2. *Learning function:* develop skills, problem-solving, decision-making, etc.
3. *Motivation function:* involve learners in the educational process and stimulate intrinsic motivation.
4. *Arousal function:* increase the level of activation of learners (Klabbers, 2006; Marshev & Popov, 1983).

Policy Sims use these four educational functions in a range of simulation-gaming combinations designed to best assist academic course participants in learning how to effectively engage in the policy development process and become immersed in policy exploration, decision-making, and strategic change. This is

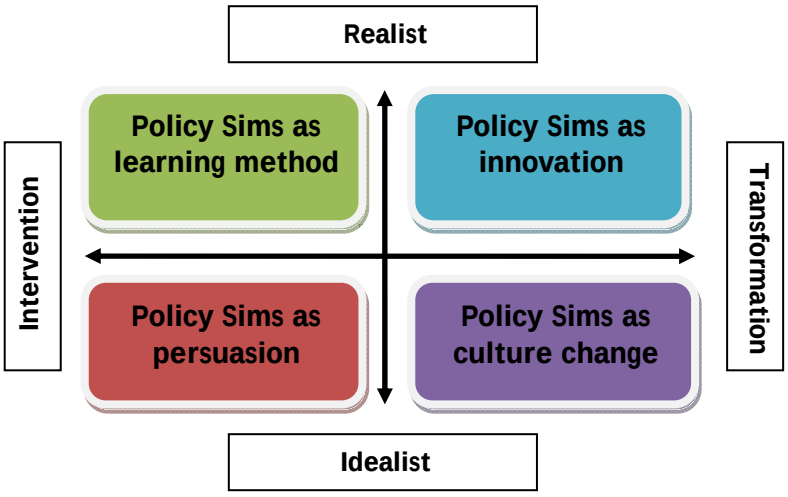
Framing the policy simulation discourse (cont.)

possible because the potential of the educational functions in policy simulations lies in their capacity to:

> combine the rigor of systems analysis and simulation techniques with the creativity of scenario building and the communicative power of role-play and structured group techniques. Reality is simulated through the interaction of role players using non-formal symbols as well as formal, computerized sub-models where necessary. The technique allows a group of participants to engage in collective action in a safe environment to create and analyse the futures they want to explore. It enables [participants] to pre-test strategic initiatives in a realistic environment (Geurts et al. 2007: 535)

As Mayer (n.d.) suggests, we can also view policy simulations through multiple frames, as in Fig. 2.4 below.

Fig. 2.4 Framing the Policy Sim discourse



(Adapted from Mayer (n.d.: 38) with permission)

Policy simulations can thus be seen in different ways, or with different emphases. We can view them primarily as a learning method, or as a means of innovation, persuasion and/or culture shift, depending on an institution's orientation e.g. realist-idealist or intervention-transformation.

However, whether as an approach to learning, innovation, persuasion or culture shift, policy simulations derive their power from two central features: their combination of simulation and gaming (Geurts et al. 2007).

1. *The simulation element*: the unique combination of simulation with role-playing.The unique simulation/role-play mix enables participants to create possible futures relevant to the topic being studied. This is diametrically opposed to the more traditional, teacher-centric approaches in which a future is produced for them. In policy simulations, possible futures are much more than an object of tabletop discussion

and verbal speculation. 'No other technique allows a group of participants to engage in collective action in a safe environment to create and analyse the futures they want to explore' (Geurts et al. 2007: 536).

Framing the policy simulation discourse (cont.)

2. *The game element:* the interactive and tailor-made modelling and design of the policy game. The actual run of the policy simulation is only one step, though a most important and visible one, in a collective process of investigation, communication, and evaluation of performance. In the context of a post-graduate course in public policy development, for example, a policy simulation is a dedicated game constructed in collaboration with practitioners to achieve a high level of proficiency in relevant aspects of the policy development process.

To drill down to a level of finer detail, policy development simulations—as forms of interactive or participatory modelling—are particularly effective in developing participant knowledge and skills in the five key areas of the policy development process (and success criteria), namely: *Complexity*, *Communication*, *Creativity, Consensus, and Commitment to action* ('the five Cs'). The capacity to provide effective learning support in these five categories has proved to be particularly helpful in strategic decision-making (Geurts et al. 2007). *Annexure 2.5* contains a detailed description, in table format, of the synopsis below.

Policy simulations address Complexity

Policymaking deals with ill-structured or 'wicked' problems (Rittel & Webber, 1973), and thus requires soft rather than hard systems thinking (Checkland, 2001). This typically involves: (a) the integration of multiple sources and types of data, insights and tacit knowledge into a problem-specific knowledge database; (b) the provision of an environment through which to explore different strategies; and (c) a holistic approach to the problem's complexity in which a wide range of perspectives, skills, and information is available, and which also involves key decision-makers and stakeholders. In contrast to traditional learning approaches, simulations have the capacity to effectively convey the totality of a model and the dynamics of a system. When participants experience the collective building and testing of policy options in the safe world of a simulation, abstract ideas and fears become tangible, the specific implications of various alternatives for different stakeholders become visible, and pertinent uncertainties can be distinguished from insufficient knowledge sharing (Geurts et al. 2007).

Policy simulations facilitate 'multilogue' Communication

Policy simulations facilitate effective communication across diverse groups, encourage the exchange of ideas, and bridge communication gaps. Participants begin to create a situation-specific language permitting them to communicate with each other about the issues with much greater clarity. This situation-specific language includes, but is not limited to, spoken or written words. A good simulation includes a range of artefacts

Framing the policy simulation discourse (cont.)

that support effective communication among participants. Duke (1974) conceptualises simulations as a hybrid, a *multilogic* rather than *dialogic* form of communication: as a language for dealing with the complexities of the future. In contrast to dialogue, multilogue is about the enabling of contact between many persons with different perspectives through the use of different forms of communication in parallel, such as through the social media tools of blogs, wikis, twitter, etc. Duke (1974) considers games primarily as a tool to structure communication in complex situations (Geurts et al. 2007).

Policy simulations stimulate Creativity

Participation in policy games has proved to be a highly effective way of developing new combinations of experience and creativity, which is precisely what innovation requires (Geurts et al. 2007: 548). Gaming, whether in analog or digital mode, has the power to stimulate creativity, and is one of the most engaging and liberating ways for making group work productive, challenging and enjoyable.

Geurts et al. (2007) cite one instance where, in a National Health Care policy change environment, 'the many parties involved accepted the invitation to participate in what was a revolutionary and politically very sensitive experiment precisely because it was a game' (Geurts et al. 2007: 547). Data from other policy simulations also indicate the uncovering of issues of which participants were not aware, the emergence of new ideas not anticipated, and a perception that policy simulations are also an enjoyable way to formulate strategy (Geurts et al. 2007).

> Gaming puts the players in an 'experiential learning' situation, where they discover a concrete, realistic and complex initial situation, and the gaming process of going through multiple learning cycles helps them work through the situation as it unfolds. Policy gaming stimulates 'learning how to learn', as in a game, and learning by doing alternates with reflection and discussion. The progression through learning cycles can also be much faster than in real-life (Geurts et al. 2007: 548).

The bottom line is that problem solving in policy development processes requires creative experimentation. This cannot be primarily taught via 'camp-fire' story telling learning mode but demands hands-on 'veld learning' that allow for safe creative and productive experimentation. This is exactly what good policy simulations provide (De Geus, 1997; Ringland, 2006). In simulations participants cannot view issues solely from either their own perspective or that of one dominant stakeholder (Geurts et al. 2007).

Policy simulations enable the seeking of Consensus

Games are popular because historically people seek and enjoy the tension of competition, positive rivalry and the procedural justice of impartiality in safe and regulated environments. As in games, simulations temporarily remove the participants from

Framing the policy simulation discourse (cont.)

their daily routines, political pressures, and the restrictions of real-life protocols.

In consensus building, participants engage in extensive debate and need to act on a shared set of meanings and beliefs to guide the policy process in the desired direction, yet without sacrificing critique and creativity. During the joint experimental actions of simulation, value debates become focused, sharpened, and placed into operational contexts that allow participants to negotiate value trade-offs. Participants work holistically, from the perspective of the entire system, in order to reach a joint definition of the problem. Most importantly, role-playing takes the attention away from the individual (Geurts et al. 2007). To cite one case, Geurts et al. (2007: 549) note that the 'impersonal (in-role) presentation of some of the difficult messages was a very important factor in the success of the game. When people play roles, they defend a perspective, not their own position: what they say in the game, they say because their role forces them to do so'. Consequently, policy simulations make it possible for participants to become (safely) caught up and to learn powerful lessons from conflict-ridden simulations rather than from conflict-ridden real-life policy processes (Geurts et al. 2007).

Policy simulations promote Commitment to action

When participants engage collaboratively in a well-designed policy simulation and work towards the assessment of possible impacts of major decision alternatives, they tend to become involved, reassured and committed. However, participating in a simulation about one's own organisation or professional arena can also be a disquieting experience. The process of objectification that takes place in a well-designed and well-run simulation helps to reinforce memory, stimulate doubt, raise issues, disagreements and further discussions, and acts to control the delegation of judgement (those who are affected can check the logic of action). Good simulations engage participants in the exploration of possible futures and foster the power of 'exercises in explicitness' to question and prevent unrealistic over-commitment to one idea or course of action and critically explore situations and conditions where a chosen strategy deviates, fails, or backfires.

Policy simulations are, of course, not free from the problem of participant passivity. However, a well-planned process of participatory modelling, a strictly balanced distribution of tasks, and transparent activity of all participants acts as a safeguard against abstention from involvement. Good simulations:

> serve as vehicles to develop realistic, mature and well-grounded commitment. They help individual actors engaged in a strategy to understand the problem, see the relevance of a new course of action, understand their roles in the master plan, and feel confident that their old or recently acquired skills will help them to conquer the obstacles or seize the opportunities ahead (Geurts et al., 2007: 551).

Framing the policy simulation discourse (cont.)

Policy simulations enable powerful learning

As a distinct, high-level authentic learning method, simulations are worthy of special mention, especially as some academics (and indeed many members of the general population), still consider educational games as an oxymoron. However, it is worth stressing that learning—in many cases powerful learning—is an integral part of all games. Although the list below originally concerned digital games, these learning attributes apply equally to analog games and simulations. Removed of all jargon, and in the context of this paper, this is Prensky's (2003: 7-8) interpretation of Gee's (2004) 36 learning principles.

What participants learn from engaging in simulations:

1. Doing and reflecting
2. Appreciating good design (procedural rhetoric and literacy)
3. Seeing interrelationships
4. Mastering game (situation specific) language
5. Relating the game world to other worlds
6. Taking risks with reduced consequences
7. Putting in effort because they care
8. Combining multiple identities (role playing)
9. Watching their own behaviour
10. Getting more out than what they put in
11. Being rewarded for achievement
12. Being encouraged to practice
13. Having to master new skills at each level
14. Tasks being neither too easy nor too hard.
15. Doing, thinking and strategising
16. Getting to do things their own way
17. Discovering meaning
18. Reading in context
19. Relating information
20. Meshing information from multiple media
21. Understanding how knowledge is stored
22. Thinking intuitively
23. Practising in a simplified setting
24. Being led from easy problems to harder ones
25. Mastering upfront things needed later
26. Repeating basic skills in many games
27. Receiving information just when it is needed
28. Trying rather than following instructions
29. Applying learning from problems to later ones
30. Thinking about the game and the real world
31. Thinking about the game and how they learn
32. Thinking about the games and their culture
33. Finding meaning in all parts of the game
34. Sharing with other game participants
35. Being part of the gaming world
36. Helping others and modifying games, in addition to simply playing.

Framing the policy simulation discourse (cont.)

Fig. 2.5 Reframing the applied learning of Policy-making

(Adapted from Mayer (n.d.: 61) with permission)

Discussion point:

1. *How can the above characteristics of good learning be deployed in the applied learning of national security policy development?*
2. *Which of the learning principles identified as having value for the learning of national security policymaking are consistently used in current teaching practices at the College?*

Pruned to their essentials and adapted to include analog as well as digital game learning, the points below list the key messages for educators about the learning that takes place in games (Prensky, 2003: 11):

1. It is unwise to make judgments about a complex field such as simulations or games based only on external observations.

2. Among the specific techniques used by simulation and game designers that relate to learning are:
   - encouraging participants to try new things, persevere, take risks, and practice. Games typically adjust automatically to

participants' skill levels, keep them at the leading edge of their capabilities, and provide rewards at appropriate times. All of these aid learning;

- managing the complex interplay between the way participants see themselves in life and the way they see themselves in a game. This interplay can potentially influence the way that participants see themselves in reality;
- letting participants, within the worlds of the simulation, try things, form beliefs, and test and revise them, employing the same procedures that practitioners use in the real world;
- teaching participants in clever ways that largely avoid telling them anything directly.

There are of course many more aspects to explore. Some further information about the practical aspects of simulation design and the basic ingredients of simulation architecture can be found in *Annexure 2.6*.

2.3 Simulation methods in public and national security policy development

This section addresses outcome 2.

It identifies the policy simulation methods that could be adopted to enhance learning at the National Security College and similar institutions, including the teaching skills, technology and resource implications.

This section enables you to appreciate:

2.3.1 The proven high-end examples of simulation methods in public policy development (PPD) and related fields, that specifically include:
- **Policy exercises**
- **Scenario thinking/planning**
- **Crisis simulations, and**
- **Examples from higher education**

2.3.2 Specific examples of policy development simulations in national security settings

2.3.3 The teaching skills, technology and resource implications

2.3.1 Simulations in public policy development[22]

2.3.1 Simulations in public policy and related fields

Simulations in public

[22] Unless otherwise indicated, in this section all references to simulations refer to analog simulations

policy development

Simulations in public policy development (cont.)

Although the military use of simulation has a long history, the central role of doctrine in military decision-making ensured that much was rigidly rule-based (Smith, 2010). However, the 1960s saw the emergence of interest in soft systems in both the fields of simulation gaming and education, and a concomitant educational interest in more experiential forms of learning. This led to significant developments in simulations, such as the shift from rigid to free-form games much more suitable for socio-political soft system complexities. In education more learner and experiential learning methods began to appear. Educators adopted role-plays, case studies and paper-based as well as real-life analog games and simulations as part of their experiential learning toolkit. The use of simulations and games also grew rapidly in the business sector and in business and management schools/faculties. While some companies designed their own, commonly purchased games included Lost in the Desert, International Partnerships, Bafa-Bafa, Star Power, Where Do You Draw the Line, Plate Company Financial Game, Promises-Promises, Lost on the Moon, Lost at Sea, The Manufacturing Simulation Game, Fly Smart etc. (Faria & Nulsen, 1996; Faria, Hutchinson, Wellington & Gold, 2009).

The variety of gaming formats that subsequently evolved—or were enhanced—include approaches such as scenario-based planning (De Geus, 1997), simulation gaming, seminar gaming, crisis simulations (Kleiboer, 1997), and the policy exercise (Brewer, 1972; 1986; 2007), as well as other forms of authentic learning such as Problem-Based Learning (Boud & Feletti, 1991), and Action Learning (Revans, 1998). These simulations, games, and authentic learning approaches moved away from rigid designer/teacher-determined rules to more participatory forms of interactive gaming and learning (Mayer, 2009; Brewer, 2007).

This section touches on the formats of policy exercise, scenario planning, and crisis simulations to illustrate the proven power of analog simulation methods relevant to public policy development. With development, all formats would be suitable for use at the National Security College.

The policy exercise

In 1986, Garry Brewer, a RAND analyst with considerable experience in policy analysis, suggested the idea that responding to long-term environmental problems ('inventing the future') required a new and innovative approach to scientific analysis for policymaking. He recognised the need for more effective methods for enhancing interdisciplinary communication and learning among scientists and policy makers. He proposed a new method, the policy exercise, a form of environmental war-gaming, which, stressing the importance of practitioner knowledge has 'its procedural roots in scenario-based, free form games' (Brewer, 1986, p. 469; see also Brewer, 2007).

> Different kinds of operational applications exist to guide alternative generation, formulation, and testing: exploration; intra-group communication; individual,

> group, and expert knowledge and opinion elucidation; and advocacy purposes, among others. Free-form, scenario-based games and models have long existed and been used to satisfy these purposes (Brewer, 2007: 166).

Simulations in public policy development (cont.)

Brewer (2007: 165) also points out that, compared to rigid hard systems games, when it comes to 'inventing the future … those [methods and procedures] related to generating, formulating, and testing alternatives go directly to the heart of the matter since they emphasize discovery and creativity rather than prediction'. This insight led to the development of a style of simulation called a 'policy exercise'.

Brewer (1986: 468) defines the policy exercise as 'A deliberate procedure in which goals and objectives are systematically clarified and strategic alternatives are invented and evaluated in terms of the values at stake. *The exercise is a preparatory activity for effective participation in official decision processes*' (emphasis added). Hence, unlike their quantitative mathematically driven forbears preoccupied with prediction and single answer solutions, policy exercises provide those learning about or learning to enhance their proficiency in public policy development with a setting, a framework, a collection of procedures to generate, formulate, and test ideas.[23]

This analytic form offers comparative advantages for public policy development (PPD) in four areas. It enables participants experientially to: (1) investigate poorly understood dynamic processes; (2) scrutinize poorly understood institutional interactions; (3) participate in the opening up of many different perspectives and special competencies on a continuing basis and over time; and (4) prepare them for future research, analysis, and operational responsibilities (Brewer, 2007).

Policy exercises are specifically attentive to political and socio-technical issues because their scenarios are accessible and relatively transparent. Policy exercises enhance participation because their proceedings use plain language (i.e. the language of participants themselves). The face-to-face, real-time features of analog games make it very easy for those with specific information to converse with other participants:

> Questionable matters of fact can be identified and areas of agreement and disagreement quickly discovered. The implications of initial simplifications and the power of assumptions are also more likely to be exposed in this form of analysis than in most others (Brewer, 2007: 166).

Additionally, because of the involvement of human participants (instead of computer programs), the elements of the simulation and its analysis become familiar and open to critical exploration.

Brewer (2007: 166) also affirms the critical role of debriefings when he stresses that 'a great deal of the discovery or learning

[23] Dealing with in-house organisational policy simulations is not in the scope of this report. However a brief overview and examples are given in **Annexure 2.7.**

occurs in the detailed criticisms following actual game play. Criticism of this sort is extremely uncommon in computer-based studies or numerical models'. This indicates not only the power of feedback from instructors or more experienced players, but also the valuable role for critical self-reflection in a learning environment such as this.

Simulations in public policy development (cont.)

The policy exercise is generally meant to create circumstances and incentives that draw many different disciplinary specialists together. The idea is to let the experts practise providing advice before attempting to tell others what to do. Policy exercises emphasise the imaginative, creative, and inventive tasks associated with discovery. Success also depends on the capacity of participants to contribute not only their substantive knowledge, but also a critical imagination, insights, the ability to abstract, flexibility, and a willingness to build and rebuild many representations of interesting phenomena (Brewer, 2007). Policy exercises may also have the added advantage of helping members to enhance their respect of one another, and also to learn other soft skills such as collaborative leadership (Shanahan, 2011).

In terms of actual usage, initial policy exercises were very similar to scenario-based free-form gaming, such as the exercises conducted by the International Institute of Applied Systems Analysis in Austria (Mermet, 1993), and the Stockholm Environmental Institute in Sweden (Jäger, Sonntag, Bernard, & Kurz, 1990). Other, later cases concerned policies dealing with the impact of global climate change on the hydrology of the Po River in Italy (Mayer, 1997: 98; Mermet, 1993), other experiments by the Stockholm Environmental Institute on forest studies and climate change (Jäger et al., 1990), on energy, infrastructures (Kuit, Mayer, & Jong, 2005; Wenzler, 1993) and health care reform (Harvey, Lidell, & McMahon, 2007). Geurts (1993) triggered several gaming style policy exercises in the Netherlands.

Another interesting example is the 1997 Metropolitan debate policy exercise (Frieling, 1998). This exercise simulated the participatory decision-making process for spatial planning in the Netherlands at a national scale. As the game progressed, the future of the Netherlands crystallised in a GIS-based 3D world as a result of the decisions and influence of all participants (Mayer, 2009).

The use of analog, real-live games such as policy exercises and scenario planning continues to gain notice and acceptance. An interesting example is the 'stabilization wedges' game designed by Pacala and Socolow (2004). This simulation enables participants to explore ways to reduce emissions in a scenario based on existing circumstances in which atmospheric carbon dioxide concentrations rise significantly over the next 50 years.

Scenario planning

Simulations in public policy development (cont.)

The scenario, as Brewer (2009) reminds us, is at the heart of analysis. It is the basis for bounding and structuring a model and it contains the criteria to appraise an issue or respond to a current or potential problem. Scenarios are tentative and contingent, thus they are easily altered and are future-oriented, as they depict past and present with likely or desired future possibilities. In effect, the five intellectual questions and practical tasks Lasswell (1971) specifies for problem-oriented, contextual analyses[24] are all included in well-constructed scenarios.

Scenarios

"Shell uses scenarios to explore the future. Our scenarios are not mechanical forecasts. They recognise that people hold beliefs and make choices that can lead down different paths. They reveal different possible futures that are plausible and challenge people's assumptions"

(Shell.com, n.d.).

Scenario planning or thinking is a flexible and nuanced tool for motivating people to challenge the status quo, or improve at doing so, by asking 'What if?' questions in a disciplined way. In environments characterised by an IT revolution, and where rules can be rewritten with breathtaking speed, scenario planning techniques are methods for coping with these unpredictabilities and uncertainties in a structured process. The scenario planning process allows public policy development (PPD) practitioners to rehearse the possibilities of tomorrow and take action today while empowered by those provocations and insights. The use of PPD scenarios can create a framework for a shared vision of the future by promoting discussion and by aligning and inspiring diverse stakeholders to find and explore common ground within a safe simulation environment (Ringland, 2002; Scearce & Fulton, 2004; Ogilvy, 2002). Also, as argued by Scearce & Fulton (2004), scenario thinking is as much a posture, a disposition, as it is a process. The first step is the process through which scenarios are developed and then used to inform strategy. The aim is that when that process is internalised, scenario thinking becomes a posture towards the world. It becomes a way of thinking about and managing change, a way of exploring the future so that participants are better prepared to meet it. Conducted well, scenario planning or thinking is a medium through which participants can envision, and begin the process of actualising, great changes.

An example

A compelling illustration of the power of scenarios is the influential set of Mont Fleur scenarios enacted in South Africa in

[24] Policy analysis needs to respond to five questions: what goal values are sought and by whom?; what trends affect the realisation of these values?; what factors are responsible for these trends?; what is the probable cause of future events?; and, what can be done to change that course of events? (Lasswell, 1971: 34-57).

Simulations in public policy development (cont.)

1991. A diverse group of South African leaders, such as community activists, politicians, unionists, academics, economists, and business leaders, engaged in a series of scenario thinking activities as a way to envision a transition out of apartheid. Each resulting scenario described a very different outcome of the political negotiations then underway. One scenario (called *Ostrich*), illustrated the results of a breakdown in negotiations between the government and the African National Congress. Another scenario, *Lame Duck*, foresaw a situation in which a prolonged transition would leave the government with little legitimacy. The third scenario, *Icarus*, described a South Africa in which the ANC came to power and precipitated an economic crash due to massive public spending. The fourth scenario, *Flight of the Flamingos*, described how the apartheid government, the ANC, and their respective constituencies might slowly and steadily rise together. These scenarios were subsequently shared widely throughout South Africa, and facilitated public debate in the transition to democracy. (Kahane, 1997; le Roux & Maphai1997).

The approach was indirect and the results subtle. Mont Fleur did not resolve the crisis in South Africa, but the project contributed to the establishment of a common vocabulary and mutual understanding. Participants did not agree upon a concrete solution to the country's problems, but they did reach a consensus on some aspects of how South Africa functioned. The process was not a formal, mandated negotiation but rather constituted by informal, open conversation that aimed to find areas of shared understanding and agreement. It did not deal with the differences among participants. Negotiation tends to focus on identifying the positions and interests of the parties and then finding a way to narrow or reconcile these differences. The Mont Fleur process only discussed the domain that all of the participants had in common in order to 'find and enlarge the common ground' about the future of South Africa (Kahane, 1997: 2).

Consequently some of the key points in scenario planning or thinking are:

- scenarios do not aim to pinpoint future events but consider the forces which may shape and push the future along different paths;
- scenario planning works best when the scenario is authentic and it involves all appropriate stakeholders;
- critically assessing each scenario keeps the process focused, relevant and valuable; and
- encourage creative thinking and do not allow existing biases to guide the process. Ensure that operational pressures do not overshadow the process to limit energy and creativity.

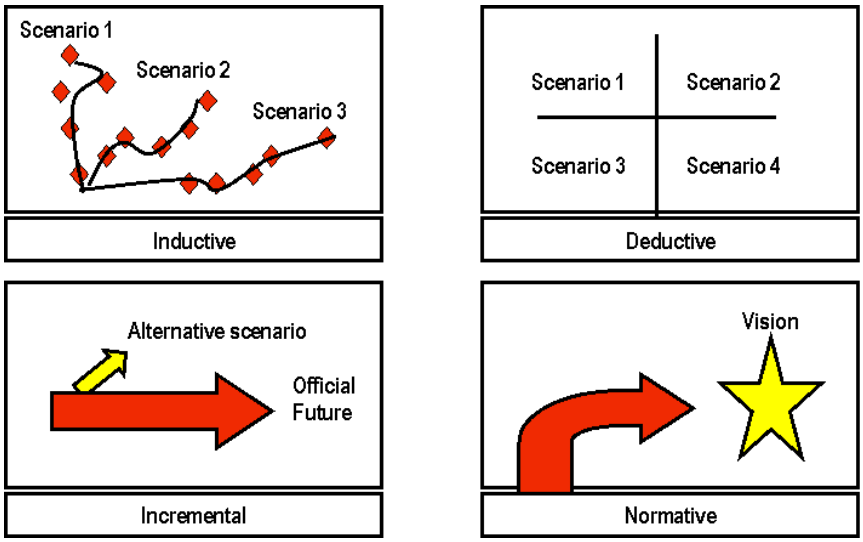
Types of Scenarios

There are different types of scenarios and different ways of

Simulations in public policy development (cont.)

classifying them. Two examples are indicative. Davis (2002) classifies scenarios as inductive, deductive, incremental and normative, as per Figure 2.6 below.

Fig. 2.6: A classification of scenarios[25]



Inductive scenarios emerge from discussion and exploration of drivers and trends, while deductive scenarios choose two or more of those drivers to structure scenario worlds. Incremental scenarios replicate typically anticipated versions of the future, yet are different enough to move policy debate in a different direction. With normative scenarios we are in the realm of visioning: these are the futures we believe ought to happen (Conway, n.d.). In relation to this taxonomy, Slaughter (2004) suggests that some scenarios can focus too much on 'out there' (e.g. the right hand quadrants in Fig. 2.6) at the expense of 'in here' (e.g. the upper left quadrant). This emphasises empirical elements at the expense of non-empirical factors. The resultant lack of a structured critique of current social reality means that participants fail to question the underpinning assumptions of that reality. Additionally, if the scenario process is not carefully handled, the exploration of alternative futures can be conducted in ways that bear little resemblance to reality and cannot be transferred to the strategic decisions that need to be made in reality. This link is critical. As already pointed out earlier, it is important that scenarios be treated as the first step in the real work of policy development and not as the end product. Again, when scenarios are done well, and are challenging and creative, they can expose participants to new ways of thinking about issues, identify blind spots and shift thinking beyond the conventional (Conway, n.d.; Davis, 2002; Slaughter, 2004).

[25] From Davis (2002).

Simulations in public policy development (cont.)

Scenarios as a tool for strategic thinking

Scenarios or stories about distinct futures have the potential to overcome some of the pitfalls of predictive approaches. What scenarios lose in terms of calibrated probabilistic accuracy can be made up for by a greater openness to initially unlikely but nevertheless possible outcomes. This is why scenarios have often been used as a tool for strategic thinking,

(Miller, 2006: 6)

The emphasis on the quality of the scenario process is also reiterated by Miller (2006). While scenarios are well suited to challenging decision makers to think creatively, they also contain notable challenges themselves. A critical issue is the selection of distinctive and pertinent stories about the long-term future from among an infinite number of possibilities.

Miller (2006) cites two familiar methods for solving the problem of how to choose scenarios, namely *trend* and *preference-based* scenarios. Both of these methods have the virtue of selecting stories that are readily accessible since the factors that determine the main characteristics of each scenario are usually quite familiar and easy to grasp. They are useful empowerment techniques, but both suffer from drawbacks that limit the utility of the stories. There is the risk of narrowness and lack of imagination and a lack of analytical precision. 'Lacking developed theories of change and charged with an overabundance of descriptive detail, it becomes difficult not only to extract analytically distinguishable stories but more crucially from a policy perspective to justify any particular selection of stories from amongst the vast possible range' (Miller, 2006: 7). To overcome these limitations Miller (2006) proposes *Possibility-space scenarios.* The 'possibility-space' approach offers one way of generating a larger set of possible futures for consideration in scenario building.

Scenario planning has a substantive track record. Its use will continue to grow because it is one of the few proven tools for developing the capacity of those engaged in public policy development to understand and manage uncertainty. It is a powerful tool that tests the mind, challenges belief, and stretches the spirit. People who take naturally to scenario thinking are lifelong learners: they believe that the world is continually changing and are forever seeking insight from new places, making new connections, and innovating new solutions (le Roux & Maphai 1997; Scearce & Fulton, 2004).

Discussion points:

1. *Why not try some authentic learning … about scenario thinking? Go to: http://scenariothinking.org/wiki/index.php/Future_of_the_City_Centre_2025*

Simulations in public policy development (cont.)

2. *Of course you might like to do this with a small group of colleagues or interested friends (e.g. at least four, so each person can choose one scenario). Do some thinking or have some discussions about the research question.*
3. *What is your impression? What do you see as its strengths and weaknesses?*
4. *How would you rate this method for application to public policy development?*

Crisis simulations as perception-shattering experiences.

Crises are not only rare events but are changing shape and are becoming more complex and increasingly trans-boundary in nature. Each is different from the other given the changeable nature of the variables involved, such as type, location, affected populations, and resources. These variables are difficult if not practically impossible to forecast in advance, and therefore defy conventional management patterns. 'A crisis is defined as a crisis precisely because something out of the ordinary happens' (Boin & Lagadec, 2000: 186). One way to deal with these uncertainties is to expose crisis management personnel to these situations in a safe and realistic environment through simulations and gaming (Boin & Lagadec, 2000; Walker, Giddings & Armstrong, 2011).

The purpose of a crisis simulation is to enable participants to confront these daunting challenges. Its purpose also extends to helping participants to better identify and apply the necessary responses to a crisis in which they will face numerous unpredictable and uncertain events (Ford & Schmidt, 2000). The difference between crisis simulations and other simulation methods is that crisis simulations expose participants to perception shattering experiences with the aim to enhance the abilities of decision-makers to respond more effectively to crisis events in which time pressure, information overload and rapidly changing circumstances dominate. The ability of participants to transfer knowledge, skills, and attitudes to actual crisis situations is therefore a critical issue in crisis simulations (Boin et al. 2004; Yung-Fang, Borodzicz & Jia-Min, 2004).

However, reflecting a growing consensus among crisis researchers, Boin et al. (2004) make two critical observations that, if true, have significant implications for both crisis management and crisis management simulations.

In particular, the very nature of crises is changing as a result of critical developments occurring on a global scale (Rosenthal, Boin, &Comfort, 2001). Future crises will be increasingly complex in nature, will transcend national, cultural, or temporal boundaries, will easily interconnect with other issues, and will become endemic as they mutate in different forms. Causal chains will become more obscure and therefore more difficult to identify. Moreover, their openness to constant redefinition and reinterpretation will make them harder to predict, let alone

Simulations in public policy development (cont.)

comprehend, and therefore much more difficult for decision-makers to come to terms with. This means that current crisis management structures and those who must deal with future crises face increasingly intricate challenges (Boin & Lagadec, 2000; Rosenthal, Boin, & Bos, 2001; Boin et al. 2004).

The challenge of this scenario for the crisis simulation method is twofold. Firstly, crisis simulations may need to meet more than just the established users such as 'American big-city government, Dutch municipalities, and a few scattered organizations' (Boin et al. 2004: 379). Second, the increasing complexity of crises also makes it increasingly difficult to interpret possible future crises 'through the lens of predictable faults and failures' (Boin & Lagadec, 2000: 186). Future crises are much less amenable if not antithetical to the application of more conventional crisis simulations that follow rigid, rule fixated, simulation processes. Thus the unpredictability of more volatile future crises calls for free-form simulations, which makes them incompatible with their more conventional, rigid, rule fixated, predecessors. The latter feature a more rigid pre-specification of objects and rules that control the legitimacy of play and rigorously define the game (Mayer, 2009: 830).

By way of example, the Pan Asian Athletics Simulation invites participants to act as national and a local crisis teams that have to respond to a hostage situation in a hotel during the Pan Asian Athletics event. In this scenario,

> both crisis teams are in separate locations and receive a limited number of messages. The local crisis team receives information from the on-scene commander near the hotel. The national crisis team gets their information from international authorities and organizations. The formal responsibilities are designed so that both teams must work together to manage this crisis situation (Boin et al. (2004: 383).

Most importantly, it is an open-ended scenario in which both teams can interact without interference from the simulation staff, making it possible for participants to affect the outcome of this crisis:

> When both teams cooperate, exchange information, and coordinate their actions, they can bring the hostage taking to a good end. If they do not cooperate, failure is very likely. The teams can take as much time for their decisions as they need. This simulation could therefore easily take a day. The debriefing must take into account that these simulations follow a less structured course, which stretches over a longer time period (Boin et al. 2004: 383).

Why use crisis simulations in public policy development?

The work of Boin et al. (2004), reflecting similar sentiments found in much of the simulation literature, offers us at least three reasons why (good) crisis simulations are beneficial learning experiences for students, practitioners and academic

staff alike:

Simulations in public policy development (cont.)

> Contrary to regular ways of transferring knowledge—such as oral presentations, written materials, standard assignments, and examinations—the learning-by-doing character of simulations has the heuristic power to make many students understand at once how difficult crisis management is. Practitioners and students experience crisis simulations as an engaging and convincing way to highlight the devilish dilemmas of crisis decision making and to explore the consequences of flawed decision making. A simulation can work magic in underwriting the real-world relevance of the course (Boin et al. 2004: 382).

First, they provide excellent opportunities to become closely acquainted with all aspects of crisis management. A crisis simulation 'offers the unique experience of "sitting in the hot seat": an experience that can otherwise only be gained by managing a real-life crisis' (Boin et al. 2004: 381).

Secondly, good crisis simulations offer levels of excitement and motivation rarely attainable in conventional learning formats. Practitioners and post-graduate course participants will find crisis simulations an engaging and convincing way to highlight the diabolical dilemmas of crisis decision-making and to explore the consequences of good and flawed decision-making (Preston & Cottam, 1997; Boin, et al. 2004).

Crisis simulations as authentic learning

Contrary to regular ways of transferring knowledge—such as oral presentations, written materials, standard assignments, and examinations—the learning-by-doing character of simulations has the heuristic power to make many students understand at once how difficult crisis management is … A simulation can work magic in underwriting the real-world relevance of the course.

Boin et al. (2004:382)

And thirdly, as a form of authentic learning, crisis simulations are a powerful way of bridging the gap between theory and practice. They enhance the learning for all involved, both participants and academic staff. Participants are immersed in settings that generate real-life experiences, enabling them to directly link theoretical insights with crisis dilemmas (Kleiboer, 1997). At the same time, designing and facilitating crisis simulations provides academics with new insights regarding crisis and public policy development (PPD) decision-making (Boin et al. 2004). Additionally, all three points apply to academics engaged in crisis simulations. The benefit from all aspects of the simulation process is that it engages them in a very different way of thinking and practice compared to writing lecture notes, making visual presentations and delivering lectures.

Given the complexities not only of crises but also of national

Simulations in public policy development (cont.)

security policymaking, as discussed earlier, Boin et al. (2004) suggest four possible ways in which crisis simulations can be helpful to the learning of PPD in relation to future crises.

1. Simulations that focus on future crisis scenarios help to deepen perceptions of the interminable variety of events that can precipitate a crisis. Simulations such as this that address inconceivable contingencies are more suitable for seasoned practitioners who already appreciate that crises can emerge anytime, anywhere.
2. Use of simulated future crises can be a useful tool in translating general appreciation into new ways of thinking, new routines, and changing group culture: the practice of organising for resilience is a catalyst for constant attention to all aspects of crisis decision-making.
3. Simulations of future crises are invaluable tools for building organisational resilience. Participants in these types of simulations will sharpen their ideas about the required personal attributes demanded of those who will be dealing with future crises, and will experience the absolute necessity for crisis management meta-strategies.
4. Future crisis simulations are valuable, at least for the more advanced organisations, for providing opportunities to audit existing procedures, competencies, responsibilities, cultures, values, and plans. A simulation can be used to identify weak links and for the assessment of individuals before committing them to real-life crisis responsibilities.

The bottom line is that the crisis simulation methods improve the disaster and crisis decision-making and management capacity of their participants. Further:

> They provide a cost-efficient, controlled environment in which individuals and teams can safely experiment with procedures, protocols, and strategies—while testing suggested improvements of the coping repertoire. They call attention to all phases of crisis management; they help to recognize impending crises, and they familiarize participants with the long crisis aftermath. Simulations provide a means for exploring very different types of crises that may occur today or in the distant future. They can be used as an assessment tool, identifying weaknesses and strengths in individuals, groups, and organizations (Boin et al. 2004: 390).

Discussion points:

1. *Go to **Annexure 2.8**: **SIIRAN: A Simulation of Complex Negotiations.** This is an interesting sample of a low tech Sim complete with explanations, instructions, and worksheets. It gives a good picture of one approach to a brief simulation.*
2. *Note the time frames for the briefing and debriefing compared to*

Simulations in public policy development (cont.)

the time frame for the actual game!

3. *There is no assessment information: how would you assess students on this or a similar simulation?*
4. *What possibilities exist within your course to design something similar? How would your course participants respond? What professional development, if any, would be helpful with designing and running such a Sim?*
5. *For an outline of a much longer (semester long) Foreign Policy Crisis Sim, go to **Annexure 2.9**. Although there are no specific Sim details, it shows how a Sim can be built into a conventional university syllabus.*

Examples of public policy-related simulations in higher education

Below are four examples of the use of public policymaking related simulations used in higher education. They range from basic to sophisticated instances. Regardless, they provide an appreciation for the range of analog simulations being deployed and provide insights into possible practices at a post graduate level in public policy development.

1. *A Role-play: Bots, Wagenaar, & Willemse (2010)*

   Target group: undergraduate social science majors

   Actual playing time: From 40 to 60 minutes

   Topic: policy-making concepts

   Simulation descriptor: As Mayer (2009) and others have pointed out, public policy development is a messy business. But that, according to some, is only one story. There are those who (also?) portray policymaking as a rational process (MacRae & Whittington, 1997). Bots and colleagues found that students seem to have difficulty internalising the differences between these two ways of approaching policymaking. They designed a role-play to see if this would improve student learning about this important conceptual distinction when compared to the problematic learning outcomes achieved via lectures.

   Based on a real-world policy issue, their role-play allowed students to experience the difference between policymaking as a process of rational design and policymaking as a process of political negotiation.

   The role-play creates an experience of immediacy on which the students were asked to reflect. The game is loosely based on a Dutch policy evaluation report on debt restructuring of the Rotterdam Audit Office.

   *Outcomes: A*lthough the general performance of the students was disappointing, the role-playing exercise did seem to have been effective as a teaching device. Moreover, the overall

findings for the control group confirm that a conventional teaching approach is not as effective.

Simulations in public policy development (cont.)

Observations: This role-play experiment was rigorously evaluated using traditional empirical methods. While motivated by a correct desire for analytical rigour in evaluating this simulation, this method still proved problematic. For more on this see Section 2.3.1 evaluating effectiveness.

The article provides a clear description of the role-play and its impact on student learning is subjected to a rigorous evaluation. Those who are interested in playing this Sim are invited to contact the authors (Pieter Bots contact is: p.w.g.bots@tudelft.nl).

2. *A complex Middle East simulation: Williams & Williams (2008)*

Target group: political science, international relations, history, and psychology undergraduates

Actual playing time: 2 x 3 hours

Topic: Building cooperative attitudes and behaviours in a Middle Eastern conflict scenario

Simulation descriptor: the authors wanted to know if students who participate in a simulation game and who are engaged and are having fun actually learn anything. They designed and conducted a complex simulation (Culture & Creed) of Middle Eastern conflict resolution, using their multiple identification theory (MIT) as a system of Sim game design intended to change attitudes and behaviours from competition to cooperation. The MIT approach speculates that a simulation can influence the affective, cognitive, and behavioural dimensions that form and express an individual's attitudes provided the simulation experience develops these three types of identification with the players.

Outcomes: Statistical analysis found significant change in a cooperative direction for both attitudinal and behavioural measures. Robust effects were observed. More than 60% of participants reported transferring the cooperative attitudes they learned in the game to life situations. Simulations designed with their MIT approach can be applied to other conflict scenarios and used to modify attitudes.

Observations: Simulations created with MIT can be crafted to fit the specifics of conflicts and promote mutually beneficial solutions. In the evaluation, the authors attempted to replicate as closely as possible a positivist empirical experimental design. In the end, while some empirical evidence was forthcoming, they too in the end had to rely on qualitative data as well as their own practitioner's knowledge. If interested in exploring this approach, contact the lead author, Robert Williams, at mylifesim@gmail.com.

Simulations in public policy development (cont.)

3. *A major political science simulation (Martin, 2004)*

Target group: senior political science undergraduates

Actual playing time: Not specified, but the whole Sim occupied the last 4 weeks of a semester course

Topic: Building cooperative attitudes and behaviours in a Middle Eastern conflict scenario

Simulation descriptor: The author spent four-fifths of the time teaching through a combination of lectures and group work, but in the final four weeks conducted a simulation of the Council of Ministers of the European Union (EU). Student performance in the Sim was worth 10% of the course mark. The Sim consisted of students having to engage with two agenda items, agricultural subsidies, and a hypothetical scenario in which the EU Council had to take a position in response to a US proposal to invade Iran.

Outcomes: There is no evidence offered other than this (experienced) practitioner's professional observations. On that basis this brief and very readable paper shows that when organising a simulation it is important to know your students' strengths and weaknesses. The author argues that these simulations appeal to students with active learning styles and provide a valuable adjunct to traditional forms of pedagogy.

Observations: This article discusses the value of curricular simulations, particularly in the context of full-year, six credit hour courses. It demonstrates how Sims can be integrated into a traditional curriculum. Although the paper is light on details, it is a useful account of the practical aspects of designing and facilitating a simulation with undergraduate students.

4. **A policy simulation (Norman, 2004)**

Target group: university undergraduates

Actual playing time: 3 x 3hr classes

Topic: Exploring the place and significance of the different (Australian) reconciliation frameworks.

Simulation descriptor: A simulated role-play based on the events relating to the development of the Hindmarsh Island Bridge on Hindmarsh Island in South Australia. The construction of the bridge has seen multilayered and complex dispute. Students were required to work collaboratively to develop an understanding of their stakeholders, and individually to produce a paper analysing and/or critically reflecting on the role of their stakeholders and how the dispute could be understood within a reconciliation framework.

Outcomes: No outcomes are presented other than noting that this (second) attempt did lead to successful learning outcomes. The author comments that Sims like this are, at

least initially, 'not easy and take considerable time, preparation and commitment. The success of the simulation was in fact years in the making. It was a second attempt at simulation case studies. The first case study, based around different events, did not achieve the learning objectives I had in mind—students became too entrenched in their roles and it became a rowdy, and fun, argument rather than a considered learning process.'

Observations: This simulation complements the traditional lecture format and small group discussions. It features extensive learning outcomes and, though lacking detail, is a good exemplar of an Australian simulation dealing with a messy complex political issue.

2.3.2 Simulations in national security policy development

2.3.2. Simulations in national security policy development

Strategic Gaming in national security policy development

As noted earlier, public policy development deals with complex, messy problems: this describes national security policy (NSP) development well. It is an inescapable fact that much if not most national security policy development plays out at the level of a nation's diplomatic, informational, military, and economic (DIME) assets and involves joint and interagency coordination. Here an unexamined assumption can become a critical vulnerability. Hence the utility of evaluating NSP decisionmaking in the context of a safe, simulated environment. The ability to envision and respond to the unexpected highlights the value in conducting gaming scenarios for strategic challenges before they occur in real-life, where the consequences are invariably high.

Political-military games, table top simulations, seminar exercises and other types of free-form games have a long history in national, international and security policy analysis and development, and strategic management in both academic and operational settings.

Two approaches to using such Sims are common. For example, a simple approach to the study of international conflict with the aid of simulations is to provide learners with a historical or fictitious scenario and ask them to choose the best policy from a range of alternatives (Crow & Noel, 1977). In this case, the simulation resembles an exam; a problem is presented, and an answer is requested. Sometimes, following the initial choice, a follow-up is requested, allowing participants to adjust their policy (Mintz, Geva, Redd, & Carnes, 1997). Another, more common approach, and one that closely corresponds with simulation format, is to create a simulated political arena comprising a number of political actors. For each actor, a

Simulations in national security policy development (cont.)

participant or a group of participants are assigned to play the role of leaders, governments, or represented stakeholders, and are required to make decisions according to a set of predetermined rules. These types of simulations are frequently extended over a number of iterations to cycle through protracted policy processes (Pilisuk, 1984).

It is clear from the literature, however, that simulation games have found systemic acceptance as a range of powerful learning methods in policy development, and at the highest levels, as for example in the U.S.[26] However, their uptake across the higher education sector and in the public service sector in countries like Australia, appears to be sporadic and ad hoc, despite its proven track record (an issue to which we return in the section on resource implications, below).

Nevertheless, as this section demonstrates, there is available a range of simulations capable of addressing the learning needs associated with operating at the highest echelons of multilevel national and transnational networks that characterise current and future security challenges. These include the National Defence University (NDU) in Washington DC, and emergency organisations such as the Federal Emergency Management Agency (FEMA): both have successfully deployed a number of national security policy development games eminently capable of addressing and assessing the complex mix of factors associated with policy development and strategic management. Their operational elements are the National Strategic Gaming Center (NSGC) and the Center for Applied Strategic Learning[27] at NDU, and FEMA's National Exercise Simulation Center, opened in 2009, which uses a mix of analog and digital simulations.

The strategic simulation gaming activities that emerge out of the NDU, more specifically the Center for Applied Strategic Learning, are not just for academics. Beyond NDU's students and staff, participants include the Office of the Secretary of Defense, Joint Staff, combatant commands, the interagency community, and Members of Congress. While academics might argue about proof of efficacy, practitioners at the highest levels of national security have long ago delivered their verdict: their clear and unequivocal endorsement of the strategic value and learning power of good strategic simulation exercises, be they at lower or higher levels of fidelity (Andreozzi, 2002; McCown, 2005; 2009; 2010; 2010a).

[26] There is of course a significant uptake of simulations in the business community, as mentioned elsewhere in this report, but a detailed analysis is beyond its scope. However, such an anylysis would affirm the directions and findings discussed in the report. (Faria & Nulsen, 1996; Faria, Hutchinson, Wellington & Gold, 2009)

[27] http://www.ndu.edu/CASL/index.cfm?pageID=9&type=page

Simulations in national security policy development (cont.)

Observations

1. The NDU literature on simulations is not at all reticent about using the terms 'game' and 'gaming'. It is clear that they, and simulation participants, which include policy makers at the highest levels of federal politics, see no dichotomy between the very serious work of high-level policy development and games.
2. Simulations conducted by the NDU (and for that matter FEMA) also appear to target not formal academic coursework but practitioners in their organisational and/or operational settings.

Strategic national security simulations, such as those facilitated by the NDU or FEMA, present participants with a

> self-contained analytical environment in which players explore the constraints that form current strategic problems, examine issues arising under them, and compare possible solutions. In short, political-military games allow players—policymakers, civil servants, and warfighters—to examine their assumptions about a problem and its solutions (McCown, 2005: 34).

NSP development simulations serve not only as an especially effective experiential learning tool, but their pooling of diverse and highly knowledgeable participants with considerable expertise promotes communication, information sharing, and cross-pollination of ideas (McCown, 2005; 2009).

There is still much work and research required on how to best design NSP simulations, especially given the emergence of digital simulations and games. Nevertheless, the extensive and effective deployment of strategic NSP simulation exercises in some important sectors of the national security community at the highest levels and for a wide range of participants demands recognition elsewhere. The benefits of gaming political-military strategic dilemmas in safe simulated environments are convincing.[28]

An advantage of simulations is that their free form allows for less-structured discussions. Strategic-level NSP development simulations not only accommodate, but also take advantage of, the strengths of its highly interdisciplinary range of participants. They provide an effective environment for analysing both coordination challenges and such problems as identifying constraints and their implications for different actors. Additionally, the challenges and constraints that shape real-life events also do so in simulation spaces. This includes the simultaneity of the problems, finite resources, the immediacy of threats, and the various relevant security challenges. All of this makes these simulations an effective means of gathering and evaluating information, knowledge, and wisdom.

Simulations are useful for such policy problems because players must engage with the multiple demands and goals that exist

[28] For sources see the extended reading list in **Annexure 2.10**

Simulations in national security policy development (cont.)

simultaneously in any strategic scenario. Some simulations also feature formal 'hot wash' sessions in which participants present policy recommendations to a panel of experts simulating Cabinet-level decision makers. Accordingly, McCown (2005) notes that senior-level participants frequently respond with highly positive evaluations. They claim these simulations to be useful not only for exploring problems and crises, but for obtaining insights from other senior participants and for their utility in highlighting coordination and planning needs. It is the structure of national security policy development simulations (seminar-based problem environments or seminar games) that facilitate these outcomes.

Effective simulations promote critical explorations and analyses that facilitate learning and offer participants a useful analytical environment in which to identify and weigh policy options and needs. This demands scenarios that are cleanly constructed with carefully researched detail and with clear learning outcomes. Scenarios must be high in fidelity but not so overworked as to make the events seem improbable (McCown, 2005; 2009; 2010). NSP simulations are especially effective in supporting interagency planning and responses to complex crises because participants must respond to multiple, concurrent demands and goals integral to any strategic scenario.

National security policy development simulations in interagency settings

In interagency settings specialists tend to assign disproportionate importance to issues closest to their area of expertise or organisational responsibilities. However, in an NSP Sim, they are required to take a holistic perspective and identify a much wider range of issues and constraints that concurrently shape the whole strategic environment and to articulate priorities and integrated solutions in a much more holistic way.

(McCown, 2005)

NSP simulations can enhance participants' crisis decision-making in interagency settings as they allow exploration of emerging national security issues and the capabilities and limitations of instruments of national power in responding to these challenges (McCown, 2005).

Other examples of national security policy development simulations conducted by the National Strategic Gaming Center (NSGC) are *Silent Prairie*, *Fragile Crescent*, *Dark Portal,* and the *Influenza Pandemic* exercises.

- *Silent Prairie*[29] deals with the complexity and nuance of policymaking during a large-scale agricultural bio-terrorism event. It examined the consequences and potential mitigating strategies that the US government may take following intentional introduction of a pathogen into its livestock

[29] For a summary go to: http://www.ndu.edu/CASL/SPF/docUploaded/Silent%20Prairie%20Jun02%20Executive%20Summary.pdf

Simulations in national security policy development (cont.)

population throughout the country.

This forum provided for information exchange and decision-making in the context of such a major national security crisis. In addition to examining the inherent difficulty in responding to the problem while conducting major overseas operations, members also assessed the economic effects of this notional incident and how the US might respond once the perpetrator had been identified. Sponsored by the NDU, two separate exercises were held in 2002 and 2003. Participants included The Office of the Secretary of Defense, the US Army National Guard, Joint Chiefs of Staff, and other military leaders.

- *Fragile Crescent*[30] is a South Asia crisis simulation exercise conducted and hosted by The Institute for National Strategic Studies (INSS) and the Center for Applied Strategic Learning at NDU. The exercise posed a number of hypothetical scenarios intended to stimulate thinking about current and future challenges in South Asia.

  The exercise focused on three policy challenges: balancing the interests of key stakeholders in Afghanistan, confronting the major drivers of instability in South Asia while mitigating its effects on development efforts in Afghanistan, and addressing the India-Pakistan rivalry and its impact on stability in Pakistan and counterinsurgency efforts in Afghanistan.

  The exercise focused on the period from April to September 2009 and involved three distinct moves during which scenario updates were introduced via video and graphic injects. The first move opened in mid April 2009 with the report of an attack against a major International Security Assistance Force troop contributor's diplomatic presence in Kabul, amid a significant escalation in Taliban-sponsored attacks on North Atlantic Treaty Organization forces in Afghanistan and Alliance supply lines transiting Pakistan. In the second move the scenario advanced ten weeks, and participants were confronted with an attack on a major Pakistani government facility in Islamabad. In the third and final move, the scenario advanced to early September, when participants were faced with an India-Pakistan crisis provoked by Pakistan-based Islamic militant attacks on Indian military targets near the Line of Control in the disputed Kashmir region.

  Each move was followed by a facilitated discussion. Participants developed hypothetical recommendations for senior U.S. policymakers including direct responses to the events posed in the scenario, as well as policy and strategy initiatives to secure long-term U.S. policy goals. In the course of the three-hour exercise participants focused on three key areas around which a new South Asia strategy might be formed (Robinson, Tomisek, & Kligge, 2009: 1).

[30] For a summary go to: http://www.ndu.edu/CASL/docUploaded/fragile%20crescent%20working%20paper.pdf

Simulations in national security policy development (cont.)

- *Dark Portal*[31] involved the analysis of policy issues following a series of physical and cyber attacks directed against the U.S. The National Strategic Gaming Center created the Sim and the National Defense University operated it. Participants included members of Congress, senior Executive Branch officials, military leaders, and state officials.
- *Global Tempest*, **Influenza Pandemic exercises**: the National Defense University (NDU) conducted a cycle of pandemic influenza exercises over a two-and-a-half year period between 2006 and 2008, for a broad and representative sample of senior policymakers involved in planning for and response to pandemics. This game, which the Strategic Policy Forum (SPF) modified for exercise Global Tempest, was originally based on a bioterrorism policy exercise. The exercise began with a first move in which a novel, highly pathogenic influenza virus emerged overseas.

  The exercises were a success. By bringing together multiple perspectives and sets of expertise, they elicited new insights into the problem as well as highlighting its salience to a broad range of actors beyond the public health community (McCown, 2010a).

  Of particular interest is how participant observations and feedback shaped the design of subsequent exercises, creating an iterative process in which lessons learned from earlier games informed structure that, in turn, elicited further and more refined insights in subsequent ones (McCown, 2010a: 162).

  In keeping with the earlier observation that learning from simulations is not only for the players of the game, but also the facilitators, the exercise taught the SPF several valuable lessons as well. This included the significance of complex Federal-State relationships. Subsequently, and drawing on these findings, the last three games introduced rather different factors.

  Affirming the way in which fresh insights can appear in scenarios, McCown (2010a: 162) cites an interesting observation from an Alaska Department of Labor official. Addressing the assertion that a crucial part of the response would be convincing the public to stay home if ill, the official stated, 'We have a large tourism industry with seasonal employees here. What do we do about workers who won't stay home because they have no sick leave?' This simple question informed a major overhaul of the exercise before it was run again in 2008. That exercise eliminated many of the existing details from resource allocation scenarios. In their stead, it favoured factors highlighted as more important in the previous exercises. Here, McCown is worth quoting at length:

[31] Information on this Sim is virtually non-existent in the public domain. See: http://www.socialimpactgames.com/modules.php?op=modload&name=News&file=article&sid=231&mode=thread&order=1&thold=0

Simulations in national security policy development (cont.)

> This series of pandemic flu exercises is an excellent example of how qualitatively specified games can help us refine our understanding of the key independent factors that structure a problem. Some factors or constraints, particularly public communication, were found consistently important and present across all exercises. Even this factor was refined, however, as the emphasis switched from justifying resource allocations to explaining the benefits of non-pharmaceutical measures. All told, exercises moved away from what could be characterized as an emergency response understanding of the problem toward a more public health understanding. Multiple iterations of the exercise, a set of participants who were both diverse and representative of the decision-making community, and exercises that were sufficiently explicit about the constraints or factors that we posited as composing the strategic challenge were the three factors key to using qualitatively specified exercises to refine and validate how we conceptualized the problem (McCown, 2010a: 162).

FEMA strategic management simulations

The FEMA National Exercise Simulation Center uses a blend of analog and virtual simulations to engage federal, state, and regional partners in joint strategic management.[32] FEMA conducts numerous analog simulations, which range in scope from tabletop exercises, for internal use by the interagency community, to large, functional and full-scale simulations involving numerous Federal and non-Federal entities. Featured below are examples of analog simulations.

- *Exercise Eagle Horizon*: is a full scale, externally evaluated, scenario-based exercise focusing on the continuity of operations programs of Federal organisations in the National Capital Region.
- *Exercise Resilient Accord*: is an Interagency Continuity Cyber Workshop (tabletop) aimed at increasing continuity awareness, preparedness, and planning for Federal and non-Federal entities during a cyber attack. The tabletop workshop focuses on identifying solutions or alternative actions to ensure continuity of operations during a cyber incident. In addition, the workshop attempts to strengthen relationships between the continuity manager and information technology professionals.
- *Determined Accord Exercise*: a multi-agency pandemic tabletop exercise designed to increase Federal and non-

[32] http://www.fema.gov/news/newsrelease.fema?id=47279 and http://www.fema.gov/about/org/ncp/coop/exercises.shtm#2

Simulations in national security policy development (cont.)

Federal Governmental Jurisdiction continuity readiness for a pandemic event, mitigate vulnerabilities during an influenza pandemic outbreak, and identify gaps or weaknesses in pandemic planning and in organisation continuity plans, policies, and procedures. The tabletop discussions allow participants to address continuity planning and program requirements with other government agencies, and help to develop organisation and interagency lines of communication.

- *Cardinal Accord Exercise*: a tabletop exercise designed to increase Federal department and agency, State, territorial, tribal and local jurisdictional continuity of operations readiness for a regional terrorism event, to mitigate vulnerabilities during a terrorist event, and to identify gaps or weaknesses in organisational continuity plans, policies, and procedures.
- *Vigilant Strategy Exercise*: a devolution tabletop exercise designed to provide a forum for Federal and non-Federal entities to discuss devolution of operations readiness to respond to a catastrophic event in which Mission Essential Functions (MEFs) and Primary Mission Essential Functions (PMEFs) are devolved to a designated devolution site.
- *Determined Challenge Exercise*: a multi-agency hurricane tabletop exercise designed to increase participant understanding of the weaknesses and gaps in organisations' existing continuity plans, policies, and capabilities.
- *Quiet Sentinel Exercise:* a full-scale exercise designed to validate an organisation's continuity of operations capability to activate, relocate, and operate from an alternate site.
- *Liberty Down Sentinel Exercise*: a functional multi-agency continuity exercise designed to evaluate the ability of organisations to activate their continuity of operations plans during a natural emergency and to sustain operations for an extended period.

An (Australian) example: Engle matrix games

As Mitchard & Ng (2010-11) point out, implementing effective interagency collaboration in simulations is not necessarily easy. Interagency simulations need to integrate a range of stakeholders, each of which brings diverse agendas, values, and differing degrees of experience and expertise. They suggest that simulations often fail to reflect the complexity of such multi-agency environments. The question for Mitchard and Ng (2010-11: 2) is 'how to situate players within an environment that captures this richness and that gives them the capacity to learn about the complexity of the socio-political space infusing modern operations?'

To address this issue and simulate the complex nature of

Simulations in national security policy development (cont.)

interagency problem spaces they propose the Engle matrix gaming methods. The Engle gaming methods[33] have proved to be sufficiently rich in their design to reflect a multitude of military, social, political, and economic drivers, the methods having been effectively applied to interagency coordination issues (Mitchard & Ng, 2010-11; Engle, 1990).

Engle matrix games are a form of structured experiential learning that results in a strong exchange of tacit and explicit knowledge between participants. Engle matrix games can make implicit knowledge explicit and help to reveal assumptions. This is a specific strength of Engle matrix games and a distinct advantage when considering interagency issues. Although they rely on a simple low-tech game engine, as in all simulations, scenario preparation is critical to success. At any rate, the role-playing nature of Engle matrix games offer important educational experiences and may be usefully applied to interagency strategic management and coordination issues (Mitchard & Ng, 2010-11: 20).

Conclusions

Strategic NSP simulations such as tabletop, role-playing games, functional simulations, scenario planning and crisis simulations provide opportunities for participants to engage in an analytical dialogue that enables an exploration of their roles, actions, and possible outcomes of the simulated scenario.[34] In addition:

> other benefits such as discussing conditions that may drive decisions, synchronizing possible actions, evaluating resources required to take those actions, and discovering other questions that need to be explored about the situations addressed can be powerful takeaways … The benefit of an organized 'exploration' and controlled discussion that wargaming provides should be leveraged … It is a good time to move beyond the question of the benefit of wargaming and codify it as one of the tools we use to improve our … efficiency and synchronization of efforts that could lead to a more successful and complete execution of policy (Lartigue, 2008: 19-20).

Its limitations, however, have to be borne in mind: these simulations have little if any predictive power and are not designed for such a purpose. On this point Brewer (1984) is worth

[33] The Engle matrix game is a multi-sided, role-based seminar game with structured turns. A role can win (by achieving its objectives) without other roles losing. Each player/team assumes a role and makes an argument, during each turn, for how their action will change the game world. These arguments are assessed by the adjudicator. Then, either the adjudicator or chance (dice) decide the outcome of the arguments, with the results of the arguments and the nature of the pre-existing conditions from earlier in the game shaping the likelihood of success. The outcomes become facts in the game world. The same process is followed for counter arguments. As each turn passes, the facts accumulate to build a new world (Mitchard & Ng, 2010-11); see also: http://hamsterpress.net/?page_id=15

[34] For additional relevant examples, see the range of Sims offered by *MIT-Harvard Public Disputes Program (PDP)* and the *Consensus Building Institute (CBI).* See http://cbuilding.org/publication/article/using-role-play-simulations-increase-public-organizational-learning and http://cbuilding.org/cases.

Simulations in national security policy development (cont.)

quoting at length. These Sims, as he correctly points out:

> never prove anything in a narrow scientific sense. They help to portray the complexities of international conflict; their role-playing aspects provide insights into the special problems of command and control; and they are important educational experiences, providing participants an opportunity to become aware of facts associated with possible conflicts. Discovery is emphasized and highly valued. Positions, expectations, perceptions, facts, and procedures typically are challenged and improved as the game proceeds. … Thus, imagination and innovation play central roles in the drama of the analog game. The game also allows players to challenge the initiating scenario, including its explicit and implicit assumptions … the fundamental purpose of analog gaming is to encourage creative, innovative thinking about problems that defy treatment with more conventional analytic approaches … (Brewer, 1984: 805, 811).

It is clear from the extensive literature on serious simulation and gaming used in organisational and educational settings that a wide range of practitioners and academics find analog or live-action, real-time simulations a powerful and useful activity (see also for instance Emerson, Movius & Meredith, 1999; Corbeil & Laveault, 2011; Weir & Baranowski, 2011). There is wide acknowledgement of their overriding comparative advantage, namely their capacity to stimulate numerous alternative pathways to the future. 'Running frequent, inexpensive, and expert-based studies encourages exploration, group opinion, shared experience, and the clarification of individual and institutional preferences' (Brewer, 2007: 166).

Two points are worth noting at this time. First, that while analog simulations are generally inexpensive, they are initially time consuming to construct and perfect. They are not the panacea for all the shortcomings of conventional approaches to learning and teaching. However, it is clear that while there is a place for imparting information and wisdom via lectures, these might be better placed as ancillary methods alongside authentic learning in general, and perhaps simulations more specifically. There needs to be recognition that both are good at some aspects of learning, and not in others.

The benefits of simulations have been well noted thus far, but it is important also to consider the challenges involved in using simulations. As Mayer (2009) points out, there are limitations to the use of low/no-tech simulations policy games such as discussed above. For example:

- they can only handle a limited cognitive load;
- procedures are usually laborious;

- storing large quantities of information during and around the game for purposes of analysis can be difficult; and
- social simulations may fall short in a reality check: good Sim design, facilitation, and debriefs are necessary to dissuade participants from producing negotiated nonsense.

More importantly, and leading to the second point, is that:

> the options to replay or try it again are nonexistent; the possibility of fast-forwarding or slowing down is absent; the option to examine the really long-term consequences of actions and visualize them in real time is unavailable; and the possibility of having asynchronous and dispersed game-play or playing games with a large number of players (hundreds or more) is unthinkable (Mayer, 2009: 849).

There are of course other considerations to address. This observation leads to the second point, namely that the exponential growth of digital technologies open up new horizons and new possibilities for simulations. This is the focus of the next section.

2.3.3 The implications of simulations

2.3.3 Implications of simulations

The use of scenarios introduces what are generally high-end authentic learning methods. Associated with doing so may have implications for teaching skills, technology and resource allocation. There is a need to emphasise 'may' here because any implications are very much both context and choice dependent.

This section provides a cost-benefit analytic overview of contextual variables (i.e. those variables external to the simulation method), and choice dependent variables (i.e. those variables internal to the particular simulation method chosen). Tabletop, functional and full-scale simulations will be used to illustrate these variables.

Context and choice: two interdependent variables.

The implications of adopting simulations depends to some degree on the teaching skills, technological support and resources already available in the College and similar post-graduate, on-campus, educational environments. Some useful questions to ask before starting include:

- What design, facilitation and debriefing skills do teaching academics already have?
- What useful learning technologies are already in place?
- If learning technologies are needed to adapt, how are teaching academics using them effectively?

Implications of simulations (cont.)

- What resources are already, or likely to be, available?
- What level of ideological acceptance is there among both teaching academics and post-graduates? For instance, to what extent are academics willing to use simulations, even if at a low level of complexity and fidelity (but where they can still act as powerful learning tools)?
- What is the availability of skilled professional development assistance in up-skilling lecturers into facilitators?
- What time availability do academics have for preparation (should they wish to deploy more complex simulations)?
- To what extent are participants (post-graduates), ready, willing, and able to engage in simulations?

However, such institutional needs analysis cannot be done in isolation from the choice of the level/s of simulations likely to be deployed. This is because these contextual and choice factors are interdependent. In terms of choice dependent variables, we have to look at the simulation method(s) likely to be used. This situation may vary over time, as a college or similar environment may start out with smaller simulations at the lower end of complexity and fidelity and slowly expand their repertoire of simulation methods when appropriate (a highly recommended approach). The point is that any implications analysis is also time dependent, as both internal and external variable might change (and in either direction).

At any rate, in regards to choice dependent variables we need to know:

- what method(s) of simulation are likely to be used? Given the learning needs and desired learning outcomes, what level(s) of complexity and fidelity will these simulation methods require?
- simulation design decisions: the higher the level of required complexity and fidelity, the higher the costs, benefits and preparation time. The ability for a simulation to be computer assisted (or not) should also be considered.

Two principles must be kept in mind when considering whether or not to use scenarios:

1. The more resource-full an institution is, the lesser are the implications and associated costs (time, equipment etc.).
2. The higher the levels of complexity and fidelity, the higher the costs in terms of time, skills, and resources.

It is clear that given this situation (itself already the basis for a good tabletop or scenario-planning simulation: see the recommendations below) many combinations are possible, and each of them will have different implications.

Of course, as the examples below will clarify, simulations with low levels of complexity and fidelity—and which are still powerful, high-end authentic learning methods—will only have

Implications of simulations (cont.)

relatively few resource implications. For example, conducting policy development role-plays require little if any additional skills, resources and technological support. This changes however the higher the levels of complexity and fidelity which simulations are required to possess. Even then, however, the implication cost curve flattens as skill levels, equipment and technologies are developed.

Nevertheless, it would be good practice to underpin a decision to use more complex and high fidelity simulations with a SWOT analysis. This approach is valuable at any time, even after using lower-level simulations. Such an analysis of both external and internal variables will clarify implications and provide the basis for a solid action plan and a successful implementation regime.

Having made these points at a generic level, the impact of the choice-dependent variables on the implications for practice can now be illustrated more clearly on a 'complexity/fidelity' continuum using the examples of tabletop, functional and full-scale simulations.[35]

Tabletop exercises

Purpose

The purpose of tabletop exercises is to provide participants with a facilitated analysis of a crisis situation in an informal, stress-free environment. It aims to elicit constructive discussion as participants examine and resolve problems based on existing operational plans and identify where those plans need to be refined. The success of this simulation is largely determined by group participation in the identification of problem areas.

Characteristics

There is minimal level of simulation in a tabletop exercise. Equipment is not used, resources are not deployed, and time pressures are not introduced.

Applications

Tabletop exercises have several important applications. They:

- lend themselves to low-stress policy and coordination discussions;
- provide a good environment for problem solving;
- provide an opportunity for key agencies and stakeholders to become acquainted with one another, their interrelated roles, and their respective responsibilities;
- provide good preparation for a functional exercise.

Comments

This is a low level simulation in terms of both complexity and

[35] The examples of policy exercises, scenario planning and crisis simulations discussed in the section above could also have been used here. However, using the examples chosen also broadens the range of examples of methods the NSC could use.

Implications of simulations (cont.)

fidelity. Nevertheless, this type of simulation has its place and value. It represents an effective though low-risk learning activity for the institution and the exercise participants.

Functional simulation

Purpose

This is a fully interactive simulation that tests the capability of personnel from one or more organisations to respond to a simulated event. The simulation tests multiple functions, such as those of a policy, strategic or operational plan. It is a coordinated response to a situation in a time pressured, realistic simulation.

Characteristics

A functional simulation focuses on the coordination, integration, and interaction of a system's policies, procedures, roles and responsibilities before, during, or after a simulated event.

Applications

Functional simulations make it possible to test several functions and exercise several organisations without incurring the cost of a full-scale exercise. A functional simulation is always a prerequisite to a full-scale simulation. In some instances, taking part in a functional simulation may serve as a full-scale simulation for a participating organisation.

It is a stressful activity, because players respond in real time with on-the-spot decisions and actions. Their decisions and actions generate real responses and consequences from other players. In the simulation process, carefully scripted complex messages force players to make decisions and act on them. This complexity makes this a time-consuming exercise to design.

Comments

Functional simulations operate at a mid-level of complexity and fidelity, as well as design difficulty and psychological fidelity, although equipment fidelity is generally low.

Full-scale or intensive simulations

Purpose

These are full-scale simulations of real or hypothetical events portrayed as realistically as possible in order to evaluate the operational capability of crisis management systems in a highly stressful environment simulating actual response conditions. To accomplish this realism, all the relevant artefacts need to be supplied, e.g. charts, documents, and other resources that are part of a crisis coordination centre.

Characteristics

A full-scale exercise coordinates the actions of several entities, tests several emergency functions, and activates the crisis coordination center (CCC). Realism is achieved through:

Implications of simulations (cont.)

- on-scene actions and decisions from policy groups;
- rapid detection, reporting and response requirements; and
- communication devices.

Full-scale exercises are unsurpassed in testing functions: they constitute what might be termed a 'trial by fire'. Because they are time consuming it is important that they be reserved for high priority issues.

Comment

From this description, as well as from earlier definitions and descriptions in this paper, this is a high fidelity, highly complex scenario. Environmental, equipment and psychological fidelity are all at very high levels.

The complexity/fidelity/cost continuum

As Table 2.1 and Figure 2.7 indicate, the tabletop simulation is uncomplicated and sits at the very low end of the complexity/fidelity continuum. However, as we move from functional to full-scale simulations, we also move up the complexity/fidelity continuum, and thereby also the cost of the implications in time, skills and resources.

Table 2.1: A comparison of three simulation methods[36]

	Tabletop Exercise	Functional simulation	Full-scale simulation
Purpose	• Practice group problem solving • Promote executive familiarity with a strategic management scenario • Assess plan coverage for a specific risk area or case study • Assess interagency coordination • Observe information sharing • Training in negotiation skills	• Evaluate a function • Reinforce established processes • Assess crisis preparedness • Asses and strengthen inter-jurisdictional or inter-organisational relations	• Assess and improve information analysis • Assess and improve interagency cooperation • Support policy development • Assess negotiation procedures • Assess and strengthen inter-jurisdictional or inter-organisational relations

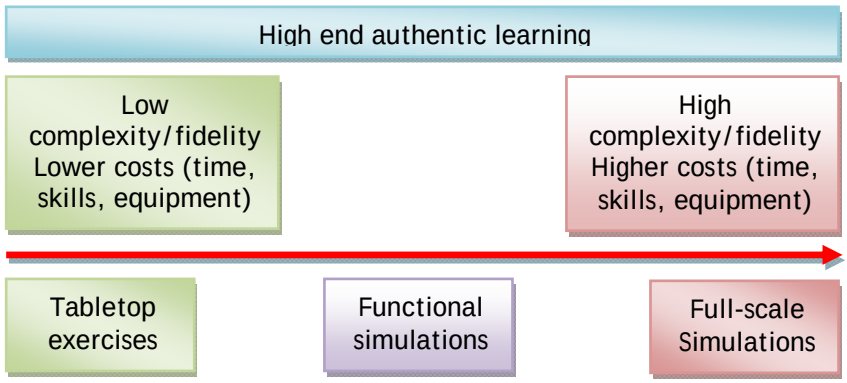
[36] Emergency Exercise Development. World Health Organisation, Western Pacific Region (2009) Retrieved 7 March, 2012 from: http://influenzatraining.org/documents/s17618en/s17618en.pdf

Implications of simulations (cont.)

Format	• Narrative presentation • Problem statements or simulated messages • Group discussion • No time pressures	• Interactive, complex • Players respond to messages (events/problems) provided by simulators • Realistic but no • actual equipment • Conducted in real time; stressful	• Realistic event announcement • Personnel gather at assigned site • Visual narrative (enactment) • Actions at scene serve as input to simulation

These illustrate clearly not only the types of simulations available to the National Security College, but also how simulations range from low to high in complexity and fidelity, and thus lead to an escalation of implications.

Fig. 2.7: the complexity-fidelity-cost continuum



Simulations in an area such as public policy development are clearly beneficial when we consider the commitment to this approach over a protracted period by major organisations. However, while simulations can be very effective, they are, as Aplin and Cosier (1979: 161) stress, 'an extremely sensitive device. Many minor environmental disturbances can mediate the success of even the best simulation exercise'. It is useful to note the more significant barriers that can interfere with a simulation when these continue over a protracted period of time. It is worth keeping in mind, as Aplin and Cosier's (1979: 161-2) paper suggests, that some dysfunctional developments emerge during the latter periods of extended simulation exercises. These may include:

- *boredom and apathy:* initial periods of most simulations require participants to master the rules and procedures of the simulation, and to simultaneously gain understanding of the decision environment. Participants can quickly master the rules of the simulation, and soon begin to make sense

Implications of simulations (cont.)

out of the decision environment itself. Once this occurs, the decision procedures become fairly structured and routinised, leading to possibilities of boredom. Most simulations have a range of decisions wherein this shift takes place. After this shift, knowledge increases only marginally;

- *competing time demands:* students and participants in Sim exercises can become engrossed in details of the decision process, and may devote inordinate amounts of time to non-critical functions. Potential conflicts with other courses and work requirements may arise. Resultant conflicts may produce resentment toward the simulation;
- *group disintegration:* whenever groups are formed in real or simulated businesses, one can expect a variety of interpersonal crises to arise. This is especially true when groups are employed in educational activities. Inadequate leadership skills, variations in participant abilities, motivation and commitment, inability to differentially reward performance, and the lack of supervision over group processes are likely to lead to significant declines in the quality of group functioning. This problem is further aggravated in groups which experience internal struggles, as these groups frequently manifest lower performance levels. Participant complaints about group activities and specific members become an impediment to continued interaction;
- *goal displacement:* extended simulations make it likely that participants will lose sight of the goal and instead focus on mastering the simulation. Goal displacement can lead to increased motivation. However, it detracts from the true goal of developing strategic management and policy development competences. Students may elicit this response and regard the simulation exercise as a 'course in simulation' (Aplin & Cosier, 1979: 161-2).

Making choices: a cost-benefit analysis

It is obvious from the above information and the wider literature that the higher the complexity and fidelity of a simulation, the higher the costs or its implications. There needs to be an equivalently high level of knowledge and skills in regard to a simulation's design, its facilitation, and construction of artefacts, assessment, and debriefing skills. With this comes with high costs in terms of time, and possible up-skilling of academic staff through professional development and practice. However, simulations, even tabletop exercises or the seminar simulations conducted by the NDU (which seem to be a blend of tabletop and functional scenarios) can comprise high-end authentic learning, as illustrated in Figure 2.7.

In this context, the work of Ritterfeld and Weber (2006) and the shifting emphasis from digital to analog games and simulations provides insight into the apparent dilemma of having to choose between fidelity and learning. Here we have three possible relationships between game fidelity and learning:

Implications of simulations (cont.)

1. Linear positive (facilitator hypothesis): increased game fidelity means learning that is more effective.
2. Linear negative (distraction hypothesis): fidelity can detract from learning. Fidelity overload can actually interfere with achieving learning outcomes, as unnecessary aspects of reality distract participants. Research tells us that there are situations in which it is not the realism of the simulation space that governs learning, but the realism of the activities within that space (de Freitas, 2007). Linear negative cases suggest that sometimes more realism leads to a decrease in learning performance.
3. Inverse U-shaped (moderate reality or fidelity hypothesis): fidelity is beneficial for learning, but only until a certain point. If fidelity exceeds this point, the additional level of realism is detrimental to the learning outcome.

It is reasonable to assume that the third relation is sound from both a cost and a learning benefit perspective. In addition, it is good practice to begin with low risk, low complexity/fidelity level simulations and build up resources, such as a sound skill-base, over time. This also reduces time costs when designing high fidelity scenarios, as the basic skill levels have already been enhanced.

Professional development

A critical issue for deploying mid-to-high fidelity simulations is appropriate staff development. There are apparently few if any universities in Australia where academic development centres employ specialists in simulation-focused staff development. High-level simulations do need high levels of proficiency in design, facilitation, assessment, and debriefing knowledge and skills.

A new approach to learning requires a new knowledge and skills base. Working with simulations opens up a new world of learning and teaching. Here competence in design, facilitation, assessment, and debriefing skills are paramount. Additionally, preparation time increases, especially as the complexity of simulations increase, as indicated in the literature (e.g. Mitchard & Ng, 2010–11). With simulations, teaching academics (the term 'lecturer' is obsolete and incompatible with learner centric approaches, and more so in simulations) will use their time quite differently. While increases in preparation time for low fidelity simulations are negligible and comparable in time to preparing for a lecture, it is in mid- to high-fidelity simulations that preparation time can increase substantially. However, it can also be argued that time spent elsewhere may also decrease as the focus of the workload shifts from in-class to pre-class and post-simulation debriefings.

> This 'experiential' learning may be more valuable than many of the so-called expert opinions that the students read in their textbooks. Furthermore … this learning may be accomplished in a relatively short

amount of time with a relatively limited commitment of resources (Aplin & Cosier, 1979: 161-2)

Discussion points:

1. *What simulation method would be suitable for your course?*
2. *How would you rate the benefits vs. any likely costs?*
3. *What support and or resources would you need to design, facilitate, assess, debrief, and evaluate such a simulation?*

2.4 The roles of technology

This section addresses outcome 3.

It identifies the roles of technology in enhancing the learning experience in the area of policy development simulations

This section will help you to appreciate:

2.4.1 how digital technologies are reshaping the world of simulations and gaming, and the ways in which digital technologies can support the analog simulation learning experience.

2.4.1 The roles of digital technology in simulations

2.4.1 Digital technologies in simulations

Normally in reports and papers a section such as this would occupy the most space. It would also send the message that digital simulations and games open up near-revolutionary possibilities, as indeed even critical educators would admit (e.g. Gee, 2003; 2004). This section is neither long, nor evangelical in tone. While this section presents a brief overview of digital simulations, it also suggests that in the context of national security policy development digital technologies can play a powerful supporting role via the use of social media.

This section will briefly provide a background briefing on the potential of digital technologies for simulations and gaming. This is for two reasons. First, the focus of this report is squarely on on-campus post-graduate education, as that is the College's core business now and in the foreseeable future. Second, student enrollment at the College and similar institutions is small. This situation would not alter significantly even if the College were to develop cutting edge expertise in policy development simulations (see Recommendations). Realistically, this has two consequences. First, the small student cohorts make huge investments in digital technology-driven simulations prohibitive. There is a significant cost-benefit issue that makes the use of

Digital technologies in simulations (cont.)

digital simulations such as multi-player online games and even COTS formats inordinately expensive. As Moreno-Ger, Sierra-Rodriguez &Fernandez-Manjon note,

> games can be a powerful resource in education, but not if used indiscriminately. Therefore one of the first things to do is to determine what kind of games have an educational value, in which cases the development costs are worth funding, who the target audience groups are, and what subjects they are to help teach … The creation of educational videogames is a much more complex and costly task than the creation of other types of educational content (Moreno-Ger et al., 2008: 16).

For example, Michael and Chen (2005) conducted a survey that included questions about the costs of serious games projects that were being developed at the time. Most answers (26.23%) fit into the $100,000 to $500,000 range, with 14.75% in the $1,000,000 to $10,000,000 range (for comments on costs see also Aldrich, 2005 and Waters, Bassendowski, & Petrucka, 2009).

Even if attempts to reduce costs were successful this situation would only change slightly (Aldrich, 2005; Van Eck, 2006). Moreover, and given the considerable financial investment required for small numbers of participants in on-campus environments, such digital simulations would have to offer extraordinary benefits well beyond attracting students on the basis of flashy technology. In addition, high-end simulation games push technology to its limits and therefore demand extremely powerful computers. Software and hardware likewise also require regular upgrades as games become more sophisticated over time. Not all institutions and students have the resources to support such sophisticated technology (Moreno-Ger et al., 2008).

Nonetheless, it is useful to have some idea of the types of games available, how digital simulations and games are different to analog simulations, and how they add to the suite of simulation tools available to educators. A list of Web links to games can be found in *Annexure 2.11.*

New media: new possibilities

Interest in digital games designed for learning is not restricted to formal educational practice. Games and simulations designed specifically for learning exist in domains as diverse as the military, commerce, health and informal learning (Sawyer, 2002).

New digital technologies have been adopted because they provide powerful new ways of engaging participants in complex computer-based decision-making exercises. Hence, across a range of academic and professional fields, simulations are considered to be effective in allowing participants to experiment with more complex configurations of data and to quickly form hypotheses and test them against different variables in real time. Participants can find digital simulations far more compelling than

Digital technologies in simulations (cont.)

more traditional ways of representing knowledge.

Given that simulations use an experiential form of learning, students experience what they learn from a robust simulation as their own discoveries. Well-designed digital forms of simulation games expose players to powerful new ways of seeing the world and encourage them to engage in a process of modelling. Digital simulations usually include relevant artefacts such as spreadsheets, maps, graphs and charts, which students must learn to use to play the game. This motivates students to move back and forth across a given complex and integrated information system, acting on the simulated environment on the basis of information gleaned from a wide range of different representations. As Aldridge (2009) stresses, provided sound pedagogic principles are applied when modifying existing games applications for educational purposes, there is great potential for learning with games. This approach has many implications for learning design, facilitation and assessment, and thereby shifting the traditional role of lecturers from teaching by telling to that of being a facilitator, collaborator, producer and author (Jenkins, Clinton, Purushotma, Robison, & Weigel, 2006; Sawyer, 2002; De Freitas, 2007; Aldridge, 2009).

However, equating the role of digital technology with digital simulations and games would represent a very narrow reading indeed. What we are dealing with is the wider role of digital technology in authentic learning. Such a wider reading opens up different ways in which various forms of digital technologies can effectively act in support of analog simulations in blended approaches to simulation learning. One approach that is worthy of consideration, however, is the use of analog simulations that employ social media for participant and facilitator networking. This could make excellent use of existing, commonly available, and highly familiar digital technologies and practices. This topic is addressed below.

Digital technologies and simulations

For our purposes, we situate digital simulations within the realm of serious gaming as an open category able to encompass any game or simulation that can be used for learning purposes. From this perspective digital simulations refer to the playing-out of real world situations[37] involving one or more persons with the aid of a digital device, usually a computer or game console.

Types of simulations

There are different types of analog and digital simulations: these vary in terms of their use of the technology (and in modelling and programming complexity). One type of simulation is where a single human participant plays against a computer program: these are referred to as single player simulations. (Gonzalez, Vanyukov, & Martin, 2005), and examples of these are given below. Micro-world simulators of this type can be used to detect common rules of conflictive behaviour and illustrate how they

[37] Though simulations can also involve fantasy worlds. For a discussion see Becker & Parker (2010)

Digital technologies in simulations (cont.)

impact on the decision process (Kuperman, 2010).

Another type is that of multi-player simulations and games in which a number of players engage with an online computer-based game or simulation. These *Massively Multiplayer Online Games (MMOGs)* are highly popular (e.g. *World of Warcraft*). Multiplayer online games are one of the most powerful forms of modern gaming, allowing the possibility of reliving situations and conflicts in different settings and conditions in groups (Becker & Parker, 2011, Aldridge, 2009).

A third approach is to simulate a system in which two or more computer programs play against each other. This type of simulation allows researchers to study very long sequences of repeated games as well as interactions between large populations of actors (Cusack & Stoll, 1990).

Methods of simulation and gaming

It is still relatively common to think of digital simulation games being played on a PC or on a console. This, however, is rapidly changing with newer alternatives:

- *PC and console games* played on a PC: this includes console games like Nintendo, Playstation etc. and single or multi-player, browser-based games;
- *portable games* played on modern handheld systems like the Nintendo 3DS and PlayStation Vita;
- *smartphone or mobile games* which do not always involve sitting in front of a screen. These run off a mobile operating system and offer scope for using games in multiple contexts;
- *social media games* have made a recent splash in the gaming landscape. Social games encourage sharing between players, and run off social networks. Facebook is the most popular (e.g. FarmVille). Usually, players are tasked with building towards or maintaining a goal, and are rewarded for interacting with each other and for getting friends to join;
- *virtual worlds* involve interactive virtual reality simulation games and environments. Virtual experience spaces provide an educational simulation genre in which students, in a role-play, practice real-world skills such as consulting or creating intellectual property, or even disaster recovery, using Web-based materials as props (Aldridge, 2009: 24). A good example is Industry Masters.[38] This is a single or multi-player, real-time web business game that provides real-time business and economic scenarios. Virtual worlds will eventually merge into *Highly Interactive Virtual Environments,* in which students and teachers can increasingly expect a smooth ramp up and down between the real world and the open virtual world. It will seamlessly combine the enjoyment and challenges of a game with the real world relevance of a simulation.

[38] http://realtime.industrymasters.com/

Digital technologies in simulations (cont.)

This list also indicates that the role of digital technologies is not just limited to digital games. Other elements, such as virtual worlds and social media, are also available to support analog simulations, a point we shall return to later.

What is the same, what is different?

Succinctly put, what digital and analog games have in common is that they both share five key characteristics. They both feature:

- Conflict: all games pose challenges;
- Constraints: all games have rules;
- Closure: all games end at some point;
- Contrivance: all games are contrived to various extents; and
- Correspondence: all games respond to selected aspects of reality.

In terms of closure, some games can be ongoing (e.g. the SimCity games) but when simulations like that are used in learning environments closure is imposed by the simulation facilitator (Becker & Parker (2011).

However, digital simulations represent a very different medium of representation (Klabbers, 2006). In any simulation or game space, the medium of representation—the game space—is a critical component. This is because the medium of representation, along with the rules, determines the resources available to simulation participants, such as what they can and cannot do. For example, a chessboard is the base medium of representation for the game of chess. Hence, moving a simulation from a mock crisis coordination centre to a computer-generated virtual crisis centre as part of a global, multi-player simulation provides participants with a very different game space and resources (Klabbers, 2006: 8-9).[39] Consequently, this very different representational space produces a very different type of engagement. While the five key characteristics remain, all but the first (the conflict challenge) are operationalised very differently.

This different representational space makes a different set of resources available: it offers distinct opportunities and constraints. Hence, the dynamics between the player(s) and the environment and between each player is also very different. For example, engaging in a simulation in a mock crisis control centre is a very different experience from doing so in Second Life with avatars (Becker & Parker, 2011).

Regardless, for serious purposes such as public policy development, the key question is whether the characteristics of digital simulations, whatever they may be, are fit for the particular desired learning purpose. Moreover, if so, do the benefits outweigh the costs?

Digital simulations as serious gaming

[39] In the chess example, the digital version changes the medium of representation so that a player now interacts with a computerised game board and rule-driven agent the play of which is determined by built-in algorithms (Klabbers, 2006).

Digital technologies in simulations (cont.)

The creation of the term 'serious games' was a well-intentioned strategy designed to give legitimacy to an emerging field at a time when computer games were popularly perceived as lightweight, time-wasting entertainment (Newman, 2004; Sutton-Smith, 2001). The aim was to provide a genre specifically for digital simulations that are designed or can be used for educational or other serious purposes, such as for business and military use. This sounds simple and logical but it is nevertheless a problematic approach. This label therefore sets up a dichotomy when there is none. Accepting this label uncritically encourages academics to choose simulations primarily, or only, from the category of 'serious games' to the exclusion of other genres because, by definition, all else is not serious. Yet many games, even those made purely for entertainment purposes, can be (and are) used for powerful learning (Aldridge, 2009, Breuer & Bente, 2010).

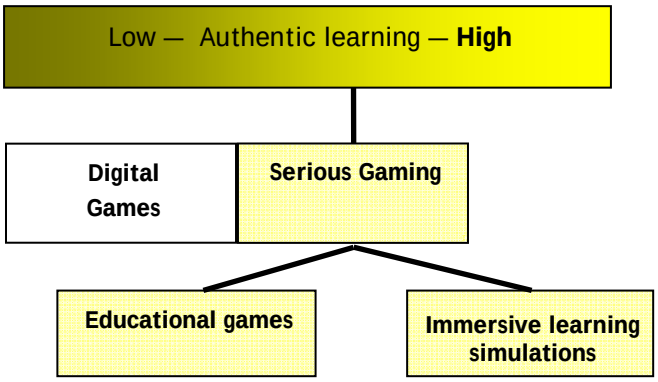
It is much more productive, and logical, as Breuer & Bente (2010) point out, to adopt a different mindset. They propose the shift from 'serious games' as a closed category the definition of which has proved to be inherently problematic, to thinking in terms of 'serious gaming': that is, to categorise games in a much more open and inclusive way using tags that can be applied easily to both current as well as future games and simulations, and which can easily incorporate games and simulations excluded from the genre now labelled 'serious games' as shown below in Figure 2.8.

The concern of this report is the area of immersive learning simulations. A distinguishing feature of these is that they are carefully structured learning experiences with associated learning outcomes and assessments, albeit as Aldridge (2009: 26) notes, that in such simulations participants engage in 'stealth learning'. Contrary to conventional ways of transferring knowledge, such as lectures, standard assignments and examinations, the learning-by-doing character of simulations has the heuristic power to enable participants to understand the complexities of public policy development through immersion. Such simulations offer players a safe and controlled environment in which to experiment with policy development skills, knowledge, and concepts (Boin et al., 2004: 382).

Policy games can therefore also be multiplayer games with combined human-human and human–computer interaction. However, the critical consideration, as deLeon (1981: 224) points out, is 'how to link these types of computer simulations to free-form political gaming. That is, how does one mesh the computational rigidity and precision of the first with the human flexibilities and creativities of the second?'

Digital technologies in simulations (cont.)

Figure 2.8: Simulation genres



Digital simulations relevant to public policy development

During the 1980s the simulation gaming community recognised the possibilities for innovation and the escalating potential of computer games, and began to explore the role of single and multi-player games for learning purposes (Prensky, 2001; Mayer, 2009, Geurts et al., 2007; De Freitas, 2007; Klabbers, 2006).

A relatively early example is *SimHealth: The National Health Care Simulation.* Released by Maxis (a subsidiary of Electronic Arts, the developers of the best-selling Sim City series of games) in 1994, SimHealth is a single player management simulation of the U.S. Healthcare system.[40]

In the Netherlands in the early 2000s a small group of researchers working on Environmental Systems Analysis at Wageningen University and the Energy Research Center in the Netherlands developed two SIMCITY-style single-player computer games for policy analysis: 'Splash!'—which concerns water management—and 'NitroGenius'—a game about solving nitrogen problems: both are high school, undergraduate level simulations (Mayer, 2009).

Splash! Is designed for high school and undergraduate level players. It simulates the interactions between society and the physical environment. Players try to manage a society with problems related to land use and water management, with emphasis on water stress issues (droughts, floods). Playing *Splash!* familiarises players with various aspects of water management and the differing interests of stakeholders. Society is represented by stakeholders from socio-economic sectors, such as industry, agriculture, and urban areas. These elements react to the actions of the player. Splash! is a fictional world that can be loaded with real data to study a specific situation. The game captures expert knowledge in simulation models, which alloes for

[40] It is available online as a functioning game. Note the similarities with the interface and graphics of SIM CITY (http://www.oldschoolapps.com/downloads/simulation-games/926-sim-health see also strategy wiki

Digital technologies in simulations (cont.)

a trustworthy simulation: players recieve immediate feedback for both short and long-term effects.[41]

NitroGenius was developed under the authority of the Dutch ministry for the Environment to explore integrated solutions to the disturbance of the nitrogen cycle. NitroGenius is a nitrogen management simulation based on the Dutch environment. In this simulation four players represent society, industry, agriculture and the government. They have to achieve their individual targets, such as profit, and at same time the overall goal of saving the Dutch environment. Players are required to switch roles to force them to look at the problem from all sides and to work together to find win-win situations.[42]

SimCity: in the early 1980s, Will Wright, a computer game designer, developed the best-selling planning game, *SimCity*. In this simulation or strategy game, players build a city from the ground up and manage it. Players can focus on specific issues such as health (SimHealth), planning scales (SimEarth), or communities (SimSocieties). Given that some of the game's limitations (the scenarios are not particularly realistic), SimCity is proof that games built for entertainment can also provide powerful learning experiences. Since its early releases SimCity has been used in educational and research institutes for lectures on city planning or complexity, among other topics (Mayer, 2009). As Paul Starr notes:

> Still, it isn't only policy wonks who are buying the games for themselves and their kids. SimCity has sold two million copies since its release in 1989 and has probably introduced more people to urban planning than any book ever has (Starr, 2001).

The following are examples of public policy related simulations that will offer a small sample of what is available and what is being used. There are many websites where an array of simulation games can be found.[43]

Digital games

The new simulations are certainly a lot more fun than most textbooks. Rather than present information, they provide tools for inventing worlds, exploring hypotheses, and stretching imaginations.

Prensky (2001)

Fishbanks: to better familiarize policy makers, world leaders, and students with the principles of system dynamics, as well as the complexity and urgency of ecological problems, Meadows (2000; 2001) developed a number of low-tech and widely-used single player simulation games, such as Fish Banks. The games

41 http://i3s.aquastress.net/factsheets/fs_splash.html

42 http://www.initrogen.net/69.0.html

43 See for example: http://forio.com/simulate/showcase/#orderbyperiodruncount=desc&staffPick=true , http://www.socialimpactgames.com/modules.php?op=modload&name=News&file=index&catid=13 http://www.abc.net.au/tv/seriousgames/examples.html

Digital technologies in simulations (cont.)

are still engaging: they carry a powerful message and are easy to disseminate and facilitate.[44]

The Fishing Dispute simulator: on a similar theme, Kuperman (2010) designed and used an interactive micro-world simulator of an imaginary fishing dispute. Participants operating the simulator play the role of a state leader while the computer program controls the behaviour of a contending state as well as providing all the environmental data associated with the conflict. As a micro-world it allows both the operator and the computer opponent to initiate actions independently of one another. Because players can learn from their experiences and improve their policies, it was expected that they should eventually discover an appropriate policy that maximises their payoffs. However, in experiments with university students, Kuperman's (2010) study found that the majority of players did not achieve optimal strategies: it appears that there is a preferred bias toward choosing particular types of strategies that satisfy normative standards, even though these strategies produce lower payoffs.

Mekong e-Sim: this digital simulation not only provides an opportunity for participants to learn more about the Mekong region and the forces shaping its development, but will also work with students from other disciplines in a professionally relevant context. An additional aim is to enable students to gain a perspective on working professionally within an international context. A key learning outcome is that students will identify the political, social, economic and scientific dimensions to decision making in resource management conflicts.[45] During the Mekong e-Sim students collaborate to adopt different stakeholder roles and initiate and respond to major events relating to economic and environmental development in the Mekong region. Key tasks include responding to topical news events, making submissions to public planning inquiries, writing reports, and debating development issues in the Mekong region. Through their participation in Mekong e-Sim, students develop an understanding of the complexities of decision-making and an appreciation of the range of perspectives associated with environmental management (Kirkpatrick, McLaughlan, Maier & Hirsch, 2002: 12).

Time to play

For some hands-on playing of digital simulations try any (or all!) of these:

http://www.radiodabanga.org/darfurgame/english/index.html

http://www.gamesforchange.org/play/peacemaker/

or just browse to see examples of 14 simulation games at:

http://www.icons.umd.edu/highered/home#.T03MGvW1tdA

[44] Fish Banks: http://earthednet.org/Support/materials/FishBanks/fishbanks1.htm

[45] Mekong e-Sim: http://services.eng.uts.edu.au/~robertm/mekong/Information.htm

Digital technologies in simulations (cont.)

Simulations in Virtual Worlds

A more recent trend in simulations is the use of virtual worlds. Virtual worlds are (often massively) multiplayer 3D continuing social environments, but without the focus on a particular goal, such as advancing to the next level or successfully navigating the Scenario (Ulicsak, 2010: 17). In terms of their educational purposes the snapshots below show how virtual worlds can be used in two ways. The first is to situate a simulation in a 3D virtual world that aims to replicate the real world realistically. The second way is to use the virtual world space as a supportive environment for learning that primarily occurs elsewhere, as for example, an analog simulation in a real learning environment.

Simulations in virtual worlds

In a virtual world simulation members (called 'residents') use a 3D avatar to interact within a virtual space, carry out multiple tasks typical of real life, and meet and talk to other residents within that simulation scenario. The best-known virtual world is 'Second Life', but whilst it has the largest user base and regions, there are several others, such as 'The New World'.[46] Not surprisingly, universities such a Harvard Law School and the University of Leicester, to name but two, have experimented with learning (Harvard) and simulations (Leicester) in a virtual world space.[47] In such learning environments, students use the virtual world to engage in simulated activities like those to be performed as part of their profession in real life. However, students may be off-campus and never meet each other, or the facilitator, face-to-face.

A case study: Leicester University's 'Oil Rig'

The University of Leicester used a virtual oil rig in the online world 'Second Life' as the location in which students in an online Masters of Occupational Psychology course could develop and implement a workplace emergency evacuation strategy, and then participate in a role-play evacuation, enabling them to reflect upon the effectiveness of their plan in context.

The main aim of the Second Life scenario was to help students develop their ability to work with their peers in contexts that resembled real work scenarios, while at the same time offering an opportunity to apply the key principles taught within the curriculum, such as teamwork and collaboration, systems, etc. The oil rig scenario was run over an intensive three day period.

Students were required to visit the rig individually and as a group in order to advise the rig workers (represented by role-playing teachers) on how to develop an evacuation plan.

Participation in the scenario had two purposes: to practise working together as a health and safety team, and to develop an evacuation plan for the oil rig. Students could wander around the

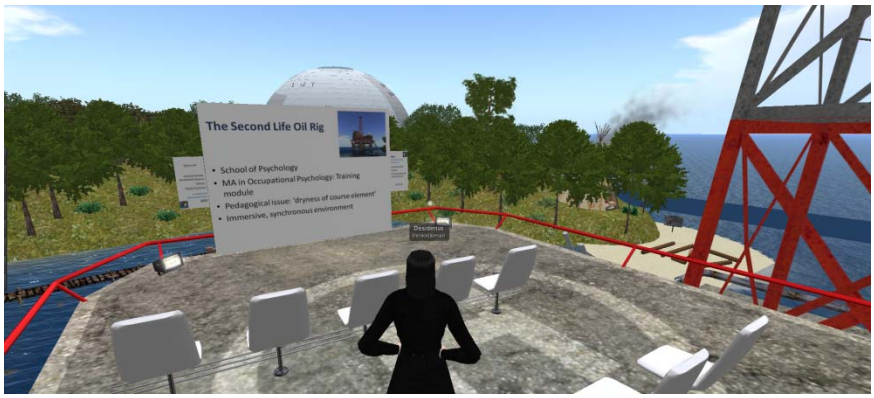
46 See: http://www.newworldgrid.com/

47 See: http://harvardextended.blogspot.com.au/2006/09/harvard-on-cutting-edge-virtual-law.html. For Leicester, see the case study: *Leicester University's "Oil Rig"*.

Digital technologies in simulations (cont.)

oil rig, conduct safety assessments, and work together to develop what they considered to be an effective oil rig evacuation plan. Towards the end of the course the online environment was modified to create obstacles such as fire and obstructions to passages to simulate an emergency situation. Students were not informed that an emergency was going to occur on the rig.

This emergency scenario gave students a chance to apply their evacuation plan in an emergency context, complete with the uncertainties, confusion, and sights and sounds of a real emergency. Students were then able to reflect on and analyse their evacuation plan with a greater level of depth and authenticity than would have been the case without the simulation experience of the emergency (Kear, 2011).



The oil rig platform on the University of Leicester's Second Life site 'Media Zoo' (http://bit.ly/eglZ4b).

In terms of the benefits, it is reported that students responded positively and that this virtual world provided an effective space for collaboration and peer learning in a simulation scenario. Working within the virtual world gave these online students a sense of authenticity that they could not have experienced by conducting the exercise using discussion forums. Moreover, students would never have an opportunity to conduct this exercise within a real-world industrial complex due to financial and occupational safety issues.

Time to watch

For an informative (six minute) videoclip about the University of Leicester's post-graduate Second Life "Oil Rig simulation" using a virtual world for simulations watch:
http://www.youtube.com/watch?v=IvNq5RfeB0o

And for coverage of the emergency:

http://www.youtube.com/watch?v=XY1yewJKcdI

However, as with analog simulations there are implications to consider. First, those engaged in the simulation were distance students, so the provision of an online learning space was a logical step in terms of teaching methods and resource usage. However, even on-campus students could benefit from this

Digital technologies in simulations (cont.)

virtual scenario. Their planning would have been enhanced by access to a simulated oil rig site, and the emergency role play would not have been able to be conducted in an on-campus environment. Nevertheless there are costs.

First, both staff and students have to be provided with training to help them to become familiar with and to navigate within the virtual world. For example, in terms of staff it can take considerable time and skill to perfect the construction of an interactive virtual world environment.

Second, off-campus students need computers and internet access sufficient to run Second Life effectively. In this course, 30% of students dropped out of the Second Life component due to such technical difficulties. Third, while students can register and create a Second Life avatar and participate in the virtual world for free, buying space (an island) in Second Life to develop your own educational environments is expensive. In 2011 the cost of an island was US$1000 with a per month maintenance fee of US$295. Furthermore, if a decision is made to contract out the construction of the simulation site, this adds to the costs involved.

However, the case study demonstrates the potential for virtual worlds to engage students by providing them with a sense of realism and authenticity.[48] The technology can offer many opportunities to create replicas of real world locations, contexts, and situations, provided they are carefully designed within a sound learning approach (see for example Girvan, & Savage, 2010) and key design factors are considered (de Freitas et al., 2006; de Freitas,2007; Boulos et al., 2007; Antonacci, & Modaress, 2008; Nie et al., 2010; Kear, 2011). Aldridge's point here is worth quoting at length:

> Virtual worlds, games, and simulations are all different; each has its own affordances and purposes. A virtual world will not suffice where a simulation is needed. The virtual world offers only context with no content; it contributes a set of tools that both enable and restrict the uses to which it may be put. An educational simulation may take place in a virtual world, but it still must be rigorously designed and implemented. Organizations routinely fail in their efforts to access the potential of virtual worlds when they believe that buying a virtual world means getting a simulation (Aldridge, 2009: 2).

The critical consideration here is how to adapt simulations originally developed for face-to-face settings for asynchronous online use such as in virtual worlds. Such an adaptation needs to ensure that the virtual version (a) sustains engagement, (b) focuses on collaboration, and (c) promotes reflection. Bos & Shami (2006) note that while this can be achieved, significant

[48] And there are others: see for example the case studies in de Freitas, 2007: 26-51

Digital technologies in simulations (cont.)

changes to the flow and format of the game will inevitably be made to compensate for lack of face-to-face interaction and facilitator-led discussions.

Virtual worlds as a supportive space

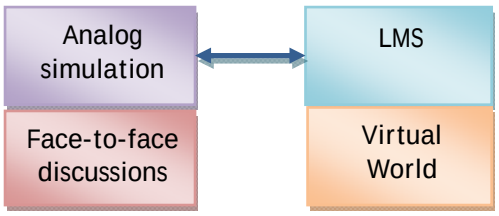
Whereas in the first instance a virtual, game-based environment can drive the learning experience, it can also be effectively used to support learning that is driven, for example, by an analog simulation augmented by input and seminar sessions. As shown in Figure 2.9, it is possible to integrate a Virtual World space in various ways with analog simulation learning methods.

To demonstrate, as in Figure 2.9(a) below, one can link the analog simulation to an LMS into which a virtual world is embedded. Such a facility is provided by SLOODLE.[49] SLOODLE is a free and open source project that integrates the multi-user virtual environments of Second Life or OpenSim with the Moodle Learning Management System (Kemp & Livingstone, 2006; Moreno-Ger, 2009). This gives the LMS a game-based interface and adds to the digital tools students and staff members have available in support of an analog simulation.

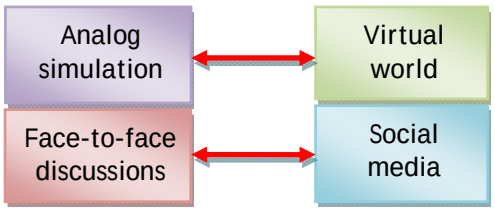
Another example is that of Figure 2.9(b) in which no LMS is used but simulation participants can access a virtual world in which they can gather to reflect on and discuss aspects of their simulation activities. This can be further supported with social media tools, such as wikis and blogs, in which assessments and other course-related discussions and records can be developed and stored. This would be especially useful for making assessment tasks more transparent and open to effective and timely feedback (Eijkman et al. 2010). The integration of Virtual Worlds and other digital technologies can also serve to support other complex educational approaches, such as collaborative problem-based learning environments (Sancho, Fernández, and Fernández-Manjón (2008).

Fig. 2.9: Virtual Worlds in support of simulations

(a) Virtual World with LMS



(b) Virtual World with social media



[49] See: http://www.sloodle.org

Digital technologies in simulations (cont.)

Discussion points:

1. *What simulation method might suit your course objectives?*
2. *How would you rate the benefits vs. any likely costs?*
3. *What support and/or resources would you need to design, facilitate, assess, debrief, and evaluate such a simulation?*

What can digital simulations/games teach us about learning?

Even if in situations such as small, on-campus, post-graduate programs, digital simulations games may not be a cost-effective option, they have much to teach us about learning and about the need for critical rhetorical literacy in online games.

Good digital games model good learning principles

Prensky (2003) asks why digital games and simulations are so exciting that they keep people in their seats for 40 hours and have them begging for a sequel?

> It's true, good videogames are deeply riveting. So riveting, in fact, that players will devote hours at a time, days even, to the pursuit of improvement and mastery in a game … And not just a few people, but millions of people, spending billions of dollars to work and to fail before they succeed … It's hard to say the same about just about any academic discipline … Can you imagine it? Millions of people worldwide paying $15/month for access to the releases of the Heidegger Gesamtausgabe? Or queuing up at midnight for the latest installation of the Platonic Dialogues? … people can play videogames for countless hours at a stretch without losing interest. They can return to it for weeks or months, trying to master it (Bogost, 2009).

A point to ponder:
Digital games are very often long, complex and difficult to master (Gee, 2008). Nevertheless, players enjoy them and stay motivated over a long period when playing them. The effort needed to enjoy most digital games makes playing them 'hard fun' (Papert 1998). Yet while people enjoy challenging games, they dislike and avoid challenging learning experiences in school education or professional training.

Breuer & Bente (2010)

Why are digital games like this? There are many reasons, but one reason is that game designers capitalise, consciously or otherwise, on good learning principles (Prensky, 2001). As Gee

Digital technologies in simulations (cont.)

(2004) points out, good games model good learning principles. Good games train players, systematically, how to master a skill, and then they test them on their mastery of that skill in a natural, synthetic context. Then they increase the challenge, demanding that basic skills recombine into more complex abilities, until eventually players have mastered the system the game represents (Bogost, 2009).

Digital games require enthusiasm that translates into learning, effort, and a willingness to invest time and resources. Yet in other contexts, such as in university lecture halls, enthusiasm, effort, and willingness evaporate. According to Breuer & Bente (2010), one crucial reason for the attractiveness of digital games is that they offer a specific mode of interactivity. In the world of digital simulations, participants experience their own actions to be effective, and this sense of control and interaction with game elements is pleasurable and motivates further interaction. The meta-level of interaction (the ability to set and manipulate the game's rules) is also important as it stresses the need for an optimal balance between challenges and skills that have been identified for the experience of flow, which is a key prerequisite for enjoyment (Csikszentmihalyi, 1990).

These levels of interaction give simulation participants a feeling of self-efficacy (Bandura, 1977). As players approach a simulation with different levels of experience, the adaptivity and adaptability of games is also important: this is because players are able to allocate all of their cognitive resources to the game, to the extent that they are so completely engaged in the experience that they lose track of time (Prensky 2007; Rieber 1996). Simulations that are exciting and engaging are in fact 'pleasantly frustrating' (Gee 2008: 36) and stay close to the borders of a player's competencies (Gee 2003).

Good simulations motivate players as learners because they comprise a balance of the entertainment element of games with the learning elements of simulation scenarios (Squire and Jenkins 2003). Good simulations can keep participants engaged because, in line with good learning principles—e.g. Vygotsky's, (1978) Zone of Proximal Development and scaffolding—they challenge participants without becoming unmanageable. In addition, as in all good authentic learning, failures do not necessarily impair the enjoyment of the interactions if a reasonable amount of practice enables participants to eventually overcome the obstacles (Gee 2008).

As Ritterfeld and Weber (2006) point out, the learning procedure aims to be entertaining, i.e. the enjoyment of mastery in the game is equivalent to the enjoyment of the acquisition and use of knowledge and skills. Hence, while academics might object to digital simulations and games, the empirical truth of the matter is that while many, if not most, learners cannot wait for lectures and tutorials to finish, this is not so with engaging simulation games. What good simulation and game designers 'have intuitively figured out at a very profound level by thinking about learning problems pragmatically, is not only *how* to get people to

learn, but how to get them to LIKE to learn' (Prensky, 2003: 11).

Digital technologies in simulations (cont.)

Digital games teach us to be critical

It is also important to reflect on the state-of-play in universities generally and the literature regarding game-based learning (Kirriemur & McFarlane, 2004). These identify, as a key issue, the reluctance of academics to adopt new educational approaches. Sometimes this rejection is based on the idea that digital games can teach but also mislead (Mayer, 2009). With particular reference to public policy development, Starr (2001) takes up this point. He notes that digital simulations "are certainly a lot more fun than most textbooks. Rather than present information, they provide tools for inventing worlds, exploring hypotheses, and stretching imaginations". But, he asks, "what assumptions were buried in the underlying models? What was their 'hidden curriculum'? Did a conservative or a liberal determine the response to changes in tax rates in SimCity?"

Starr notes that while digital simulations hold out the promise of an enriched understanding of the world and of complex systems, the danger is that in the fun and excitement of the game it is easy to forget that simulations rely on the models on which they are built. If there is a hidden curriculum in SimCity and other simulation games, it lies here. The critical problem raised by simulations is the black-box nature of the models. In the real world of policy simulation the models are subject to criticism and debate, at least among professionals. What we need is to open up the boxes by making the models more transparent. However, digital games make these models not less transparent but, rather, even more opaque. Few can penetrate the black box and understand what is inside.

Digital games and simulations represent a major addition to the intellectual repertoire that increasingly shapes how we communicate ideas and think through problems. According to Starr (2001), this ought to make transparency the objective of simulation designers and a critical basis for judging the success of their games. In playing with simulation, one ought to be able to see its limits as well as its possibilities.

Digital simulations embody a multi-actor network, and all of them exhibit values and political interests and viewpoints. The problem is that in digital games these values and interests are opaque: they are hidden in the programming: in its representational rhetoric, as Bogost (2007) rightly points out.

Digital simulations as persuasive games

According to Bogost[50] (2007: 46) serious digital games are *persuasive* in that they 'mount procedural rhetorics effectively' (Bogost, 2007: 46). Digital simulations open a new domain for the

[50] Building on his own work as a well-known game designer, Bogost, in his book *Persuasive Games: the expressive power of videogames*, makes new and important contributions that are supported with extensive explanatory examples. Use of these examples is precluded here due to scope requirements.

Digital technologies in simulations (cont.)

art of persuasion, which plays a key role in policymaking:

> Almost all information offered to those who make or modify rules, regulations, laws, or other policies, is offered with the intention of influencing their policy decisions. With all due respect to truth, efficiency, optimization, and other high-sounding ideals, no one who produces information for policy makers does so hoping their product will be ignored. The euphemisms may be education or advice, but the goal is influence, and the art of influence is called *rhetoric* (Thorngate & Tavakoli, 2009: 515).

Taking up Starr's (2001) point about the black boxes which hide the assumptions and ideological values that shape the simulation, Bogost argues that digital games usher in a new form of persuasion: *procedural rhetoric*. This is a form of rhetoric now made possible through the rule-based representations and interactions inherent in the programming of these games (Bogost 2007; Murray, 1997). Bogost shows how a new form of rhetoric emerges from the ways games are encoded and represented. The interfaces of digital simulations create representations of processes that are used persuasively—inductively and deductively—to involve participants in the purpose of the simulation.

Digital policy development simulations, as Bogost (2007) points out, are expressive media that represent the workings of real and imagined policy systems. Participants interact with these systems and form judgements about them, making digital simulations a particularly powerful medium for computational persuasion and expression. They have unique persuasive powers because they can 'disrupt and change fundamental attitudes and beliefs about the world, leading to potentially significant long-term social change.' (Bogost, 2007: iii). Bogost's work (2005, 2007) also stresses that this rhetorical power does not derive from the content of digital simulations, but comes much more subtly from the way these simulations mount claims through procedural rhetoric; and the ways in which they use in-built processes—such as codes and programming—persuasively. It is the semiotic structure of digital simulation that sets it apart from traditional media and it is this essential difference that enables it to offer distinct, but mostly hidden, rhetorical possibilities (Frasca, 2003).

In digital simulations arguments rely not on words or images, but on the authorship of programmed rules of behaviour. A simulation's procedural rhetoric influences the way participants relate to the simulation by constraining the strategies that yield failure or success (Bogost, 2007). Hence, participating in digital simulations requires a capacity to analyse critically the procedural rhetoric embodied in a simulation.

It is becoming increasingly clear, as authors such as Gee (2003) attest, that games teach! And what Bogost explores is exactly how they teach, rather than what they teach. Learning

Digital technologies in simulations (cont.)

effectively through digital simulations requires critical rhetorical literacy: the ability to understand and appreciate the procedural elements written into the simulation's programming. It requires asking:

- what are the rules of the system?
- what is the significance of these rules (over other rules)?
- what claims about the world do these rules make?
- how do I respond to those claims? (Bogost, 2007: 258).

Procedural literacy is a new means to understand how digital Sims teach. Procedurally literate simulation participants are able to understand the abstract rules underwriting a simulation as well at its specific material context. Reflecting what seems like a key competence in public policy development, procedural literacy means being able to 'reconfigure basic concepts and rules to understand and solve problems, not just on the computer, but in general' (Bogost, 2007: 32). 'Videogames teach biased perspectives about how things work. And the way they teach such perspectives is through procedural rhetorics, which players "read" through direct engagement and criticism' (Bogost, 2007: 260). Hence, procedural literacy is also a valuable skill when it comes to buying, adapting, designing, and using digital simulations (Bogost, 2009).

Crawford (2003) proposes that hidden elements can be revealed if designers choose. He acknowledges that the multi-actor network involved in policy development brings subjectivities into any simulation. According to Crawford (2003), the inclusion of subjective political and ideological values in a simulation is a delicate business that no designer ought secretly to impose on users. He gives examples of how the value judgements embodied in the rules of the game can be revealed to participants and also be changed by them. Rather than sweeping the issue under the carpet, this brings the question of personal values and representational rhetorics to the forefront. In conclusion he notes that in designing simulations:

> Our goal is to create simulations and worlds that force players to confront their own values and make explicit their assumptions; this is the most powerful way to bring home the real lessons of simulation. For ultimately, simulation is not a mechanical exercise nor is it a means of bottling truth inside a computer—it is a way to bounce our ideas and values against reality and see how they bounce back (Crawford, 2003: 11).

2.5 Assessing learning effectiveness in simulations

This section addresses outcome 4.

This section examines the effectiveness of learning through simulations.
This section will help you to appreciate:

2.5.1 the ways in which to assess the effectiveness of learning through simulations and how new assessment processes will support practice and research.

2.5.1 The assessment of learning in simulations

2.4.2 Assessing learning in simulations

Simulations, like all other educational tools, must demonstrate the achievement of learning outcomes or objectives. Specifically, simulation games that teach also need to be simulation games that test.

It is not sufficient to declare, 'games teach': that they do so is clear by their record of accomplishment over a now prolonged period of time and in many sectors such as military, commerce, health, education, etc. It is important to know more precisely how simulation facilitators assess the learning performance of all the participants. However, given that simulations constitute a non-traditional learning strategy, the question arises as to the compatibility—or at least the effectiveness—of traditional forms of assessment within the context of such a high-level authentic learning practice. It is logical to assume that, to some extent at least, the learning outcomes in authentic forms of learning require authentic forms of assessment. While the challenge of digital games as a new medium poses specific issues for assessment, this section, given the primary emphasis of this report, focuses on the authentic assessment of analog simulations.

Authentic assessment, according to Mueller (2008), is a form of assessment that asks students to perform authentic real-world tasks that demonstrate meaningful application of essential knowledge, skills, and attitudes. A key aid that assists with the assessment of performance is the rubric: a rubric is a list of the required learning outcomes with guidelines as to what constitutes a pass, credit, distinction, etc. Because authentic assessment practitioners believe that learners should be capable of performing meaningful tasks in the real world, it is clear that traditional testing will not suffice. However, Mueller (2008) continues to point out that the teacher does not need to choose between the authentic assessment and traditional assessment, as one can complement the other (Luongo-Orlando,

Assessing learning in simulations (cont.)

2003; Mueller, 2008).

We should also note at this stage the broader context of this discussion. Changes in learning practices have been tardy in response to changing ideas: it has been even more so with assessments. To date, innovative approaches, or at least critiques challenging traditionalist assessment practices posed since the late 1960s, have failed to bear fruit in any systematic way, while much current assessment practice has been targeted by critics for its 'abiding amateurishness' (Elton and Johnson, 2002).

Assessments *for* as well as *of* learning

By way of a generic introduction, good assessments are not just assessments *of* learning but are also assessments *for* learning. The conditions under which assessments support learning, as in Table 2.2, are a minimal pre-requisite for any assessment regime, but especially so with authentic or situated assessments.

Based on an extensive research and literature review, Gibbs and Simpson (2004-5) have identified ten conditions under which assessment supports learning. As shown in Table 2.3 below, the first three conditions pertain to the influence of assessment on the volume, focus, and quality of studying; the following seven refer to the influence of feedback on learning.

Table 2.2: The 10 assessment principles

Influences of assessment on volume, focus & quality of studying	
Condition 1:	Sufficient assessed tasks are provided for students to capture sufficient study time
Condition 2:	These tasks are engaged with by students, orienting them to allocate appropriate amounts of time and effort to the most important aspects of the course.
Condition 3:	Tackling the assessed task engages students in productive learning activity of an appropriate kind
The influence of feedback on learning	
Condition 4:	Sufficient feedback is provided, both often enough and in enough detail
Condition 5:	Feedback focuses on students' performance, on their learning and on actions under the students' control, not on the students themselves or on their characteristics
Condition 6:	The feedback is timely in that it is received by students while it still matters to them and in time for them to pay attention to further learning or receive further assistance
Condition 7:	Feedback is appropriate to the purpose of the assignment and to its criteria for success
Condition 8:	Feedback is appropriate in relation to students' understanding of what they are supposed to be doing
Condition 9:	Feedback is received and attended to
Condition 10:	Feedback is acted upon by the student

Assessing learning in simulations (cont.)

The first point of note is that seven conditions concern feedback. This is a recurring theme in authentic assessment for learning, but also reflects the stress the simulation literature places on the vital importance of feedback loops and debriefing (Crookall, 2009). Within the changed circumstances that simulations represent, these ten conditions provide a sound generic yardstick for good assessment practices in simulations.

This section provides an overview of the essential assessment issues associated with analog simulations as an authentic learning tool. The key issues revolve around how simulation facilitators currently assess student learning, the challenges they face in doing so, and some options for addressing those challenges effectively.

The limitations of traditional assessments

In academic environments, assessments are a key consideration in providing credentials. Therefore, no matter how sophisticated a simulation may be, the key question is 'how do we know that the participants have achieved the set learning outcomes?' Suffice to say, we know from experience and considerable literature that assessment drives student learning. Ultimately, it is assessment that defines what simulation participants will regard as important, and therefore where they focus their attention and how they come to see themselves as students and as professionals. Moreover, to support effective learning, assessment is about assessing *for*, as well as *of*, learning (Gibbs & Simpson, 2004-5; Gibbs, 2006; Lombardi, 2008).

This already begins to point to important issues for assessing simulations. For example, when engaged in simulations, students take on roles that resemble those of professionals. Thus, engaging in simulations foregrounds their identity as professionals, not students, yet it is as students that they are identified and expected to act and communicate (Moore & Johnson, 2010).

At a much more consequential level, if in simulations we expect participants to engage in real-life ambiguous and complex problem solving, then the assessments used must be able to identify and document the higher-order thinking and problem solving that participants demonstrate. For example, in law the moot court, which requires students to take on the role of lawyers, is standard assessment practice (Williams, 2008). In addition, commerce often structures assessments around the role-playing of professional roles: the management consultant, the in-house accountant, and so on (Moore & Johnson, 2010). If the collective wisdom of long-time simulation practitioners is correct, simulations are better at promoting higher levels of learning while, for example, the lecture method is likely to be more appropriate for the lower levels (McKeachie, 1999). If this

Assessing learning in simulations (cont.)

is true, assessments that target the measuring of learning at lower levels on Bloom's taxonomy[51] will in all likelihood produce results that undervalue simulations (Anderson & Lawton, 2009).

Thus, a legitimate question arises as to the extent to which traditional assessment instruments are sensitive enough to measure the gains achieved with authentic learning, such as with simulations. 'It is one thing to measure whether a student has added a vocabulary item or can understand a new concept, but quite another to assess whether the student has improved his or her ability to solve problems that require original, creative thinking' (Anderson & Lawton, 2009: 206).

Responding to the need for alternative, authentic assessment strategies is timely, as the generations currently using games in the classroom are progressing into adult education (de Freitas, 2007). As Squire (2006: 2) observed, educators have been slow to notice the paradigmatic shift inherent in the way in which learners use games, which, he notes, 'are an important site of a shift toward a culture of simulation' because they make it possible to construct, investigate and interrogate hypothetical worlds.

All of this suggests that there is much to gain by adopting a broader assessment worldview. This calls for a much broader suite of assessment practices, as suggested by Table 2.3 below.

Table 2.3 From traditional to authentic assessment[52]

Traditional assessment	Authentic assessment
Purpose is to document learning	Purpose is to facilitate learning
Assessment seen as objective, value-free and neutral	Assessment seen as subjective and value-laden
Learning as an individual process	Learning as a socially driven process
Separates process from product	Emphasises product and process
Generally relies on forced-choice, written methods	Promotes integration of various written and performance measures
Relies on proxy measures of learning to represent target skills	Relies on direct measures of target skills
Encourages memorisation of correct answers	Encourages divergent thinking in generating possible answers
Goal is to measure acquisition of knowledge	Goal is to enhance development of meaningful skills
Curriculum directs assessment	Assessment directs curriculum
Emphasises developing a body of knowledge	Emphasises proficiency in real-world tasks

51 Anderson, L. W. & Krathwohl, D. R., et al (eds.) (2001). A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. Boston: Allyn & Bacon.

52 Adapted from Lombardi, 2008: 6; and Anderson & Speck, 1998: 9.

Assessing learning in simulations (cont.)

Promotes knowing 'what'	Promotes knowing 'how'
Provides a one-time snapshot of student understanding	Provides an examination of learning over time
Emphasises competition	Emphasises cooperation
Targets simplistic skills or tasks in a concrete, singular fashion	Prepares students for ambiguities and exceptions that are found in realistic problem settings
Priority on summative outcomes or product	Priority on the learning sequence or process

Conventional university assessments consist mostly of unseen, time-constrained, written examinations and essays and/or reports which tell us very little about a student's readiness to put knowledge into practice in creative ways (Race & Brown, 2001). Authentic assessments focus on knowledge, skills and attitudes linked to skills such as the ability to innovate, collaborate, think critically, perform system thinking, and work within complex adaptive systems and multi-actor networks. Evaluating, rather than measuring how well these skills are demonstrated demands rethinking what is assessed: a shift in orientation that goes beyond a narrow focus on product to a wider vision that encompasses process as the context for product.

It is quite simple to test for subject matter content recall, but more difficult to assess independent critical thinking and creativity. Yet, the primary learning objective of higher education is ostensibly the development of those habits of mind most difficult and time-consuming to measure. Unfortunately, as noted earlier, these are not served particularly well by most traditional assessment practices (Gardiner, 1994). Yet if we continue to insist on traditional practices, much high-level learning—such as simulations in which originality and collaborative negotiation come into play—will be under-assessed (Lombardi 2008). This also denies students feedback on the high-level cognitive skills they practice in simulations.

The point is that a reconceptualisation of learning—as detailed in Part I and made clear from Table 2.3—inevitably involves a reconceptualisation of assessment. In authentic and constructivist or constructionist learning spaces, as epitomised by simulations, students learn from active participation and inquiry. The focus is on concept development, deep understanding, and high levels of cognitive performance. Therefore, embracing more authentic assessment practices brings into play new opportunities to provide students with valuable feedback about their performance on high-level cognitive skills (Anderson & Speck, 1998). This move also reflects the changes advocated by McDowell (2002), namely that we shift:

- from testing to educational assessment and judgement;

- from de-contextualised elements of knowledge to holistic, complex knowledge and skills; and
- from a standardised and controlled approach to a diverse range of methods with qualitative descriptors.

Assessing learning in simulations (cont.)

In addition to Gibbs & Simpson's (2004-5) '10 Conditions of authentic learning and assessment', practitioners would also promote a framework that includes the notion that assessment of learners in authentic settings should be longitudinal, contextualised and collaborative (Scanlon & Ford, 1998).

What this means in broad terms for practice is this: a focus on formative assessments and effective feedback (Gibbs & Simpson, 2004-5); the development of transparent assessment criteria such as rubrics, preferably with student participation (Anderson & Speck, 1998); and a balance between facilitator, peer and self-assessment (Tan, 2007; Falchikov, 2007).

Although some barriers must be overcome, numerous examples point to the opportunities available for effective assessment of authentic learning initiatives.

Examples of authentic assessment practices

The assessment literature tends to concentrate on generic advice and to neglect practical assistance. Rather than reiterate the generic advantages and disadvantages of alternative assessment strategies, below are a few examples indicative of the range of situated assessments available and that are found to be useful among academics across the disciplinary spectrum.

On a brief introductory note, authentic or situated assessments presuppose the use of clear, flexible performance-focused learning outcomes and assessment rubrics or grading criteria.[53] These are not the same as objectives. Whereas authentic assessments indicate what learners can actually do, objectives state what an educator wants students to achieve. (Jackson, Wisdom & Shaw, 2003).

Authentic assessments are ongoing: they are integrated with simulations and other associated forms of learning, and encourage a range of different types of formative and summative assessments. Authentic assessments can be formal as well as informal. Some formal assessments allow the educator to evaluate all the students systematically on important skills and concepts by using real-life reading and writing experiences that fit with the simulation. Informal assessments include activities such as group or individual projects, presentations, demonstrations or performances. However, educators can also use classroom activities such as assignments, journals, portfolios, essays, reports, discussion groups, or reading logs. More direct evidence related to the completion of a simulated mission may also be used to

[53] http://edtech.kennesaw.edu/intech/rubrics.htm; http://jonathan.mueller.faculty.noctrl.edu/toolbox/; https://www.k12.gov.sk.ca/docs/midcareer/pg1013.pdf

demonstrate achievement of the learning outcomes. For example, the simulation director or facilitation team can collect evidence of learning by keeping notes or checklists to record their observations of the simulation processes and the debriefings.

Assessing learning in simulations (cont.)

Methods that feature strongly in this field include research portfolios, reflection logs, reflective journals, self and peer assessments, in addition to the more conventional facilitator-based assessments, team-work assessment, reflection logs, the use of rubrics, individual and small group vivas, etc.[54] Some indicative examples of authentic assessments suitable for simulations follow.

Going digital

There are many advantages in using digital technologies in support of authentic assessments of simulations. The use of social media is particularly useful and easy to use. For example, learners can post their group work on a blog and develop their 'product', e.g. a team report on a team wiki. The more adventurous (institutional finance permitting) can use a virtual world like Second Life. The value of digital technologies is that they make student work available for continuous monitoring, the provision of feedback, and enabling others to contribute from external as well as internal sources (Eijkman & Clarke, 2007, 2007a; Herrmann & Eijkman, 2008)

Research Portfolios

Portfolio assignments are used widely across under- and post-graduate curricula as part of a formative assessment strategy which emphasises the process of knowledge construction over the final (summative) product. The portfolio is an appropriate mechanism for monitoring progress and providing regular feedback on extended, multifaceted work that involves higher-order thinking skills. Research portfolios are therefore useful tools for providing evidence of aspects such as planning, organisation, interpretation, inference, analysis, application, prediction, and evaluation.

The portfolio assignment also has the advantage of being an authentic learning experience in its own right. It replicates the reporting processes that participants experience in real-world policy development situations in which professionals must evaluate various problem-solving approaches and justify choices. Portfolios can be composed in a digital or more conventional paper-based format (Lombardi, 2008).

Vivas (oral exams)

Vivas, or viva-voce (living voice), are oral exams that take the form of an interview, and have a long history. They are useful in consolidating the results of other assessment tasks. In vivas,

[54] For more information and examples see: http://www.uwstout.edu/soe/profdev/assess.cfm; http://www.wcer.wisc.edu/archive/cl1/flag/cat/portfol/portfol6.htm; http://www.tedi.uq.edu.au/downloads/T&L_Assess_group_tasks.pdf ; http://staff.mq.edu.au/teaching/curriculum_development/assessment/toolkit/setting_outcomes/

Assessing learning in simulations (cont.)

students are questioned about selected aspects of their study and/or aspects on which they have been assessed in other ways. The advantages are flexibility in seeking out learning achievements, and utility in checking the ownership of evidence of learning. At the same time, they are not anonymous, and some students may underperform if nervous. Hence, they require student preparation, e.g. by way of prior informal vivas, and work best when the environment puts students at ease. Although they are conventionally used on an individual basis, consider using them in small groups with due regard for comprehensive planning and preparation (Race, 2007).

Peer Assessments

Peer assessment is assessment of students by other students: both formative reviews to provide feedback, and summative grading. This method has many potential learning benefits for both the person being assessed and the assessor. It extends the focus of student centred learning and higher order thinking skills into the assessment arena. To avoid its weaknesses, anonymity, multiple assessors, and tutor moderation should be used in tandem with peer assessment.

With large numbers of students, digital technology can assist the management of peer assessment. Peer assessment is one form of innovative assessment that aims to improve the quality of learning and empower learners in situations in which traditional forms might by-pass learners' needs. It can include student involvement in the final judgements made of student work and in the prior setting of criteria and the selection of evidence of achievement.

The potential advantages of peer assessment for students includes:

- developing students as autonomous learners;
- treating assessment as part of learning, so that mistakes are regarded as opportunities rather than as failures;
- practising transferable skills, such as evaluation for life-long learning;
- providing students with a model for internal and critical self-assessment (metacognition); and
- encouraging deep rather than surface learning (Bostock, 2006; Brown, Rust and Gibbs, 1994).

Heppell and others have explored the use of self-assessment as well as using portfolio-based approaches. Learning is evaluated through peer and self-assessment as well as through tutorial assessment (Heppell, 2006; Moss, 2005).

Evaluating Team Work

Assignments that involve significant group work often come close to the dynamics of real-world practice. Students usually take team-based tasks more seriously if they receive a grade, yet facilitators often find group assessment challenging. Common questions include: should all members of the team receive the same final grade, or should distinctions be made,

and if so, how? Can individual contributions be separated out from a collective performance? How can educators tell whether students are committed or are not performing satisfactorily? Sutcliffe's (2002) example addresses these concerns thoughtfully and innovatively. See *Annexure 2.12* for details.

Assessing learning in simulations (cont.)

Discussion points:

1. ***Go to Annexure 2.12: Case study 3: The Press Briefing.*** *The case study outlines a role-play designed for undergraduates undertaking a business degree. Students' reflections on the role-play are assessed within a module entitled Global Business Context. The module places a strong emphasis on understanding the motivation of stakeholders and the implications of their actions for business. It contains some very useful ideas for assessment.*
2. *Given these examples, what opportunities are there in your course to shift assessment (and your teaching and curriculum) more in the direction of authentic learning?*

Debriefings as triggers for reflective assessment tasks

Debriefings are a critical component of simulations (Mayer, 2009; Crookwell, 2009; Thiagarajan, 1993; Kriz, 2010). They provide valuable triggers for documenting critical reflections. The six-step debriefing process proposed by Thiagarajan (1993) contains specific reflection topics and basic questions that can easily form the basis for a powerful reflective writing assessment task. This can constitute a singular or iterative formative assessment or a summative assessment task, depending on the length of the simulation. Even for a short but intense simulation, regular periods can be allotted separate from the simulation to engage in mini-debriefs.

> Facilitators can log learner progress through the simulation to see what decisions they make, whether they improve over time, and how long they take to achieve the tasks. This type of assessment is much more capable of evaluating learning than traditional summative assessment that generally only tests the ability to regurgitate information, often well out of context (Klabbers, 2006: 49).

A suggested six-phase debrief outline follows:

- *Phase 1: How did you feel?* Participants are invited to describe their emotions after completing the simulation game and to recall and recount their feelings during the game.
- *Phase 2: What has happened?* In this phase participants talk about their perceptions, observations, and current thoughts about the activity. Factual aspects are also discussed, for

Assessing learning in simulations (cont.)

instance, an evaluation of different decisions and problem-solving strategies of a team.

- *Phase 3: To what extent are events in the simulation and reality connected*? In this phase the relationship between experiences and reality are critically analysed to begin a transfer of the experience and knowledge to participants' own lives.
- *Phase 4: What did you learn*? In this phase participants identify their most important learning and report conclusions they can draw from the experience in regard to personal insights, experiences of group dynamics, and new knowledge gained.
- *Phase 5: What would have happened if…*? Here participants speculate about hypothetical scenarios. They reflect on how an alternative framework and set of rules may have motivated different conditions, decisions, trajectories and behavioural effects in the team. The aim of this phase is to stimulate participants to further explore the essential principles and terms of the simulation.
- *Phase 6: How do we continue*? This last phase focuses on the purpose of committing to clear, realistic, and measurable goals for future actions of all involved. Participants describe as concretely as possible how they want to act (differently) in a real situation comparable to the gaming simulation experience. Plans for action steps are put in concrete terms (Kriz, 2010).

Authentic assessment considerations

Sutcliffe (2002) makes a valuable observation regarding simulations and assessment. The three case studies he presents illustrate ways in which simulation games can be used in assessment. A key principle he follows in these case studies is that the assessment focuses on students' reflections on their experiences rather than on their performance in the simulation.

> For example, in the Virtual Economy simulation, students are asked to reflect upon the problems facing the Chancellor of the Exchequer. In answering this question, students are drawing upon their experience with the simulation, but they are not limited by their success in achieving particular outcomes in the simulation (Sutcliffe, 2002: 22).

Students' learning through a role-play might be assessed by asking them to identify what they believe they have learned from their experience in the role-play.

When roles are more controlled a wider range of assessment strategies become possible. This is exemplified in Sutcliffe's third case study, described in detail in *Annexure 2.12*, in which the role-play does not involve participating in a debate, but rather the roles provide a structure for analysing a problem. When this approach is adopted it is also useful to ask students

to provide a critique of the way they have acted in the role.

In terms of good assessment practice Sutcliffe (2002: 22) concludes that, 'students' ability to step out of role in their analysis is important to the development of their understanding of the subject'.

Assessing learning in simulations (cont.)

Concluding comments

As with all assessment, the best way to measure success is to start with clearly articulated goals: learning outcomes. This means asking at least three vital questions:

- What kinds of skills and knowledge do I want my students to have at the end of this course?
- What is the best way to get there?
- How would I know my students have achieved the expected learning?

Having determined what the learning outcomes are, the next step is to devise techniques for collecting relevant evidence to ascertain the extent to which the learning outcomes have been achieved. Given the absence of universal or perfect assessment data collection techniques, these will be determined in part by the expertise and skills of the facilitator, and in part by the nature of the activity and the outcomes they aim to address. The review of experiential exercises by Gosen and Washbush (2004) advises that collecting evidence of learning from participants immediately after the activity is good practice (Chin, Duke & Gamson, 2009).

However, since one or more debriefing periods are an integral design element of the overall simulation agenda, adding written assessment takes up relatively little additional time. More importantly, because group discussions are often dominated by a vocal minority, a preliminary written assessment can capture thoughts from the participants before they are contaminated by group discussion. Additionally, they give quieter or more thoughtful participants, or those whose first language is not English, the opportunity to express their opinions when they may not feel confident to do so in a group discussion.

At any rate, while many facilitators already routinely plan post-tests, this method can be further enhanced by structuring a pre-test and a post-test. This technique provides data that can more directly assess the impact of the simulation (Chin, Duke & Gamson, 2009).

Chin, Duke, & Gamson (2009) confirm that in addition to pre-tests and post-tests, a facilitator can collect assessment evidence during the simulation itself. Unobtrusive methods include note taking during the proceedings. However, given the demands of game facilitation it is good practice to enlist assistance for this task. These notes can also be used to summarise the simulation activities during the debriefing. The simulation can also be video or audio-recorded. While obviously more intrusive, videorecording has the advantage of providing a

permanent and accurate record for subsequent analysis.

Again, as indicated above, learning can also be assessed through two well-grounded methods; reflection papers or journal writing. Other written assessment tasks can include 'written concept technique, letter writing, written answers, and guidelines for writing' (Petranek, 2000: 311). For the purposes of assessment, writing gives participants the opportunity to reflect on and articulate their thoughts on the activities in ways that are most meaningful to them (Chin, Duke, & Gamson, 2009).

Part III Recommendations

Recommendations

This section contains recommendations for the potential use of authentic learning in general and simulations more specifically.

3.1 Recommendations

Recommendations

Establishing an 'Authentic Learning Paradigm College'[55]

John Tagg (2003) proposes a theme reflected throughout this report, namely a shift from the 'Instructional Paradigm' to the 'Learning Paradigm'.

A learning paradigm college, he notes:

- promotes intrinsically rewarding goals;
- requires frequent, continual, connected, and authentic student performances;
- provides consistent, continual, interactive feedback to students;
- provides a long time horizon for learning;
- creates purposeful communities of practice; and
- aligns all of its activities around the mission of producing student learning (Tagg, 2003: 124).

It is a challenge to change: all academics—with perhaps the fewest exceptions—are educated and ultimately work in Instructional Paradigm institutions. Although we cannot merely blame the victims, choices are possible and are needed, if not desired. The question is whether the College will manage to escape from the tenacity of the old to embrace the new. The following recommendations aim to shift the College's trajectory toward the learning paradigm and Tagg's Golden Rule (2003: 347):

Do what you want your students to do.
Be what you want your students to be.

Recommendations

1. *That the College formally articulate a generic set of authentic learning principles in a learning framework to guide practice (refer to Sections 1.1.1; 1.1.2; 1.1.3; 1.1.7).*

   For the College to achieve its aims of operating out of a robust 21st century learning framework geared to real-world

[55] See Tagg, J. (2003) *The Learning Paradigm College*. Bolton: Anker Publishing.

Recommendations (cont.)

policy analysis and development 'based on strong relationships, openness to critical analysis, open intellectual exchange and professional collaboration" (NSC, 2010), a traditional curriculum and teaching approach is increasingly unsustainable and untenable.

Formally adopting a broad-based authentic learning framework signals a genuine commitment to engage learners in realistic, multi-disciplinary and collaborative problem solving learning experience that enhances the credibility of the College for high-end professionals wishing to develop their proficiencies in policy development.

The experience of educators in public policy and elsewhere, and the literature on authentic learning and simulations, underscore the College's preference for the *applied learning* of policy development. This stance currently implies but does not yet specify a focus on authentic learning in general, or on simulations more specifically. The literature indicates that specifying an authentic learning approach with an orientation towards simulation is well placed. Formalising a broad set of principles is valuable for a number of reasons: it provides a set of broad guiding principles for educators. While broad enough not to restrict individual teaching styles, it will ensure that at minimum there is a systemic approach to learner-centred practice and that all three educational message systems—curriculum, teaching, and assessment—deliver a consistent learner-centred experience to all students through all their courses and subjects. To reinforce its commitment, teaching staff members should be expected to demonstrate (e.g. during their annual performance appraisals) how they operationalise these principles consistently in their teaching.

To promote the learner-centred approach, the College might also consider its nomenclature for academic staff members. It is incongruent to call teaching academics 'lecturers' in a learner-centric environment. The term 'lecturer' invites associations with the teacher-centred paradigm.

This learning framework also ought to consider addressing learner-centred authentic practice of national security policy development as a research area in its own right. In this regard there is a distinct gap in the educational literature which needs to be filled.

Adopting an authentic learning framework *now* is timely. The significant advantage in being a start-up educational institution is the opportunity to shape a consistent, systemic learner-centric professional development culture. At the level of the College itself, there is no culture to change but only to shape: no history of an implicit commitment to a traditional transmission paradigm.

Including a formal set of learner-centred principles will not only drive the systemic adoption of authentic learning and send consistent messages about the learning environment the

Recommendations (cont.)

College provides to its post-graduate students, but will also begin to set the College apart as a leading-edge provider of professional development in national security policymaking.

2. *To develop a reputation in the field not just on the basis of its content, that is, national security policy development, but equally so for its cutting edge approaches to the processes of effective learning (refer to Sections 1.1.1; 1.1.7; 2.2 and 2.3)*

   Authentic learning marks a distinct shift to a process rather than content-focused approach. The College is exceptionally well placed to consider such a shift, not just at the micro-level of learning and teaching, but equally so at the macro-level of its strategic vision. The remit of the College to assist the professional development of national security professionals covers two aspects: to be a leader in the field of national security research and to be a leading provider of educational programs in national security policy development. The logical inclination is to focus primarily on the content of that remit, namely on national security. However, the NSC has—as evidenced in the commissioning of this report—at least an embryonic commitment to a vision that includes an innovative educational approach to the applied learning of policy development. This recommendation proposes a formal adoption of this commitment into its vision and strategic planning.

   Currently, and despite any formal policies in place and the work of some dedicated academics, there does not appear to be any university in Australasia that can demonstrate an overt and systemic implementation of a learner-centric, authentic learning paradigm. The weight of a conservative academic culture among other pressures militates against such a shift. This provides an extraordinary opportunity for the College to be a lighthouse institution in this regard; in doing so it can refer to a number of important institutions, especially the National Defense University (NDU) in Washington and, at a more generic level, the Technical University in Delft, the Netherlands (TU Delft).

   The College is positioned extremely favourably to market both its expertise in national security policy development *and* to build a reputation in Australasia as the premier national security professional development institute that treats its post-graduate students not conventionally as students, but as informed practitioners and valued contributors to learning processes.

3. *To develop a 'Strategic Authentic Learning plan' with a goal of establishing the College as a lead Australasian institution in the business of designing and facilitating (analog) simulations (refer to Sections 2.2.2; 2.2.3; 2.3.1; 2.3.2; 2.3.3;and Annexure 2.7)*

   Following on from Recommendation 2, this recommendation proposes formalising a bold (and achievable) vision: for the

Recommendations (cont.)

College to position itself as a national security development institute that deploys the most powerful and sophisticated educational methods in this field. Again, it can use its recent establishment as a distinct advantage to create a simulation-oriented culture. It is small, hence easily able to marshal its resources strategically to deliver a range of powerful policy development simulations to its students and eventually to national security organisations around Australasia (through in-house policy simulation exercises). This represents a unique opportunity currently largely unfilled, and one that is certainly unmet in national security policy development: it is worth aiming and planning for such an approach.

It might seem overly optimistic, but the overview of the literature on the authentic learning of national security policymaking, such that it is, indicates that there is an opening to be filled and that the College is well placed to fill that gap. Even more so, while it can learn from the NDU it is also in a position to surpass it in its focused delivery of policy simulations, both in its own courses and to external organisational customers. In its strategic planning at least, the NDU and TU Delft provide benchmark standards and approaches.

The College has the opportunity to plan strategically to be the Australasian equivalent of the NDU (with a touch of TU Delft) and in fact become a global benchmark institution in the use of authentic learning and simulations in national security policy development.

4. *To host an 'Authentic Practice with Simulations' seminar to which world leaders in simulations are invited as key speakers (and at which the 'Strategic Authentic Learning plan'can be launched) (refer to Sections 2.2.1; 2.3.2; 2.3.3)*

   On the proviso that key aspects of recommendations 1, 2, and 3 are adopted, there is a real benefit, both strategically and tactically, for the College to host an 'Authentic Practice with Simulations in National Security Policy' seminar.

   First, it will give College academics and executive development staff members the opportunity to explore first-hand the work of leading simulation practitioners, and to develop valuable networks to enhance simulation practice at the College. If the seminar is well planned and executed it will be a powerful learning experience and counteract conservative tendencies to maintain the status quo.

   Second, it will signal the intent of the College to become a key player in the field of authentic learning and simulations in Australasia. An associated recommendation is to launch the 'Strategic Authentic Learning Plan' at this seminar. From a strategic perspective, this seminar therefore only ought to be publicised after the College has put its Strategic Authentic Learning Plan in place and has commenced at least one or two small but powerful simulations and/or can demonstrate that there is evidence of implementation of learner-centric

Recommendations (cont.)

practices. If such a seminar is held too early another institution could enter this market before the College has the opportunity to begin to establish its intention and expertise.

Leading world simulation practitioners should be invited, such as Igor Mayer from TU Delft (charging a day tariff based in integral costs of around €800), Jack Geurts, and Simon Ng.

Igor Mayer: http://tbm.tudelft.nl/index.php?id=31075&L=1

Dr. Igor S. Mayer is associate professor of Public Management and Gaming in the faculty of Technology, Policy and Management (TPM) at Delft University of Technology, the Netherlands. He is also a director of the Delft Centre for Process Management and Simulation (CPS, www.cps.tbm.tudelft.nl). He is a co-founder of SAGANET: the Netherlands Simulation and Gaming Association, and a member of the Netherlands Institute of Government (NIG).

Jac. Geurts: http://www.tilburguniversity.edu/webwijs/show/?uid=j.l.a.geurts

Jac. Geurts is a Professor of policy and strategy in the Department of Organizational Sciences at the University of Tilburg, the Netherlands. He is a visiting professor at Cornell's Center for Sustainable Global Enterprise. He specialises in the use of gaming/simulations for strategy and policy. His primary academic focus is on the processes and tools used in strategic decision-making

Simon Ng: Simon.Ng@dsto.defence.gov.au

Principal Research Scientist at DSTO

Dr. Jan Klabbers: http://www.kmpc.nl

Dr. Klabbers was a founder of the Social Systems Research Group (SSRG) at Radboud University, Nijmegen, the Netherlands; he has been General Secretary of the International Simulation And Gaming Association (ISAGA) and its President, and since 2004 Honorary Member. His research and publications cover social systems theory, and the application of simulations in a variety of areas of application such as educational systems & global climate change policy development.

5. *That as part of this Strategic Plan, the College should begin gradually and systematically to enhance its use of simulations across the full suite of courses (refer to Sections 1.1.1; 1.1.3; 1.1.6; 1.1.7; 2.2.1; 2.2.3; 2.3.3)*

   The College is already using simulations of varying types and fidelity in its education programs. Two factors suggest that a gradual enhancement of these simulations will progressively build academic confidence and skills in authentic learning and promote a shift to a learner-centric academic culture. It is essential to stress that the adoption of authentic learning does not mean abandoning all traditional practices; instead, the aim should be to reshape some and reduce the empahsis on others. The beginning point for this change is a learner-centric worldview. Hence, this approach fits with a systemic

Recommendations (cont.)

shift to authentic learning and simulations and addresses cultural concerns. Even though the College is newly established and as such has no immediate institutional culture, the dead hand of academic history in teaching weighs heavily on any initiative to shift to more learner-centred approaches to learning.

6. *That the College introduce a simulation-focused academic development plan to skill academic staff in all aspects of conducting high level simulations, including the supportive use of digital technologies (refer to Sections 2.2.3; 2.5.1; 2.5.1; and Annexures 2.5 and 2.6)*

   Authentic learning in general and simulations more specifically represent a very different perspective on learning and teaching. For some academics, whether already quietly dissatisfied with the transmission model or steeped in the traditional paradigm, simulation focused professional development is necessary. This is especially so if the College wishes to attain a regional or global reputation in this field.

   Realignment from teacher to learner-centred methods requires reconsideration of traditional academic roles. For example, the task of lecturers is to be facilitators of student learning and to plan appropriate learning-centred assessment activities and resources to maximise learning and to achieve efficiency and productivity. In short, the balance of attention will gradually shift from giving lectures and seminars to facilitating learning and validating achievements. To support the achievement of this shift, some academic staff development could consist of the College teaching staff engaging in simulation games themselves, individually and/or collaboratively.[56] This requires the use of academic developers familiar with and highly skilled in the use of simulations, from planning and facilitation to assessment, debriefing, and evaluation.

   Such a development plan should also include a focus on the supporting role that social media and the ANU Learning Management System (LMS) can provide for simulations. Another aspect of a simulation-focused academic development plan is to consider the provision of incentives for its teaching academics to engage in authentic learning and simulations, especially with appropriate support of digital technologies.

   It will also be useful to encourage staff to research and publish their authentic and simulation practices. Action Research—especially Participatory Action Research—comes highly recommended for this purpose.

7. *That the College enhance its use of digital technologies to serve authentic learning and simulations and include this in its Simulation-focused Academic Development Plan*

[56] For a range of games see, for example, http://cfpm.org/models.html and **Annexure2.11.**

(refer to Section 2.4.1; 2.5.1; and Annexure 2.12)

As discussed in Section 2.4.1, digital simulations are currently not advantageous to the learning environment at the College. However, they are most useful in a supporting role. This pertains especially to social media, the increased use of which would be even more supportive when such media (e.g. Second Life) can be linked to an LMS such as the ANU system (Moodle, which supports Sloodle).

There is therefore great benefit to both staff and students in strategically deploying digital technologies to extend the interactivity and collaboration that are the hallmark of authentic learning and simulations especially.

The use of virtual worlds such as Second Life and other similar digital environments is worthy of exploration and possibly some investment in time and finance. SLOODLE ought to be of particular interest given ANU's use of Moodle. Though the costs of Second Life may exceed its benefits at this point in time, the College could create and explore the use of a low-cost virtual world by sharing Second Life with the Graduate Studies in International Affairs (GSIA) and/or Graduate Studies in Strategy and Defence (GSSD) and/or partner colleges across Australasia and beyond. For example, Leicester university has created a Second Life site for use by a number of faculties and schools (Sutcliffe, 2002).[57]

[57] Sutcliffe, M. (2002). The Handbook for Economics Lecturers: Simulations, Games, and Role-play. Retrieved January 27, 2012, from: http://www.economicsnetwork.ac.uk/handbook/printable/games_v5.pdf

Part IV References

References: Part I

Part I References

Alessi, S.M. (1996). Seeking common ground: Our conflicting viewpoints about learning and technology, ITForum. On-line discussion paper: ITFORUM@UGA.CC.UGA.EDU.

Anderson, W. T. (1990). *Reality isn't what it used to be.* San Francisco: Harper & Row.

Anderson, G.L. & Herr, K. (1999). The New Paradigm Wars: Is There Room for Rigorous Practitioner Knowledge in Schools and Universities? Educational Researcher, 28(5): 21-40

Anderson, R.S. & Speck, B.W. (eds.) (1998). *Changing the Way We Grade Student Performance: Classroom Assessment and the New Learning Paradigm*. New Directions for Teaching and Learning, Number 74, Summer. San Francisco: Jossey Bass

Armitage, A. (2007) Mutual Research Designs: Redefining Mixed Methods Research Design. British Educational Research Association Annual Conference, Institute of Education, University of London, 5-8 September 2007

Badley, G. (2003). The Crisis in Educational Research: a pragmatic approach. *European Educational Research Journal*, 2 (2): 296-308

Bandura, A. (1986). *Social Foundations of Thought and Action*. Englewood Cliffs, NJ: Prentice-Hall.

Barab, S.A., Squire, K.D., & Dueber, W. (2000). A co-evolutionary model for supporting the emergence of authenticity. *Educational Technology Research and Development, 48* (2): 37-62.

Bernstein, B. (1973). *Class, Codes and Control, Vol. 2*. London, Routledge & Kegan Paul

Boud, D., Keogh, R., & Walker, D. (1985). Promoting reflection in learning: A model. In D. Boud, R. Keogh & D. Walker (eds.), *Reflection: Turning experience into learning* (pp. 18-40). London: Kogan Page.

Bottge, B.A., & Hasselbring, T.S. (1993). Taking word problems off the page. *Educational Leadership, 50*(7): 36-38.

Boud, d. & Feletti, G. (1991). the Challenge of Problem-Based Learning. London: Kogan Page.

Bransford, J.D., Sherwood, R.D., Hasselbring, T.S., Kinzer, C.K., & Williams, S.M. (1990). Anchored instruction: Why we need it and how technology can help. In D. Nix & R. Spiro (eds.), *Cognition, education and multimedia: Exploring ideas in high technology* (pp. 115-141). Hillsdale, NJ: Lawrence Erlbaum.

Bransford, J.D., Vye, N., Kinzer, C., & Risko, V. (1990).

Part I References (cont.)

Teaching thinking and content knowledge: Toward an integrated approach. In B.F. Jones & L. Idol (eds.), *Dimensions of thinking and cognitive instruction* (pp. 381-413). Hillsdale, NJ: Lawrence Erlbaum.

Brown, J. S. (1999, March). Learning, working, and playing in the digital age. Presented at the American Association for Higher Education Conference on Higher Education. Retrieved Nov. 17, 2011 from http://www.ntlf.com/html/sf/jsbrown.pdf

Brown, J. S., Collins, A., & Duguid, P. (1988). Situated cognition and the culture of learning (Report No. IRL 88-0008). Palo Alto, CA: Institute for Research on Learning;

Brown, J.S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18* (1): 32-42.

Brown, J.S., & Duguid, P. (1993). Stolen knowledge. *Educational Technology, 33*(3): 10-15.

Bruffee, K.A. (1999) *Collaborative Learning: higher Education, Interdependence, and the Authority of Knowledge*. Baltimore: John Hopkins University Press

Bruner, J. (1960, 1977). *The Process of Education*, Cambridge Ma.: Harvard University Press.

Bryant, I, & Usher, R. (1997). The personal and the particular: adult educators, postmodernity and the problem of localised knowledge. Conference Proceedings of the 27th Annual SCUTREA conference. Retrieved November 5, 2011 from http://www.leeds.ac.uk/educol/documents/000000211.htm

Burbules, N. (1995). Postmodern Doubt and Philosophy of Education. Unpublished paper , Philosophy of Education Society Annual Conference, San Francisco.

Choo, C. W. (2001). "Environmental scanning as information seeking and organizational learning." *Information Research*, 7(1) Retrieved Oct. 12, 2011 from http://informationr.net/ir/7-1/paper112.html

Cognition and Technology Group at Vanderbilt. (1990a). Anchored instruction and its relationship to situated cognition. *Educational Researcher, 19* (6): 2-10.

Cognition and Technology Group at Vanderbilt. (1990b). Technology and the design of generative learning environments. *Educational Technology, 31* (5): 34-40.

Collins, A. (1988). *Cognitive apprenticeship and instructional technology* (Technical Report No. 6899), Cambridge, MA: BBN Labs Inc.

Collins, A., & Brown, J.S. (1988). The computer as a tool for learning through reflection. In H. Mandl & A. Lesgold (eds.), *Learning issues for intelligent tutoring systems* (pp. 1-18). New York: Springer-Verlag.

Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive

Part I References (cont.)

apprenticeship: Teaching the craft of reading, writing, and mathematics. In L. B. Resnick (ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser*. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 453–493.

Collins, A., Brown, J.S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. *American Educator, 15*(3), 6-11, 38-46.

Connolly, D. (2011). Interview, Initial Project briefing meeting. National Security College, Canberra.

Creswell, J.W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches.* (2nd ed.) Thousand Oaks: Sage.

Cronin, J.C. (1993). Four misconceptions about authentic learning. *Educational Leadership, 50*(7), 78-80.

Dabbagh, N. (2012). The Instructional Design Knowledge Base. Retrieved Jan. 30th 2012 from N. Dabbagh's Homepage, George Mason University, Instructional Technology Program: http://classweb.gmu.edu/ndabbagh/Resources/IDKB/index.htm

Darlington, Y. & Scott, D. (2002). *Qualitative Research in Practice: Stories from the field.* Australia: Allen and Unwin.

DePaul University (2011). Forms of Experiential Learning. Retrieved October 08, 2011 from http://sr.depaul.edu/catalog/catalogfiles/Current/Liberal%20Studies%20Program%20for%20Undergraduates/pg14.html

Dirkx, J. (2003). *Generational Difference and the Problem of Identity in Adult Education and the Community College Classroom.* Paper presented at the Twenty-first Annual Midwest Research-to-Practice Conference in Adult and Continuing Education. DeKalb, Illinois. Retrieved November 7, 2011 from https://scholarworks.iupui.edu/handle/1805/433

Dreyfus, H., & Dreyfus, S. (1989). Why computers may never think like people. In T. Forester (ed.), *Computers in the human context: Information technology, productivity and people.* Oxford: Basil Blackwell.

Duchastel, P.C. (1997). A Web-based model for university instruction. *Journal of educational technology systems, 25*(3), 221-228.

Edelson, D.C., Pea, R.D., & Gomez, L. (1996). Constructivism in the collaboratory. In B.G. Wilson (ed.), *Constructivist learning environments: Case studies in instructional design* (pp. 151-164). Englewood Cliffs, NJ: Educational Technology Publications.

Educause Learning Initiative (2006). Mekong e-Sim: A Cross-Disciplinary Online Role-Play Simulation -The University of Adelaide, Australia. Retreived November 13, 2011 from http://net.educause.edu/ir/library/pdf/ELI5014.pdf

Part I References (cont.)

Eijkman, H. (2004). Online learning as curricular justice? A critical framework for higher education. Unpublished thesis, University of Canberra.

Eijkman, H. (2008). Web 2.0 as a Non-Foundational Network-Centric Learning Space. *Campus Wide Information Systems,* 25 (2): 93-104.

Eijkman, H. (2009). Megatrends in Education, Training, and Learning: Considerations for the Australian Army. A literature Review. Adelaide: Land Operations Division, Defence Science & Technology Organization.

Eijkman, H. (2009a). Using Web 2.0 to decolonise transcultural learning zones in higher education *Campus-Wide Information Systems*, 26(3): 240-55.

Eijkman, H. (2010). Academics and Wikipedia: reframing Web 2.0+ as a disruptor of traditional academic power-knowledge arrangements. *Campus-Wide Information Systems* 27 (3): 173-85.

Eijkman, H. (2011). Dancing with postmodernity: Web 2.0 as a new epistemic learning space. In Lee, M., & McLoughlin, C. (eds.) *Web 2.0 based e-learning: Applying Social Informatics for Tertiary Teaching*. Hershey, (Penn): IGI Global Publishing.

Ertmer, P. A. and Newby, T. J. (1993). Behaviorism, Cognitivism, Constructivism: Comparing Critical Features from an Instructional Design Perspective. *Performance Improvement Quarterly,* 6: 50–72.

Gabrys, G., Weiner, A., & Lesgold, A. (1993). Learning by problem solving in a coached apprenticeship system. In M. Rabinowitz (ed.), *Cognitive science foundations of instruction* (pp. 119-147). Hillsdale, NJ: Lawrence Erlbaum Associates.

Gallie, W.B. (1956). "Essentially Contested Concepts", *Proceedings of the Aristotelian Society*, 56: 167-198.

Galarneau, L. L. (2005). Authentic Learning Experiences Through Play: Games, Simulations and the Construction of Knowledge. Retrieved Feb. 1, 2012 from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=810065

Gentry, J. W. (1990). Guide to Business Gaming and Experiential Learning. London: Nichols/GP.

Gergen, K. J. (1994). *Realities and Relationships: Soundings in Social Construction*. Cambridge MA: Harvard University Press.

Gergen, K. J. (1999). *An Invitation to Social Construction*. London: Sage.

Gergen, K. J. (2003). *An Invitation to Social Constructionism (2nd edition)*. London: Sage.

Gergen, K. J. (no date). Social Construction and Pedagogical Practice. Retrieved November 9, 2011 from http://www.swarthmore.edu/Documents/faculty/gergen/Social_Construction_and_Pedagogical_Practice.pdf

Part I References (cont.)

Gergen, M.M. & Gergen, K.J. (2003). *Social Construction: A Reader*. London: Sage.

Gordon, R. (1998). Balancing real-world problems with real-world results. *Phi Delta Kappan, 79*, 390-393.

Gray, J. (1978). "On Liberty, Liberalism and Essential Contestability", *British Journal of Political Science*, 8 (4,October): 385-402.

Greenfield, P. M. (1984). A theory of the teacher in the learning activities of everyday life. In B. Rogoff & J. Lave (eds.), *Everyday cognition: Its development in social context* (pp. 117-138). Cambridge, MA: Harvard University Press.

Griffin, M. M. (1995). You can't get there from here: Situated learning, transfer and map skills. *Contemporary Educational Psychology, 20*, 65-87.

Guba, E. & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of Qualitative Research*, (eds.) Denzin, N. and Lincoln, Y. Sage: London, 105-117.

Guba, E. G. & Lincoln, Y. S. (1998). Competing Paradigms in Qualitative Research. In Denzin, N. K. & Lincoln, Y. S. (eds) *The Landscape of Qualitative Research: Theories and Issues*. Thousand Oaks: Sage, 195-220.

Gulikers, J. T. M., Bastiaens, T. J., & Kirschner, P. A. (2004). A five-dimensional framework for authentic assessment. *Educational Technology Research and Development, 52*(3), 67-86.

Gulikers, J. T. M., Bastiaens, T. J., & Martens, R. L. (2005). The surplus of an authentic learning environment. *Computers in Human Behavior, 21*, 509—521.

Hacking, I. (1999). *The Social Construction of What?* Harvard University Press.

Harley, S. (1993). Situated learning and classroom instruction. *Educational Technology, 33*(3), 46-51.

Healey, M. (2005). Linking Research and Teaching to Benefit Student Learning. *Journal of Geography in Higher Education.* Vol. 29(2): 183-201.

Healey, M. (2005). Linking research and teaching: disciplinary spaces, in: R. Barnett (ed.) *Reshaping the university: new relationships between research, scholarship and teaching*, 30-42. Maidenhead: McGraw-Hill/Open University Press.

HERDSA (2011). Edith Cowan University Authentic Learning Award http://www.herdsa.org.au/wp-content/uploads/edith-cowan-prize1.pdf

Herrington, J. (2006). *Authentic E-Learning in higher education: Design principles for authentic learning environments and tasks.* In: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (ELEARN), 13-17 October 2006, Honolulu, Hawaii, USA.

Part I References (cont.)

Herrington, J., & Herrington, A. (1998). Authentic assessment and multimedia: How university students respond to a model of authentic assessment. *Higher Education Research &Development, 17*(3), 305-322.

Herrington, J., & Oliver, R. (2000). An instructional design framework for authentic learning environments. *Educational Technology Research and Development*, 48(3), 23-48.

Herrington, J., Oliver, R. & Reeves, T. C. (2002). Patterns Of Engagement In Authentic Online Learning Environments. *Australian Journal of Educational Technology* 2003, 19(1), 59-71.

Herrington, A, Oliver, R. & Reeves, T. C. (2003). 'Cognitive realism' in online authentic learning environments. In Lasser, D. & McNaught, C. (eds.) *Ed/Media World Conference on Educational Multimedia, Hypermedia and Telecommunications*, Norfolk: AACE, 2115-2121.

Herrington, A. & Herrington, J. (eds.) (2006). Authentic Learning Environments in Higher Education. Hershey: Information Science Publishing.

Herrington, A. & Herrington, J. (2006). What is an authentic learning environment? In Herrington, A. & Herrington, J. (eds.) (2006) Authentic Learning Environments in Higher Education. Hershey: Information Science Publishing, pp. 1-13.

Herrington, J. and Kervin, L. (2007). Authentic Learning Supported by Technology: Ten suggestions and cases of integration in classrooms. Educational Media International, 44 (3): 219-36.

Honebein, P. (1996). Seven goals for the design of constructivist learning environments. In B. Wilson, *Constructivist Learning Environments* (pp. 17-24). New Jersey: Educational Technology Publications.

Honebein, P. C., Duffy, T. M., & Fishman, B. J. (1993). Constructivism and the design of learning environments: Context and authentic activities for learning. In T. M. Duffy, J. Lowyck & D. H. Jonassen (eds.), *Designing environments for constructive learning* (pp. 87-108). Heidelberg: Springer-Verlag.

Hooper, S. (1992). Cooperative learning and computer-based design. *Educational Technology Research and Development, 40*(3), 21-38.

Hoover, J. D. and Whitehead, C. (1976). "An Experiential-Cognitive Methodology in the First Course in Management: Some Preliminary Results," In Buskirk, R.H. *Simulation Games and Experiential Learning in Action*: *the Proceedings of the Second National Absel Conference*, Bloomington, Indiana, April 9-11, 1975, 25-30.

Hruby, G. G. (2001). Sociological, postmodern, and new realism perspectives in social constructionism: Implications for literacy research. *Reading Research Quarterly, 36*(1, January-March),

Part I References (cont.)

48-62.

Hsui-Mei, H. (2002). Toward constructivism for adult learners in online learning environments. *British Journal of Educational Technology* 33 (1): 27-37.

Illeris, K. (2002). *The Three Dimensions of Learning. Contemporary learning theory in the tension field between the cognitive, the emotional and the social*, Leicester: NIACE.

Instructional Design Knowledgebase (2012). Select Instructional Models/Theories to Develop Instructional Prototypes. George Mason University. Retrieved Jan. 31st 2012 from: http://classweb.gmu.edu/ndabbagh/Resources/IDKB/models_theories.htm

Jenkins, A. & Healey, M. (2005). Institutional strategies to link teaching and research. Heslington: The Higher Education Academy. Retrieved November 12, 2011 from http://www.heacademy.ac.uk/assets/documents/research/Institutional_strategies.pdf

Jonassen, D. (1991). Evaluating constructivistic learning. *Educational Technology, 31*(9), 28-33.

Jonassen, D. H. (1997). "Instructional Design Models for Well-Structured and Ill-Structured Problem-Solving Learning Outcomes". *Educational Technology Research and Development* 45 (1): 65–94.

Jonassen, D. H. (1999). Activity Theory as a Framework for Designing Constructivist Learning Environments. Educational Technology Research & Development, 47(1), 61-79.

Jonassen, D. H. (1999a). Designing constructivist learning environments. In C. M. Reigeluth (ed.), *Instructional design theories and models: A new paradigm of instructional theory, Volume II*, pp. 215-239). Mahwah, NJ: Lawrence Erlbaum Associates.

Jonassen, D., Mayes, T., & McAleese, R. (1993). A manifesto for a constructivist approach to uses of technology in higher education. In T.M. Duffy, J. Lowyck, & D.H. Jonassen (eds.), Designing environments for constructive learning (pp. 231-247). Heidelberg: Springer-Verlag.

Kemmis, S. (1985). Action research and the politics of reflection. In D. Boud, R. Keogh, & D. Walker (eds.), *Reflection: Turning experience into learning* (pp. 139-163). London: Kogan Page.

Kincheloe, J. L. (2005). Critical constructivism. New York: Peter Lang.

Kincheloe, J. L., & Berry, K. S. (2004). *Rigour and complexity in educational research: conceptualizing the bricolage*. Boston: McGraw-Hill International.

Knights, S. (1985). Reflection and learning: The importance of a listener. In D. Boud, R. Keogh, & D. Walker (eds.), *Reflection:*

Part I References (cont.)

Turning experience into learning (pp. 85-90). London: Kogan Page.

Kroll, D. L., Masingila, J. O., & Mau, S. T. (1992). Grading cooperative problem solving. *Mathematics Teacher, 85*(8), 619-627.

Lajoie, S. (1991). A framework for authentic assessment in mathematics. *NCRMSE Research Review: The Teaching and Learning of Mathematics, 1*(1), 6-12.

Laurillard, D. (2002). *Rethinking university teaching: a framework for the effective use of learning technologies*. London: Routledge Falmer.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Learning Theories Knowledgebase (2012a, January). Paradigms. Retrieved January 30th, 2012 from http://www.learning-theories.com/paradigms

Learning Theories Knowledgebase (2012b, January). Index of Learning theories and Models. Retrieved January 31st, 2012 from http://www.learning-theories.com/

Lebow, D., & Wager, W. W. (1994). Authentic activity as a model for appropriate learning activity: Implications for emerging instructional technologies. *Canadian Journal of Educational Communication, 23*(3), 231-144.

Linn, R. L., Baker, E. L., & Dunbar, S. B. (1991). Complex, performance-based assessment: Expectations and validation criteria. *Educational Researcher, 20*(8), 15-21.

Lombardi, M. M. (2007). Authentic Learning for the 21st Century: An Overview. In Oblinger, D.G. (ed.) Educause Learning Initiative Paper 1:2007 May. Retrieved October 28, 2011 from http://net.educause.edu/ir/library/pdf/ELI3009.pdf

Mackenzie, N. & Knipe, S. (2006). Research dilemmas: Paradigms, methods and methodology. *Issues In Educational Research, Vol 16(2):* 193-205.

Maxwell J. (1992). Understanding validity in qualitative research. *Harvard Education Review,* 62(3): 279–300.

McLellan, H. (1993). Evaluation in a situated learning environment. *Educational Technology, 33*(3), 39-45.

Melles, G. (2008). An Enlarged Pragmatist Inquiry Paradigm For Methodological Pluralism In Academic Design Research, *Artifact*, 2: 1, 3-11.

Mercer, N. (1996). The quality of talk in children's collaborative activity in the classroom. *Learning and instruction, 6*(4), 359-377.

Merriam, S. and Caffarella (1991, 1998). *Learning in Adulthood. A comprehensive guide*, San Francisco: Jossey-Bass.

Part I References (cont.)

Mertens, D. M. (2005). *Research methods in education and psychology: Integrating diversity with quantitative and qualitative approaches.* (2nd ed.) Thousand Oaks: Sage.

Meyer, C. A. (1992). What's the difference between authentic and performance assessment? *Educational Leadership, 49*(8), 39-40.

Moore, J. L., Lin, X., Schwartz, D. L., Petrosino, A., Hickey, D. T., Campbell, O., Hmelo, C., & Cognition and Technology Group at Vanderbilt. (1994). The relationship between situated cognition and anchored instruction: A response to Tripp. *Educational Technology, 34*(10), 28-32.

Moore, J. (2005). Recognising and Questioning the Epistemological Basis of Educational Psychology Practice. *Educational Psychology in Practice,* 21 (2, June): 103–16.

Morrison, J. L. (1992). Environmental scanning. In M. A. Whitely, J. D. Porter, and R. H. Fenske (eds.), *A primer for new institutional researchers* (pp. 86-99). Tallahassee, Florida: The Association for Institutional Research.

Myers, S. (1993). A trial for Dmitri Karamazov. *Educational Leadership, 50*(7).

National Security College (2010). Strategic Plan 2010-2015. Australian National University, November, 2010.

Nelson, L. M. (1999). Collaborative problem solving. In Reigeluth, C.M. (ed.), *Instructional design theories and models: A new paradigm of instructional theory* (pp. 241-267). Mahwah, NJ: Lawrence Erlbaum.

Newmann, F. & Wehlage, G. G. (1993). Five Standards of Authentic Instruction. *Educational Leadership*. April, 50 (7): 8-12.

Norman, D. (1993). *Things that make us smart: Defending human attributes in the age of the machine*. Reading, MA: Addison-Wesley.

Oliver, R., & Omari, A. (1999). Using online technologies to support problem based learning: Learners responses and perceptions. *Australian Journal of Educational Technology, 15*: 158-79.

Palincsar, A. S. (1989). Less charted waters. *Educational Researcher, 18*(5), 5-7.

Palincsar, A. S. (1998). Social constructivist perspectives on teaching and learning. Annual Review of Psychology, 49: 345-375.

Palm, T. (2002). *The realism of mathematical schools tasks - Features and consequences.* PhD Thesis. Umeå, Sweden: Umeå University.

Parry, O, Gnich, W., & Platt, S. (2001) Principles in practice: reflections on a `postpositivist' approach to evaluation research *Health Education Research* 16(2): 215-26.

Part I References (cont.)

Patent, J. D. (2001) A Unified Account of Essentially Contested Concepts. Proceedings of the Annual Meeting of the Berkeley Linguistics Society. 27: 205-213. Retrieved 04/11/2011 from http://elanguage.net/journals/index.php/bls/article/viewFile/698/558

Patton, M. (1990). *Qualitative Evaluation and Research Methods. 2nd ed.* Newbury Park, CA: Sage Publications.

Pea, R. D. (1991). Learning through multimedia. *IEEE Computer Graphics & Applications, 11*(4), 58-66.

Peirce, C. S. (1958). *Charles S. Peirce: Selected Writings*. New York: Dover.

Petraglia, J. (1998a). The real world on a short leash: The (mis)application of constructivism to the design of educational technology. *Educational Technology Research and Development, 46*(3), 53-65.

Petraglia, J. (1998b). *Reality by design: The rhetoric and technology of authenticity in education*. Mahwah, NJ: Lawrence Erlbaum.

Pinch, T. J. (1996). The Social Construction of Technology: a Review. In R. Fox (ed.), Technological Change; Methods and Themes in the History of Technology (pp. 17-35). Amsterdam: Harwood Academic Publishers.

Reeves, T.C. (1993b). Interactive learning systems as mindtools. In P. Newhouse (ed.), *Viewpoints 2* (pp. 2-11, 29). Perth: ECAWA.

Reeves, T. C. (1999). A research agenda for interactive learning in the new millennium. In P. Kommers & G. Richards (eds.), *World Conference on Educational Multimedia, Hypermedia and Telecommunications 1999* (pp. 15-20). Norfolk, VA: AACE.

Reeves, T. C. (2000). Socially responsible educational research. *Educational Technology, 40*(6), 19-28.

Reeves, T. C., & Okey, J.R. (1996). Alternative assessment for constructivist learning environments. In B.G. Wilson (ed.), *Constructivist learning environments: Case studies in instructional design* (pp. 191-202). Englewood Cliffs, NJ: Educational Technology Publications.

Reeves, T. C., Herrington, J., & Oliver, R. (2002). Authentic activities and online learning. *Annual Conference Proceedings of Higher Education Research and Development Society of Australasia.* Perth, Australia. Retrieved Sept. 26, 2011, from http://learnatics.sydneyinstitute.wikispaces.net/file/view/Reeves.pdf

Resnick, L. (1987). Learning in school and out. *Educational Researcher, 16*(9), 13-20.

Resnick, L. B., & Resnick, D. P. (1992). Assessing the thinking curriculum: New tools for educational reform. In B.R. Gifford & M. C. O'Connor (eds.), *Changing assessment: Alternative views*

Part I References (cont.)

of aptitude, achievement and instruction (pp. 37-75). Boston: Kluwer.

Revans, R. (1980). Action learning: New techniques for management. London: Blond & Briggs.

Ritchie, S. M., & Rigano, D. L. (2001). Researcher-participant positioning in classroom research. *International Journal of Qualitative Studies in Education,* 14 (6), 741- 756.

Rule, A. C. (2006). Editorial: The Components of Authentic Learning" *Journal of Authentic Learning,* 3 (1) August, pp. 1-10.

Ryan, A. B. (2006). *Post-Positivist Approaches to Research.* In: Researching and Writing your thesis: a guide for postgraduate students. MACE: Maynooth Adult and Community Education, pp. 12-26.

Scanlon, P. A. & Ford, M. P. (1998). Grading Student Performance in Real World Settings. In Anderson, R.S. & Speck, B. W. (eds.) *Changing the Way We Grade Student Performance: Classroom Assessment and the New Learning Paradigm.* San Francisco: Jossey Bass.

Schank, R. C., Berman, T. R., & MacPherson, K. A. (1999). Learning by doing. In C. M. Reigeluth (ed.), *Instructional design theories and models: Anew paradigm of instructional theory* (Vol. 2, pp. 161–181). Mahwah, NJ: Lawrence Erlbaum.

Schoemaker, P. J. H. & van der Heijden, C. A. J. M. (1992). "Integrating Scenarios into Strategic Planning at Royal Dutch/Shell," *Planning Review*. Vol. 20 (3): 41-6.

Schön, D. (1991). *The reflective practitioner: How professionals think in action.* London: Arena.

Siemens, G. (2004). Connectivism: A Learning Theory for the Digital Age". elearnspace. Retrieved Oct. 16, 2011 from: http://www.elearnspace.org/Articles/connectivism.htm

Senge, P. (2000). The Industrial Age System of Education. In Senge, P., Cambron-McCabe, N., Lucas, T., Smith, B., Dutton, J. & Kleiner, A. Schools That Learn: *A Fifth Discipline Fieldbook for Educators, Parents, and Everyone Who Cares About Education*. London: Nicholas Brealey Publishing.

Smeyers, P., & Depaepe, M. (eds.) (2006). Educational Research: Why 'What Works' Doesn't Work. Educational Research, Vol. 1, Dordrecht, The Netherlands, Springer.

Smith, M. K. (1999). 'Learning theory', *the encyclopedia of informal education*, Retrieved November 9, 2011 from www.infed.org/biblio/b-learn.htm

Somekh, B., & Lewin, C. (2005). *Research methods in social sciences.* London: Sage.

Spiro, R. J., Vispoel, W. P., Schmitz, J. G., Samarapungavan, A., & Boeger, A. E. (1987). Knowledge acquisition for application: Cognitive flexibility and transfer in complex content domains. In B. K. Britton & S.M. Glynn (eds.), *Executive*

Part I References (cont.)

control processes in reading (Vol. 31, pp. 177-199). Hillsdale, NJ: Lawrence Erlbaum Associates.

Spiro, R. J., Feltovich, P. J., Jacobson, M. J., & Coulson, R. L. (1991a). Cognitive flexibility, constructivism, and hypertext: Random access instruction for advanced knowledge acquisition in ill-structured domains. *Educational Technology, 31*(5), 24-33.

Spiro, R. J., Feltovich, P. J., Jacobson, M. J., & Coulson, R. L. (1991b). Knowledge representation, content specification, and the development of skill in situation-specific knowledge assembly: Some constructivist issues as they relate to cognitive flexibility theory and hypertext. *Educational Technology, 31*(9), 22-25.

Sternberg, R. J., Wagner, R. K., & Okagaki, L. (1993). Practical intelligence: The nature and role of tacit knowledge in work and at school. In J. M. Puckett & H. W. Reese (eds.), *Mechanisms of everyday cognition* (pp. 205-227). Hillsdale, NJ: Lawrence Erlbaum Associates.

Straub, D, Gefen, D., & Boudreau, M. (2004). Quantitative, Positivist Research Methods in Information Systems. Section 2. Philosophical Perspectives. Retrieved 24 Oct. 2011 from: http://dstraub.cis.gsu.edu:88/quant/2philo.asp

Tashakkori, A., & Teddlie, C. (2003). *Handbook of mixed methods in social and behavioural research.* London: Cassell.

Torrance, H. (1995). Introduction. In H. Torrance (ed.), *Evaluating authentic assessment: Problems and possibilities in new approaches to assessment* (pp. 1-8). Buckingham: Open University Press.

Toulmin, S. (1990). *Cosmopolis: the Hidden Agenda of Modernity*. New York: The Free Press.

Tripp, S. D. (1993). Theories, traditions and situated learning. *Educational Technology, 33*(3), 71-77.

Tuchanska, B. (1999) *Is a Non-Foundationalist Epistemology Possible?* The Second Summer School for the Theory of Knowledge. Retrieved November 9, 2011 from http://hektor.umcs.lublin.pl/~zlimn/school/2/frames/courses/bt.htm

Usher, R. Bryant, I, & Johnston, R. (1997). *Adult Education and the Postmodern challenge: learning beyond the limits*. London, Routledge.

von Wright, J. (1992). Reflections on reflection. *Learning and Instruction, 2*, 59-68.

Voros, J., (2001) "Reframing environmental scanning: an integral approach". *Foresight* 3 (6): 533-51.

Vos, P. (2011). 'What is Authentic in the Teaching and Learning of Mathematical Modelling? In Kaiser, G., Blum, W., R. Borromeo Ferri, R. & Stillman, R. (eds.), *Trends in Teaching and Learning of Mathematical Modelling* (in print). New York:

Part I References (cont.)

Springer.

Vygotsky, L. (1978). *Mind in Society: The Development of Higher Psychological Processes*, Cambridge: Harvard University Press.

Warmoth, A. (2000). Social constructionist Epistemology. Retrieved Jan. 28, 2012 from: http://www.sonoma.edu/users/w/warmotha/epistemology.html

Wenger, E. (1998). *Communities of Practice*. New York: Cambridge University Press.

Wiggins, G. (1989). A true test: Toward more authentic and equitable assessment. *Phi Delta Kappan, 70*(9), 703-713.

Wiggins, G. (1990). The case for authentic assessment . Washington, DC: ERIC Clearinghouse on Tests, Measurement, and Evaluation.

Wiggins, G. (1993). *Assessing student performance: Exploring the purpose and limits of testing*. San Francisco: Jossey-Bass.

Wilson, B. G., & Welsh, J.R. (1991). Small knowledge-based systems in education and training: Something new under the sun. In Educational Technology Anthology Series (ed.), *Expert systems and intelligent computer-aided instruction* (Vol. 2, pp. 7-13). Englewood Cliffs, NJ: Educational Technology Publications.

Winn, W. (1993). Instructional design and situated learning: Paradox or partnership. *Educational Technology, 33*(3), 16-21.

Yates, L. (2004). *What does good education research look like? Situating a field and its practices*. Maidenhead, Berkshire: Open University Press.

Young, M. F. (1993). Instructional design for situated learning. *Educational Technology Research and Development, 41*(1), 43-58.

Young, M. F. (1995). Assessment of situated learning using computer environments. *Journal of Science Education and Technology, 4*(1), 89-96.

Young, M. F., & McNeese, M. (1993). A situated cognition approach to problem solving with implications for computer-based learning and assessment. In G. Salvendy & M.J. Smith (eds.), *Human-computer interaction: Software and hardware interfaces*. New York: Elsevier Science Publishers.

References: Part II

Part II References

Aarseth, E. (2004). Genre Trouble: Narrativism and the Art of Simulation. In P. Harrington and N. Wardrip-Fruin. *First Person: New Media as Story, Performance, and Game*. Cambridge MA: MIT Press (45-47).

Abt, C. (1970). *Serious Games*. New York: The Viking Press.

Aldrich, C. (2005) Learning by doing. San Francisco. CA. Pfeiffer

Aldridge, C. (2009). *The Complete Guide to Simulations and Serious Games*. San Diego: Pfeiffer.

Aldrich, C., (2009a). Virtual worlds, simulations, and games for education: A unifying view. *Innovate: Journal of Online Education*, 5(5).

Aldridge (n.d.). Commentary: Which name is better - Serious Games or Educational Simulations or...? Retrieved Feb. 11, 2012 from: http://www.clarkaldrichdesigns.com/2007/09/commentary-what-name-is-better-serious.html

Alexander, A. L. Brunyé, T., Sidman, J. & Weil, S. A., (2005). From Gaming to Training: A review of Studies on Fidelity, Immersion, Presence, and Buy-in and their effects on transfer in PC-based Simulations and Games. DARWARS Training Impact Group, November 2005. Retrieved Feb. 2, 2012 from: http://www.aptima.com/publications/2005_Alexander_Brunye_Sidman_Weil.pdf

Allen, J., Buffardi, L., and Hays, R. (1991). The Relationship of Simulator Fidelity to Task and Performance Variables (Report No. ARI-91-58). Alexandria, VA: Army Research Institute for the Behavioral and Social Sciences.

Anderson, L. W. & Krathwohl, D. R., et al (eds.) (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Boston: Allyn & Bacon.

Anderson, P. H., & Lawton, L. (2009). Business Simulations and Cognitive Learning: Developments, Desires, and Future Directions. *Simulation & Gaming*, 40(2, April): 193-216.

Anderson, R. S. & Speck, B. W. (1998). *Changing the Way We Grade Student Performance: Classroom Assessment and the New Learning Paradigm*. New directions for Teaching and Learning, 74, Summer. San Francisco: Jossey-Bass.

Antonacci, D. M. & Modaress, N. (2008). "Envisioning the Educational Possibilities of User-Created Virtual Worlds" *AACE Journal*, 16(2): 115–26.

Apperley, T.H. (2006). Genre and game studies: Toward a critical approach to video game genres. *Simulation & Gaming*, 37 (1): 6-23.

Part II References (cont.)

Badiou, A. (2005). *Being and Event*. Translated by Feltham, O. London: Continuum.

Bandura, A. (1977). Self-efficacy: Toward a Unifying Theory of Behavioral Change. Psychological Review, Vol. 84 (2), p.191-215.

Barwood, H. & Falstein, N. (n.d.). The 400 Project Rule List. Retrieved March 4, 2012 from: http://www.theinspiracy.com/Current%20Rules%20Master%20List.htm

Beaubien, J. M., & Baker, D. P. (2004). The Use of Simulation for Training Teamwork Skills in Health Care: How low can you go? *Qual Saf Health Care,* 2004;13:i51-i56.

Bean, C. (2011). Avoiding the Trap of Clicky-Clicky Bling-Bling. E-Learn Magazine. Retrieved Dec. 22 2011, from http://elearnmag.acm.org/featured.cfm?aid=1999745

Becher, T. & Trowler, P. R. (2001). *Academic tribes and territories: intellectual enquiry and the culture of disciplines*.(2nd ed.) Buckingham: SRHE & Open University Press.

Becker, K. & Parker, J. R. (2011). *The Guide to Computer Simulations and Games*. New York: John Wiley & Sons.

Bekebrede, G. (2010). Experiencing Complexity: A gaming approach for understanding infrastructure systems. Thesis summary. Delft: Next Generation Infrastructures Foundation. Retrieved Jan. 6th , 2012 from http://www.tbm.tudelft.nl/fileadmin/Faculteit/TBM/Over_de_Faculteit/Afdelingen/Afdeling_Multi_Actor_Systems/Sectie_Beleid,_Organisatie,_Recht_en_Gaming_POLG/Onze_gepromoveerden/doc/Summary_Experiencing_complexity_final.pdf

Benford, S., Crabtree, A., Reeves, S., Flintham, M., Drozd, A., Sheridan, J., Dix, A. (2006). The Frame of the Game: Blurring the Boundary between Fiction and Reality in Mobile Experiences. Paper presented at the CHI 2006, Montréal, Quebec, Canada.

Bogost, I. (2005). Procedural Literacy: Problem Solving with Programming, Systems, & Play. *Telemedium*, Winter/Spring, 32-36.

Bogost, I. (2007). *Persuasive Games: The Expressive Power of Videogames*. Cambridge, Massachusetts: The MIT Press.

Bogost, I. (2009). The Metaphysics Videogame: Part 1: Why a videogame? Retrieved January 26, 2012 from: http://www.bogost.com/blog/the_metaphysics_videogame.shtml

Boin, A. & Lagadec, P. (2000). Preparing for the Future: Critical Challenges in Crisis Management. *Preparing For The Future*, 8(4) December: 185-191.

Boin, A., Kofman-Bos, C. & Overdijk, W. (2004). Crisis

Part II References (cont.)

Simulations: Exploring Tomorrow's Vulnerabilities and Threats. *Simulation & Gaming*, 35(3) September: 378-392.

Bos, N. & Shami, N. S. (2006). Adapting a Face-to-Face Role-

Playing Simulation for Online Play. *Educational Technology, Research & Development (ETR&D).* 54(5): 493-521.

Bostock, S. (2006). Student Peer Assessment. Retrieved February 28, 2012, from: http://www.keele.org.uk/docs/bostock_peer_assessment.htm

Bots, F., Wagenaar, P., & Willemse, R. (2010). Assimilation of Public Policy Concepts Through Role-Play: Distinguishing Rational Design and Political Negotiation. *Simulation & Gaming* 41(5) 743–766.

Boud, D., and Feletti, G. (eds.). (1991). *The challenge of problem based learning*. New York: St. Martin's Press.

Boulos, M. N. K., Hetherington, L. & Wheeler, S. (2007). Second Life: an overview of the potential of 3-D virtual worlds in medical and health education. *Health Information & Libraries Journal*, 24(4), 233–245.

Breuer, J. & Bente, G. (2010). Why so serious? On the relation of Serious Games and Learning. Eludamos. *Journal for Computer Game Culture.* 4(1) : 7-24 Retrieved March 5, 2012 from: http://journals.sfu.ca/eludamos/index.php/eludamos/article/viewArticle/vol4no1-2/146

Brewer, G. (1972). *Dealing with complex social problems: the potential of the decision seminar*. Santa Monica, CA: RAND Corporation.

Brewer, G. (1984). Child of Neglect: Crisis Gaming for Politics and War. *Orbis, A Journal of World Affairs,* 27(4) Winter: 803-812.

Brewer, G. (1986). Methods for synthesis: Policy exercises. In Clark, W. & Munn, R. (eds.), *Sustainable Development of the Biosphere*. Cambridge, UK: Cambridge University Press, (455-475).

Brewer, G. (2007). Inventing the future: Scenarios, imagination, mastery and control. *Sustainability Science, 2*, 159-177.

Brewer, G., & Shubik, M. (1979). *The War Game*. Cambridge, MA: Harvard University Press.

Bridgman, P. & Davis, G. (2000). *Australian Policy Handbook*, 2nd edn. Sydney: Allen & Unwin.

Bridgman, P. & Davis, G. (2003). What Use is a Policy cycle? Plenty, if the Aim is Clear. *Australian Journal of Public Administration*, 62(3) 98-102, September.

Broll, G., and Benford, S. (2005). Seamful Design for Location-Based Mobile Games. Lecture Notes in Computer Science, 3711, p.155-166.

Part II References (cont.)

Brown, S., Rust, C. and Gibbs, G. (1994). Involving students in the assessment process, in *Strategies for Diversifying Assessments in Higher Education,* Oxford: Oxford Centre for Staff Development.

Caliper Corp. (2008). *TransModeller.* Retrieved February 22, 2012 from: http://www.caliper.com/TransModeler/default.htm

Charsky, D. and Mims, C. (2008). Integrating Commercial Off-the-Shelf Video Games into School Curriculums. *TechTrends: Linking Research and Practive to Improve Learning*, Vol. 52 (5), p. 38-44.

Checkland, P. (2001). Soft Systems Methodology in Action: Participative Creation of an Information Strategy for an Acute Hospital, in Rosenhead, J. & Mingers, J. (eds.), *Rational Analysis for a Problematic World Revisited*. Chichester: John Wiley & sons: 91-113.

Chin, J., Dukes, R. & Gamson, W. (2009). Assessment in Simulation and Gaming: A Review of the Last 40 Years. *Simulation & Gaming*, 40(4) August: 553-568.

Clark, D., Nelson, B., Sengupta, P., & D'Angelo, C. (2009). Rethinking science learning through digital games and simulations: Genres, examples, and evidence. Washington DC: National Research Council. Retrieved Dec 22, 2011 from: http://www7.nationalacademies.org/bose/Clark_Gaming_CommissionedPaper.pdf

Clark, R. & Mayer, R. (2007). *E-learning and the Science of Instruction*, San Francisco: Pfeiffer.

Connery, D. (2010). *Crisis policy-making: Australia and the East Timor crisis of 1999*. Canberra: ANU E-Press.

Conway, M. (n.d.). Scenario Planning. Retrieved February 28, 2012 from: http://thinkingfutures.net/resources/scenario-planning/

Corbeil, P. & Laveault, D. (2011). Validity of a Simulation Game as a Method for History Teaching. *Simulation & Gaming* 42(4): 462–75.

Crawford, C. (2002). *Serious games: Improving public policy through game-based learning and simulation. Subjectivity and simulation*. Retrieved February 5, 2012, from http://www.seriousgames.org/images/Seriousgamescrawfordfinal.pdf

Crookall, D. (1995). A guide to the literature on simulation/gaming. In D. Crookall &K. Arai (eds.), *Simulation and gaming across disciplines and cultures: ISAGA at a watershed* (pp. 151-177). Thousand Oaks, CA: Sage.

Crookall, D. (2010). Serious Games, Debriefing, and Simulation/Gaming as a Discipline. *Simulation & Gaming* 41(6) 898–920. Retrieved Dec. 16, 2011 from: http://sag.sagepub.com/content/41/6/898.full.pdf+html

Part II References (cont.)

Crookall, D., & Thorngate, W. (2009). Acting, Knowing, Learning, Simulating, Gaming. *Simulation & Gaming*. 40(1) February: 8-26.

Crow, W. J., & Noel, R. C. (1977). An experiment in simulated historical decision-making. In M. G. Hermann (ed.), *A psychological examination of political leaders* (pp. 383-405). New York: Free Press.

Csikszentmihalyi, M. (1990). Flow: The psychology of optimal experience. New York: Harper Perennial.

Cusack, T. R., & Stoll, R. J. (1990). *Exploring realpolitik: Probing international relations theory with computer simulation*. Boulder: Lynne Rienner.

Davis, G. (2002).Scenarios as a Tool for the 21st Century. Paper presented at the Probing the Future Conference, Strathclyde University, July 12.

de Freitas, S., Savill-Smith, C, & Attewell, J. (2006). *Educational games and simulations: Case Studies from Adult Learning Practice*. London: Learning and Skills Research Centre.

de Freitas, S. (2007). *Learning in immersive worlds: A review of game-based learning*. Bristol, UK: Joint Information Systems Committee. Retrieved on Dec. 21, 2012 from: http://www.jisc.ac.uk/whatwedo/programmes/elearning_innovation/eli outcomes/GamingReport.aspx

De Geus, A. (1997). *The Living Company*. London: Nicholas Brealey.

Deker, S., Sportsman, S., Puetz, L., & Billings, L. (2008). The evolution of simulation and its contribution to competency. *The Journal of Continuing Education in Nursing*, 99(2), 74-90.

deLeon, P. (1981). The analytic requirements for free-form gaming. *Simulation & Games, 12*, 201-231.

Dormans, J. (2011). Beyond Iconic Simulation. *Simulation & Gaming*, 42(5): 610–31.

Dörner, D. (1996). The Logic of Failure, New York: Metropolitan Books.

Douglas, K., & Coburn, C. (2009). Students Designing Role-Plays:Building Empathy in Law Students? Retrieved Jan. 10, 2012 from: http://www.alta.edu.au/pdf/JALTA/%282009%29%20JALTA%20Individual%20Typeset%20Articles/05_Students%20Designing%20Role-Plays_Building%20Empathy%20in%20Law%20Students_Douglas_Coburn.pdf

Duke, R. D. (1974). *Gaming, the Future's Language*, Beverly Hills: Sage.

Duke, R. D. (1998). The Gaming Discipline as Perceived by the Policy and Organization Sciences, In Geurts, J.L.A., Joldersma, F., & Roelofs, E. (eds). *Gaming-simulation for Policy*

Part II References (cont.)

Development and Organizational Change, Tilburg: Tilburg University Press: 21-28.

Duke, R. D. & Geurts, J. L. A., (2004). *Policy Games for Strategic Management: Pathways in to the Unknown*. Amsterdam: Dutch University Press.

Eijkman, H. & Clarke, B. (2007). Towards a Participatory Learning and Assessment Culture in Higher Education: Leveraging Social Technologies to Reframe Curricular Practices. *Proceedings of the International Conference on ICT in Education (ICICTE) 12-14 July, Heraklion, Crete*.

Eijkman, H. & Clarke, B. (2007a). 'Using Web 2.0 for powerful and sustainable assessments for real world learning'. Proceedings of the International Conference on ICT in Education 12-14 July, Heraklion, Crete.

Eijkman, H., Herrmann, A. & Savige. K. (2010). E-assessment as a driver for cultural change in network-centric learning. *International Journal of E-Adoption* (Special Issue): Impact of e-adoption at organization, firm or state level in the Asia-Pacific region. July/Sept. 2(3): 14-25.

Elton, L & Johnson, B. (2002). Assessment in Universities: a Critical Review of Research, CHERI, The Open University.

Emerson, K., Movius, H. & Merideth, R. (1999). Trouble in Tortuga! A Role-playing Simulation Game for Teaching Environmental Conflict Resolution. Udall Center for Studies in Public Policy, Tucson: The University of Arizona (August). Retrieved December 23, 2011, from: http://udallcenter.arizona.edu/publications/epp/pdfs/1999_emerson.MERIDETH.etal_trouble.in.tortuga.pdf

Engle, C. (1995). *The Matrix Game*. Hamster Press. Retrieved March 3, 2012 from: http://hamsterpress.net/?page_id=15

Eskelinen, M. (2001). The Gaming Situation. Paper presented at the Digital Arts and Culture conference, Providence April 2001.

Falchikov, N. (2007). The place of peers in learning and assessment. In Boud, D. & Falchikov, N. (eds.) *Rethinking Assessment in Higher Education: Learning for the longer term*. London: Routledge, pp.128-143.

Faria, A. J. & Nulsen, R. (1996). Business Simulation Games: Current usage levels a ten year update. *Developments In Business Simulation & Experiential Exercises*, Volume 23: 22-28.

Faria, A. J., Hutchinson, D., Wellington, W. J., & Gold, S. (2009). Developments in business gaming: A review of the past 40 years. *Simulation & Gaming*, 40, 464-487.

Floyd, D. and Portnow, J. (Writer) (2008). Video Games and Learning [Online]. Retrieved March 5, 2012 from: http://www.youtube.com/watch?v=rN0qRKjfX3s

Fortmüller, R. (2009). Learning Through Business Games: Acquiring Competences Within Virtual Realities. *Simulation &*

Part II References (cont.)

Gaming, 40 (1) February: 68-83.

Frasca, G. (2003). Simulation versus narrative: Introduction to ludology. In Wolf, M. J. P. & Perron, B. (eds.), *The Video Game Theory Reader*. New York: Routledge (pp. 221-236).

Frieling, D. H. (ed.) (1998). *The Metropolitan Debate*. Bussum: Thoth.

Gardiner, L. F. (1994). *Redesigning higher education: Producing dramatic gains in student learning.* Washington: George Washington University, Graduate School of Education and Human Development.

Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming*, 33(4) December: 441-467.

Gee, J. P. (2003). High Score Education [Online]. *Wired*, Vol. 11 (5). Retrieved 23 January, 2012 from: http://www.wired.com/wired/archive/11.05/view.html?pg=1http://www.wired.com/wired/archive/11.05/view.html?pg=1

Gee, J. P. (2004). *What video Games have to Teach us about Learning and Literacy*. New York: Palgrave Macmillan.

Gee, J. P. (2008). *Good Video Games + Good Learning*. New York: Peter Lang.

Geurts, J. (1993). *Looking back to the future. Long term reconnaissance in policy exercises.*Alphen aan den Rijn: Samson.

Geurts, J. L. A., Joldersma, F., & Roelofs, E. (eds), (1998). *Gaming-simulation for Policy Development and Organizational Change*, Tilburg: Tilburg University Press.

Geurts, J. L.A., Duke, R.D., & Vermeulen, P. A. M. (2007). Policy Gaming for Strategy and Change. Long Range Planning 40 (6) December: 535–558.

Gibbs, G. & Simpson, C. (2004-5). Conditions under which assessment supports student learning. *Learning and Teaching in Higher Education,* Issue 1:3-31.

Gibbs (2006). How assessment frames student learning. In Bryan, C. & Clegg, K. (eds.) Innovative Assessment in Higher Education. London: Routledge, 23-36.

Girvan, C., & Savage, T. (2010). Identifying an appropriate pedagogy for virtual worlds: A Communal Constructivism case study. *Computers & Education*, 55(1), 342-349.

Glouberman, S. & Zimmerman, B. (2002). What Would Successful Reform of Medicare Look Like? Discussion paper No. 8, July, the Commission on the Future of Health Care in Canada. Retrieved Jan. 7th 2012 from http://publications.gc.ca/collections/Collection/CP32-79-8-2002E.pdf

GoldSim Technology Group. (2008). *GoldSim Monte Carlo simulation software.* Retrieved February 22, 2012, from:

Part II References (cont.)

http://www.goldsim.com/Web/Solutions/EnvironmentalSystems/

Gonzalez, C., Vanyukov, P., & Martin, M. K. (2005). The use of micro-worlds to study dynamic decision making. *Computers in Human Behavior, 21:* 273-286.

Gosen, J., & Washbush, J. (2004). A review of scholarship on assessing experiential learning effectiveness. *Simulation & Gaming*, *35*(2): 270-93.

Guetzkow, H. (1995). Recollections about the Inter-Nation Simulation (INS) and some derivatives in global modeling. *Simulation & Gaming: An Interdisciplinary Journal, 26*, 453-470.

Guetzkow, H., Alger, C., Brody, A., Noel, R., & Snyder, R. (1963). *Simulation in international relations: Developments for research and teaching*. Englewood Cliffs, NJ: Prentice Hall.

Harvey, S., Lidell, A., & McMahon, L. (2007). *Windmill 2007: The future of health care reforms in England*. London: Kings Fund.

Heppell, S. (2006). Personalisation of Assessment: Issues. Discussion paper presented at Department for Education and Skills, Personalized content workshop on 13th February 2006.

Herrmann, A. & Eijkman, H. (2008). 'e-Assessment as a Driver for Cultural Change in Network Centric Learning' Proceedings of the e-Assessment in Practice Conference, Defence Academy of the United Kingdom, Shrivenham, Nov.25-26.

Hew, K. F. & Cheung, W. S. (2010). Use of three-dimensional (3-D) immersive virtual worlds in K-12 and higher education settings: A review of the research. *British Journal of Educational Technology*, 41(1), 33 - 55.

Holland, J. (1995). *Hidden order: How adaptation builds complexity*. Reading, MA: Addison-Wesley.

Huizinga, J. (1950). *Homo Ludens: A Study of the Play-Element in Culture.* Boston: The Beacon Press.

Hung, W., & R.Van Eck. (2010). Aligning problem solving and gameplay: A model for future research and design, In *Interdisciplinary Models and Tools for Serious Games: Emerging Concepts and Future Directions,* ed. R.Van Eck, 227-263, Hershey, PA: IGI Global.

Issenberg, S. B., Mcgaghie, W. C., Petrusa, E. R., Gordon, D. L., & Scalese, R. J. (2005). Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review *Medical Teacher*, 27 (1): 10-28.

Jacobson, M. J. (2000). Problem solving about complex systems: differences between experts and novices. In Fishman, B., O'Connor-Divelbiss, S. (eds.), *Fourth International Conference of the Learning Sciences*, Mahwah, NJ: Erlbaum, 14–21.

Jacobsen, M. J., Wilensky, U. (2006). Complex systems in

Part II References (cont.)

education: scientific and educational importance and implications for the learning sciences. *The Journal of the Learning Sciences*, 15(1), 11–34.

Jackson, N., Wisdom J. & Shaw M. (2003). *Using learning outcomes to design a course and assess learning.* The Generic Centre: Guide for Busy Academics. York: Higher Education Academy. Available at http://www.heacademy.ac.uk/assets/York/documents/resources/resourcedatabase/id252_Guide_for_Busy_%20Academics_Using_Learning_Outcomes_to_Design.rtf

Jäger, J., & Sonntag, N., Bernard, D., & Kurz, W. (1990). *The challenge of sustainable development in a greenhouse world: Some vision of the future* (Report of a policy exercise held in Bad Bleiberg, Austria). Stockholm, Sweden: Stockholm Environmental Institute.

Jasanoff, S. (1990). *The Fifth Branch. Science Advisors as Policymakers*. Cambridge, MA: Harvard University Press.

Jenkins, H., Clinton, K, Purushotma, R., Robison, A. J. & Weigel, M. (2006). Confronting the Challenges of Participatory Culture: Media Education for the 21st Century. Retrieved December 27, 2011 from: http://www.nwp.org/cs/public/download/nwp_file/10932/Confronting_the_Challenges_of_Participatory_Culture.pdf?x-r=pcfile_d

Jenkins, H., Camper, B., Chisholm, A., Grigsby, N., Klopfer, E., Osterweil, S., et al. (2009). From Serious Games to Serious Gaming. In Ritterfeld, U., Cody, M. and Vorderer, P. (eds.) Serious Games: Mechanisms and Effects. New York/ London: Routledge.

Joldersma, C. & Geurts, J.L.A. (1998). Simulation/gaming for Policy Development and Organizational Change, *Simulation & Gaming* 29(4): 391-99.

Jones, H. (2011). *Taking responsibility for complexity: When is a policy problem complex, why does it matter, and how can it be tackled.* ODI Briefing Paper 68, August. London: ODI.

Juul, J. (2001). Games Telling Stories? A Brief Note on Games and Narratives. Game Studies 1(1): 1-12. Retrieved Jan. 28, 2012 from: http://www.gamestudies.org/0101/juul-gts/

Kahane, A. (1997). Learning from Mont Fleur: Scenarios as a tool for discovering common ground. *GBN Deeper News*, 7(1): 1-5.

Kato, F. (2004). Facilitation and communication: Toward a study of an educational gaming simulation. In R. Shiratori, K. Arai, & F. Kato (eds.), *Gaming, Simulations and Society* (pp. 71-80). Tokyo: Springer.

Kear, S. (2011). Teaching to Learn Online Case Study: Teaching using scenario-based simulations in Second Life. Retrieved March 9, 2012, from:

Part II References (cont.)

http://unsw.academia.edu/KarinThieleWatson/Papers/622107/Teaching_using_scenario_based_simulations_in_Second_Life_-_Case_study

Kemp, J., & Livingstone, D. (2006, August). *Putting a second life "Metaverse" skin on learning management systems.* Paper presented at the Second Life Education Workshop at the Second Life Community Convention, San Francisco.

King, G. and Krzywinska, T. (eds.) (2002). ScreenPlay: Cinema/Videogames/Interfacings. London: Wallflower Press.

Kirkpatrick, D., McLaughlan, R.G., Maier, H.R., & Hirsch, P. (2002). Real and virtual experiential learning on the Mekong: Field schools, e-Sims and cultural challenge. In Proceedings of Scholarly Inquiry in Flexible Science Teaching and Learning Symposium (p.13-18) , April 5, 2002, The University of Sydney. Retrieved January 23, 2012, from: http://sydney.edu.au/science/uniserve_science/pubs/procs/wshop7/schws001.pdf

Kirriemuir, J. & McFarlane, A. (2004). Literature Review in Games and Learning. Bristol: Nesta Futurelab series, report 8.

Kline, S., Dyer-Witheford, N., & de Peuter, G. (2003). *Digital Play*. London: McGill-Queen's University Press.

Klabbers, J. H.G. (2006). *The Magic Circle: Principles of Gaming and Simulations*. Rotterdam: Sense Publishers.

Kleiboer, M. (1997). Simulation methodology for crisis management support. *Journal of Contingencies & Crisis Management* 5(4): 198–206.

Kriz, W. C. (2010). A Systemic-Constructivist Approach to the Facilitation and Debriefing of Simulations and Games. *Simulation & Gaming*, 41(5) 663–680.

Kuit, M., Mayer, I., & Jong, M. (2005). The INFRASTRATEGO game: An evaluation of strategic behavior and regulatory models in a liberalizing electricity market. *Simulation & Gaming, 36*, 58-74.

Kuperman, R. D. (2010). Analyzing Conflict Dynamics With the Aid of an Interactive Microworld Simulator of a Fishing Dispute. *Simulation & Gaming*, 41(3) 293–315.

Lainema, T. (2009). Perspective Making: Constructivism as a Meaning-Making Structure for Simulation Gaming. *Simulation & Gaming*, 40(1) February: 48-67.

Lane, N. E., & Alluisi, E. A. (1992). Fidelity and Validity in Distributed Interactive Simulation: Questions and Answers (Report No. IDA-D-1066). Alexandria, VA: Institute for Defense Analysis.

Lartigue, L. J. (2008). *Wargaming and the Interagency*. Carlisle Barracks: U.S. Army War College.

Lasater, C. (2007). High-fidelity simulation and the development of clinical judgment: students' experiences.

Part II References (cont.)

Journal of Nursing Education, 46(6), 269-276.

Lasswell, H. D. (1971). Ch. 3, Problem orientation: the intellectual tasks: 34-57, in *A pre-view of policy sciences*. New York: Elsevier.

Lederman, L. (1992). Debriefing: toward a systematic assessment of theory and practice. Simulation and Gaming, 23(2) June: 145-160.

Lederman, L. C. & Kato, F. (1995). Debriefing the debriefing process. In Crookall, D. & Arai, K. (eds.), *Simulation and gaming across disciplines and cultures: ISAGA at a watershed* (pp. 235-242). Thousand Oaks, CA: Sage.

Leigh, E., & Spindler, L. (2004). Researching congruency in facilitation styles. In W. C. Kriz & Th. Eberle (eds.), *Bridging the gap: Transforming knowledge into action through gaming & simulation* (pp. 309-317). München: Sagsaga.

Lennon, J. L. (2010). Debriefing a Health-Related Educational Game: A Case Study. *Simulation & Gaming*, 41(3): 390–99.

le Roux,P. & Maphai, V. (1997). The Mont Fleur Scenarios. *GBN Deeper News* 7(1): 6-22.

Lombardi, M.M. (2008). *Making the Grade: The Role of Assessment in Authentic Learning*. Educause Learning Initiative, January 2008. Retrieved December 21, 2011, from: http://net.educause.edu/ir/library/pdf/ELI3019.pdf

Luongo-Orlando, K. (2003). *Authentic assessment: Designing performance-based tasks*, Markham: Pembroke Publishing.

MacRae, D., & Whittington, D. (1997). *Expert advice for policy choice: Analysis and discourse*. Washington, DC: Georgetown University Press.

Martin, G. (2004). Diplomat for a Day: Incorporating Simulations in Classes to Engage all Learners. *Journal of the Association of Atlantic Universities*. Retrieved November 12, 2011 from: http://ojs.acadiau.ca/index.php/AAU/article/viewFile/121/86

Mayer, I. (1997). *Debating technologies. A methodological contribution to the design and evaluation of participatory policy analysis*. (Doctoral dissertation) Tilburg: Tilburg University Press.

Mayer, I. (2008). Gaming for policy analysis. Learning about complex multi-actor systems. In L. de Caluwé, G. J. Hofstede, & V. Peters (eds.), *Why do games work? In search of the active substance* (pp. 31-40). Dordrecht: Kluwer.

Mayer, I.S. (2009). The gaming of policy and the politics of gaming: A review. *Simulation & Gaming*, 40 (6) December: 825-862.

Mayer, I. S. (n.d.). Serious Gaming. Retrieved Feb. 24, 2012 from: http://www.slideshare.net/CPSGamingStreet/serious-gaming-8402563

Mayer, I., Bekebrede, G., Bilsen, A., & Zhou, Q. (2009). Beyond

Part II References (cont.)

SimCity: Urban gaming and multi-actor systems. In E. Stolk & M. te Brommelstroet (eds.). *Model town. Using urban simulation in new town planning* (pp. 168-181). Amsterdam: Sun/INTI.

Mayer, I., & Veeneman, W. (eds.). (2002). *Games in a world of infrastructures. Simulation games for research, learning and intervention*. Delft: Eburon.

McDowell, E. (2002). Students and Innovative Assessment, ILT Resource Pack.

McCown, M.M. (2005). Strategic Gaming for the National Security Community. *Joint Forces Quarterly*, 39(1): 34-9.

McCown, Margaret (2009). "Designing Exercises for Teaching and Analysis" *Joint Force Quarterly*, 55(4): 173-5.

McCown, Margaret (2010). "The Social Sciences and Innovation in Strategic Gaming". *Joint Force Quarterly*, 58:2. Retrieved March 2, 2012 from http://www.ndu.edu/press/lib/images/jfq-58/JFQ58_113-114_McCown.pdf

McCown, (2010a). Wargaming the Flu. *Joint Force Quarterly.* 56 (1): 161-2.

McKeachie, W.J. (1999). *Teaching tips; Strategies, research and theory for college and university teachers*. Boston: Houghton Mifflin.

Meadows, D. L. (2000). Learning to be simple: My odyssey with games. *Simulation & Gaming: An Interdisciplinary Journal, 30:* 342-352.

Meadows, D. L. (2001). Tools for understanding the limits to growth: Comparing a simulation and a game. *Simulation & Gaming: An Interdisciplinary Journal, 32:* 522-536.

Media Analysis Laboratory (1998). Video Game Culture: Leisure and Play Preferences of B.C. Teens. Simon Fraser University, Burnaby B.C. October 1998. Retrieved Dec. 22, 2011 from: http://www.media-awareness.ca/english/resources/research_documents/studies/video_games/vgc_conclusion.cfm

Mermet, L. (1993). A prospective method: policy exercises. *Nature, Sciences, Societies, 1*: 34-46.

Michael, D., & Chen, S. (2005). Serious games: Games that educate, train, and inform. Boston: Thompson Course Technology PTR.

Miller, R. (2006). Chapter 5 Futures studies, scenarios, and the "possibility-space" approach. Retrieved February 28, 2012 from: http://www.oecd.org/dataoecd/27/37/37246742.pdf

Mintz, A., Geva, N., Redd, S. B., & Carnes, A. (1997). The effect of dynamic and static choice sets on political decision making: An analysis using the decision board platform. *American Political Science Review, 91,* 553-566.

Mitchard, H. & Ng, S. (2010-11). Composing Effective Environments for Concept Exploration in a Multi-Agency

Part II References (cont.)

Context. *The International C2 Journal*, 4(3): 1-26.

Mitgutsch, K. (2009). Passionate Digital Play-Based Learning, (Re)Learning in computer games like Shadow of the Colossus. *Eludamos. Journal for Computer Game Culture*.3(1): 9-22.

Moore, T. & Johnson, A. (2010). Words within worlds: theorising simulation, role play and genre in university assessment. Retrieved Jan. 22, 2012 from: http://www.iml.uts.edu.au/pdfs/MOORE.pdf

Moreno-Ger. P. Burgos, D. & Torrente, J. (2009). Digital Games in eLearning Environments: Current Uses and Emerging Trends. *Simulation & Gaming*, 40(5) October: 669-687.

Moss, M. (2005). Personalized learning: A failure to collaborate? In S. de Freitas and C. Yapp (eds). Personalizing learning in the 21st Century. Stafford. Network Continuum Press.

Mueller, J. (2008). What is authentic assessment. Authentic assessment toolbox. Retrieved March 12, 2012, from: http://jonathan.mueller.faculty.noctrl.edu/toolbox/whatisit.htm

Murray, J.H. (1997). *Hamlet on the Holodeck*. New York: Free Press.

Murray, J. H. (2005). The Last Word on Ludology v Narratology in Game Studies . Preface to keynote talk, DiGRA 2005, Vancouver, Canada, June 17 Retrieved Feb 11, 2012 from http://lcc.gatech.edu/~murray/digra05/lastword.pdf

Newman, J. (2004). Videogames. New York: Routledge.

Ng, S., v. Antwerpen, C., Beck, J., Kuster, R., Mitchard, H., Gill, A., Warren, L. & Bowley, D. (2006). Applying a national effects based approach to strategic planning. DSTO-TR-1938, Defence Science and Technology Organisation.

Nie, M., Witthaus, G., Armellini, A., Salmon, G., & Mukherjee, J. (2010). DUCKLING Final Report: Leicester: University of Leicester.

Norman, H. (2004). Exploring Effective Teaching Strategies: Simulation Case Studies *And* Indigenous Studies At The University Level. *The Australian Journal of Indigenous Education*, 33:15-21.

Oblinger, D. G. (2006). Games and Learning. Digital games have the potential to bring play back to the learning experience. EDUCAUSE, 29 (3): 5-7.

Ogilvy, J. A. (2002). *Creating Better Futures: Scenario Planning as a Tool for a Better Tomorrow*, Oxford: Oxford University Press.

Pacala S, Socolow, R. H. (2004). Stabilization wedges: solving the climate problem for the next 50 years with current technologies. *Science* 305: 968–979.

Papert, S. (1998). Does Easy Do It? Children, Games, and

Part II References (cont.)

Learning. Game Developers Magazine, Vol. 5 (6), p.88.

Peters, V., & Vissers, G. (2004). A simple classification model for debriefing simulation games. *Simulation & Gaming*, 35(1) March: 70-84.

Peterson, G. D., Cumming, G. S., & Carpenter, S.R. (2003). Scenario Planning: a Tool for Conservation in an Uncertain World. *Conservation Biology*, 17(2) April: 358–366.

Petranek, C. (2000). Written debriefing: The next vital step in learning with simulations. *Simulation &Gaming*, *31*:108-118.

Pilisuk, M. (1984). Experimenting with the arms race. *Journal of Conflict Resolution, 28:* 296-315.

Portugali, J. (2009). Self-organization and the city. In R. A. Meyers (ed.), *Encyclopedia of complexity and systems science*. Heidelberg: Springer.

Prakash, E., Brindle, G., Jones, K., Zhou, S., Chaudhari, N. S., & Wong, K. W. (2009). Advances in games technology: Software, models, and intelligence. *Simulation & Gaming*, 40 (December): 752-801.

Prensky, M. (2001). *Digital Game- Based Learning*. San Francisco: McGraw-Hill.

Prensky, M. (2003). Escape from Planet Jar-Gon Or, What Video Games Have to Teach Academics About Teaching And Writing. A Review of *What Video Games Have To Teach Us About Learning and Literacy* by James Paul Gee. *On The Horizon*, Volume 11 No 3. Retrieved Jan. 23, 2012 from http://www.marcprensky.com/writing/Prensky%20-%20Review%20of%20James%20Paul%20Gee%20Book.pdf

Prensky, M. (2006). *Don't Bother Me, Mom, I'm Learning!* St. Paul, MN: Paragon House.

Preston, T., & Cottam, M. (1997). Simulating U.S. foreign policy crises: Uses and limits in education and training. *Journal of Contingencies and Crisis Management*, *5*(4), 224-230.

Race, P. (2007). *The Lecturer's Toolkit: A practical guide to assessment, learning and teaching*. London: Routledge.

Race, P. & Brown, G. (2001). Inspiring Learning about Teaching and Assessment. *The ILTA Guide* York: Institute of Learning and Teaching.

Ratan, R., & Ritterfeld, U. (2009). Classifying Serious Games. In Ritterfeld, U., Cody, M., and Vorderer, P. (eds.) Serious Games: Mechanisms and Effects. New York/London: Routledge.

Rehmann A, Mitman R, Reynolds M. (1995). A handbook of flight simulation fidelity requirements for human factors research. Technical Report No. DOT/FAA/CT-TN95/46. Wright-Patterson AFB, OH: Crew Systems Ergonomics Information Analysis Center. Retrieved January, 29, 2012 from: http://ntl.bts.gov/lib/000/800/858/tn95_46.pdf

REMI (n.d.). *The REMI Model.* Retrieved February 22, 2012 from:

Part II References (cont.)

http://www.remi.com/index.php?page=model

Revans, R. W. (1998). *ABC of Action Learning*. London: Lemos & Crane.

Rieber, L. P. (1996). Seriously considering play: Designing interactive learning environments based on the blending of microworlds, simulations, and games. *Educational Technology Research & Development*, Vol. 44 (2), p.43-58.

Richards, D. (2000). *Political Complexity: Nonlinear Models of Politics* . Ann Arbor: University of Michigan Press.

Ringland, G. (2002). *Scenarios in Public Policy.* New York: John Wiley.

Ringland, G. (2006). *Scenario Planning: Managing for the Future*. 2nd edition. Chichester: Wiley & Son.

Rittel, H. & Webber, M. (1973). Dilemmas in a General Theory of Planning. *Policy Sciences*, 4: 155–169.

Ritterfeld, U. & Weber, R. (2006). Video Games for Entertainment and Education. In Vorderer, P. and Bryant, J. (eds.) *Playing Video Games. Motives, Responses, and Consequences*. Mahwah, NJ: Lawrence Erlbaum Associates, pp.399-413.

Robinson, C., Tomisek, S. & Kligge, K. (2009). "Perspectives from Fragile Crescent: A South Asia Crisis Simulation." *INSS Proceedings.* Retrieved March 2, 2012 from: http://www.ndu.edu/CASL/docUploaded/fragile%20crescent%20working%20paper.pdf

Roberts, J.C. (2006). SIIRAN: A Simulation of Complex Negotiations. Paper presented at the 47th annual meeting of the International Studies Association. San Diego, CA. March.

Rodriguez, H. (2006). The Playful and the Serious: An Approach to Huizinga's Homo Ludens. Game Studies, Vol. 6 (1).

Rosenthal, U., Boin, R. A., & Comfort, L. K. (2001). The changing world of crisis management. In U. Rosenthal, R. A. Boin, & L. K. Comfort (eds.), *Managing crises: Threats, dilemmas, opportunities.* (pp. 5-27). Springfield, IL: Charles C Thomas.

Sancho, P., Gómez-Martín, P. P., & Fernández-Manjón, B. (2008). *Multiplayer role games applied to problem based learning.* Paper presented at the Third ACM International Conference on Digital Interactive Media in Entertainment & Arts. Athens, Greece.

Sawyer, B. (2002). Serious Games: Improving Public Policy through Game-based Learning and Simulation. Foresight and Governance Project Woodrow Wilson International Center for Scholars. Publication 2002-1. Retrieved Nov. 3, 2011 from: http://wwics.si.edu/subsites/game/Serious2.pdf

Sawyer, B. & Smith, P. (2008). Serious Games Taxonomy. Retrieved Jan. 28, 2012 from:

Part II References (cont.)

http://www.seriousgames.org/presentations/serious-games-taxonomy-2008_web.pdf

Scearce, D. & Fulton, K. (2004). *What if? The Art of Scenario Thinking for Non Profits*. The Global Business Network. Retrieved February 28, 2012 from: http://www.gbn.com/articles/pdfs/GBN_What%20If.pdf

Scearce, D. & Fulton, K. (2004). *What if? The Art of Scenario Thinking for Non Profits*. The Global Business Network. Retrieved February 28, 2012 from: http://www.gbn.com/articles/pdfs/GBN_What%20If.pdf

Schon, D. A. (1983). *The Reflective Practitioner*. New York: Basic Books.

Shanahan, R. (2011). *An Idea In Good Currency: Collaborative Leadership in the National Secuirty Community.* Canberra: National Security College.

Shaw, M. L. G. & Gaines, B. R. (1989). A methodology for recognizing conflict, correspondence, consensus and contrast in a knowledge acquisition system. *Knowledge Acquisition* 1(4) 341-363.

Shell (n.d.). Looking ahead: scenarios. Retrieved February 27, 2012 from: http://www.shell.com/home/content/aboutshell/our_strategy/shell_global_scenarios/

Slaughter, R. A. (2004). *Futures Beyond Dystopia: Creating Social Foresight*, London: Routledge.

Smith, R. (2010). The long history of gaming in military training. *Simulation & Gaming*, 41(1, February): 6-19.

Squire, K. (2006). From content to context: digital games as designed experiences. *Educational Researcher*. 35(8) November: 19-29.

Squire, K. and Jenkins, H. (2003). Harnessing the power of games in education. *Insight*, 3,(1): 5-33.

Squire, K. & Jan, M. (2007) Mad City Mystery: Developing Scientific Augmentation Skills with a Place-based Augmented Reality Game on Handheld Computers. Journal of Science Education and Technology, 16 (1), p.5-29.

Starr, P. (2001). Seductions of Sim: Policy as a Simulation Game. American Prospect, December 19. Retrieved February 12, 2012 from http://prospect.org/article/seductions-sim-policy-simulation-game

Sutcliffe, M. (2002). The Handbook for Economics Lecturers: Simulations, Games, and Role-play. Retrieved January 27, 2012, from: http://www.economicsnetwork.ac.uk/handbook/printable/games_v5.pdf

Sutton-Smith, B. (2001). *The Ambiguity of Play.* Cambridge, Mass.: Harvard University Press.

Part II References (cont.)

Tagg, J. (2003). *The Learning Paradigm College*. Bolton: Anker Publishing.

Tan, K. (2007). Conceptions of self assessment: what is needed for long-term learning. In Boud, D. & Falchikov, N. (eds) *Rethinking Assessment in Higher Education: Learning for the longer term.* London: Routledge, pp.114-127.

Thalheimer, W. (2004). "Bells, Whistles, Neon, and Purple Prose: When interesting words, sounds, and visuals hurt learning and performance— a review of the seductive-augmentation research. Retrieved Dec. 20, 2011 from: http://www.oktopusz.hu/domain9/files/modules/module15/28283C732CAE682.pdf

Thiagarajan, S. (1993). How to maximize transfer from simulation games through systematic debriefing. In F. Percival, S. Lodge, & D. Saunders (ed.), *The Simulation and Gaming Yearbook 1993* (pp. 45-52). London: Kogan Page.

Thorngate, W. & Tavakoli, M. (2009). Simulation, Rhetoric, and Policy Making. *Simulation & Gaming*, 40(4) August: 513-527.

Tonks, D. (2002). Using marketing simulations for teaching and learning: Reflections on an evolution. *Active Learning in Higher Education*, Vol 3(2): 177–94.

Ulicsak, M. (2010). Games in Education: Serious Games. A FutureLab Literature Review. Retrieved Jan.22 from: http://media.futurelab.org.uk//resources/documents/lit_reviews/Serious-Games_Review.pdf

van Bilsen, A., Bekebrede, G., & Mayer, I. (2010). Understanding Complex Adaptive Systems by Playing Games. *Informatics in Education*, 9 (1): 1–18.

van de Riet, O. (2003). *Policy analysis in multi-actor policy settings. Navigation between negotiated nonsense and superfluous knowledge*. (Doctoral dissertation). Delft: Eburon.

van Eck, R. (2006). Digital game-based learning: It's not just the digital natives who are restless. *EDUCAUSE Review*, 41(2): 16-30.

Vygotsky, L.S. (1978). *Mind and society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Walker, W.E., Giddings, J. & Armstrong, S. (2011). Training and learning for crisis management using a virtual simulation/gaming environment. *Cogn Tech Work*, 6 March

Waters, A., Bassendowski, S, & Petrucka, P. (2009). Serious Games for Students in Healthcare: Engaging a Technically Inclined Generation. *Canadian Journal of Nursing Informatics.* 3(4): 16-27.

Weir, K. & Baranowski, M. (2011). Simulating History to Understand International Politics. *Simulation & Gaming*, 42(4): 441–61.

Part II References (cont.)

Wenzler, I. (1993). *Policy exercises, a new approach to policy development*. Nijmegen: ITS.

Wilensky, U., Resnick, M. (1999). Thinking in levels: a dynamic systems approach to making sense of the world. *Journal of Science Education and Technology*, 8(1).

Williams, P. (2008). Assessing context-based learning: Not only rigorous but also relevant, *Assessment & Evaluation in Higher Education, 33*(4): 395-408.

Williams, R. H. & Williams, A. J. (2010). One for All and All for One: Using Multiple Identification Theory Simulations to Build Cooperative Attitudes and Behaviors in a Middle Eastern Conflict Scenario. *Simulation & Gaming 41*(2): 187-207.

Wittgenstein, L. (1953). *Philosophical Investigations*. G. E. M. Anscombe trans., Oxford: Blackwell Publishing.

Wolf, M.J.P. (2001). *The Medium of the Video Game.* Austin: University of Texas Press.

Yung-Fang, C., Borodzicz, Jia-Min, C. (2004). Flood Management: a simulation and gaming perspective. Retrieved February 29, 2012 from: http://203.72.2.115/Ejournal/3042040205.pdf

Zimmerman, B. (1999). "Complexity Science: A Route through Hard Times and Uncertainty." *Health Forum Journal,* March/April (1999): 42-6.

Zyda, M. (September 2005). "From visual simulation to virtual reality to games". *IEEE Computer, 38(9)*: 25-32.

Part V Annexures
Part: I

Annexure 1.1: An evidence-based checklist for authentic learning[58]

No	Element of authentic learning	Operational guidelines for effectiveness
1	Provide a context that reflects the way the knowledge will be used in real-life (Gabrys, Weiner, & Lesgold, 1993; Harley, 1993; Moore et al., 1994; Palincsar, 1989; Resnick, 1987; Winn, 1993; Young, 1993)	The learning environment provides: ☐ a real or virtual environment which presents learners with a holistic view of the problem situation and thereby reflects the way the knowledge will ultimately be used (Brown et al., 1989b; Collins, 1988) ☐ a design that preserves the complexities of the real-life setting by supplying rich situational opportunities (Brown et al., 1989b; Collins, 1988; Young & McNeese, 1993) ☐ a large number of resources that enable sustained examination from a number of different perspectives (Brown et al., 1989b; Collins, 1988; Spiro, Vispoel, Schmitz, Samarapungavan, & Boeger, 1987; Young & McNeese, 1993) ☐ a design which makes no attempt to fragment or simplify the environment (Brown et al., 1989b; Honebein, Duffy, & Fishman, 1993; Spiro et al., 1987; Young & McNeese, 1993)
2	Provide activities that have real-world relevance (Brown et al., 1989b; Cognition and Technology Group at Vanderbilt [CTGV], 1990a; Griffin, 1995; Harley, 1993; Resnick, 1987; Tripp, 1993; Winn, 1993; Young, 1993)	The learning environment provides: ☐ activities which have real-world relevance (Brown et al., 1989b; Cognition and Technology Group at Vanderbilt [CTGV], 1990a; Jonassen, 1991; Resnick, 1987; Winn, 1993; Young, 1993) ☐ ill-defined activities (Brown et al., 1989b; CTGV, 1990a; Winn, 1993; Young, 1993) ☐ a single complex task to be investigated by students (Bransford, Vye, et al., 1990; CTGV, 1990b; Jonassen, 1991) ☐ opportunities for students to define the tasks and sub-tasks required to complete the activity (Bransford , Vye, et al., 1990; CTGV, 1990b; Collins et al., 1989; Young, 1993) ☐ a sustained period of time for investigation (Bransford et,Vye, et al., 1990; CTGV, 1990b) ☐ opportunities to detect relevant versus irrelevant information, (CTGV, 1990a; Young, 1993) ☐ opportunities to collaborate (Young, 1993) ☐ tasks which can be integrated across subject areas (Bransford, Sherwood, et al., 1990; Bransford , Vye, et al., 1990; Jonassen, 1991)

[58] Adapted from Herrington & Oliver, 2000: 4-6 and Herrington & Kervin, 2007)

No	Element of authentic learning	Operational guidelines for effectiveness
3	Provide access to expert performances and the modelling of processes (Collins, 1988; Collins et al., 1989; Lave & Wenger, 1991; Resnick, 1987)	The learning environment provides: ☐ access to expert thinking and modelling processes (Collins, 1988; Collins et al., 1989) ☐ access to learners in various levels of expertise (Collins et al., 1989) ☐ opportunity for the sharing of narratives and stories (Brown et al., 1989b; Brown & Duguid, 1993; Lave & Wenger, 1991) ☐ access to the social periphery or the observation of real-life episodes as they occur (Brown et al., 1989b; Brown & Duguid, 1993; Lave & Wenger, 1991; Wenger, 1998)
4	Provide multiple roles and perspectives (Bransford, Sherwood, et al., 1990; Brown et al., 1989b; CTGV, 1990a; CTGV, 1993; Collins et al., 1989; Lave & Wenger, 1991; Spiro, Feltovich, Jacobson, & Coulson, 1991a; Spiro, Feltovich, Jacobson, & Coulson, 1991b; Young, 1993)	The learning environment provides: ☐ different perspectives on the topics from various points of view (Bransford , Sherwood, et al., 1990; Brown et al., 1989b; CTGV, 1990a; CTGV, 1993; Collins et al., 1989; Lave & Wenger, 1991) ☐ opportunities to express different points of view through collaboration (Honebein et al., 1993) ☐ opportunities to explore the learning environment by providing more than one investigation within a resource sufficiently rich to sustain repeated examination, (Spiro et al., 1991a; Spiro et al., 1991b; Young, 1993)
5	Support collaborative construction of knowledge (Bransford , Sherwood, et al., 1990; Brown et al., 1989b; CTGV, 1990a; Collins et al., 1989; Resnick, 1987; Young, 1993)	The learning environment provides: ☐ tasks which are addressed to a group rather than to an individual (Alessi, 1996; Brown et al., 1989b; Collins et al., 1989; Hooper, 1992; Resnick, 1987; Young, 1993) ☐ classroom organisation into pairs or small groups (Hooper, 1992) ☐ an appropriate incentive structure for whole-group achievement (Hooper, 1992).
6	Promote reflection to enable abstractions to be formed (Brown et al., 1989b; CTGV, 1990a; Collins, 1988; Collins et al., 1989; Resnick, 1987)	The learning environment provides: ☐ authentic context and task (Brown et al., 1989b; Norman, 1993) ☐ the facility for students to return to any element of the program if desired, and to act upon reflection (Boud, Keogh, & Walker, 1985; Collins & Brown, 1988; Kemmis, 1985) ☐ opportunities for learners to compare themselves with experts (Collins, 1988; Collins & Brown, 1988; Collins, Brown, & Holum, 1991) ☐ opportunities for learners to compare themselves with other learners in varying stages of accomplishment (Collins et al., 1989) ☐ collaborative groupings of students that enable attentive reflection (Kemmis, 1985; Knights, 1985; von Wright, 1992)

No	Element of authentic learning	Operational guidelines for effectiveness
7	Promote articulation to enable tacit knowledge to be made explicit (Bransford, Sherwood, et al., 1990; Collins, 1988; Collins et al., 1989)	The learning environment provides: ☐ a complex task incorporating inherent, as opposed to constructed, opportunities to articulate (Bransford , Sherwood, et al., 1990; Collins, 1988; Collins et al., 1989; Edelson, Pea, & Gomez, 1996) ☐ collaborative groups to enable social and individual understanding (Mercer, 1996; Vygotsky, 1978) ☐ public presentation of arguments to enable articulation and defence of learning (Lave & Wenger, 1991; Pea, 1991)
8	Provide coaching by the teacher at critical times, and scaffolding and shadowing of teacher support (Collins, 1988; Collins et al., 1989; Griffin, 1995; Harley, 1993; Resnick, 1987; Young, 1993)	The learning environment provides: ☐ a complex, open-ended learning environment (Collins, 1988; Collins et al., 1989; Resnick, 1987) ☐ no explicit or additional scaffolding and coaching (Collins & Brown, 1988; Dreyfus & Dreyfus, 1989; Greenfield, 1984; Reeves, 1993b; Wilson & Welsh, 1991) ☐ collaborative learning, whereby more able partners can assist with scaffolding and coaching (Collins, 1988; Collins et al., 1989; Young, 1993) ☐ a model by which the facilitator implementing the program is available for coaching and scaffolding assistance for a significant portion of the period of use (Collins, 1988; Griffin, 1995; Harley, 1993; Young, 1993)
9	Provide for integrated assessment of learning within the tasks (McLellan, 1993; Young, 1993; Young, 1995).	The learning environment provides: ☐ fidelity of context (Meyer, 1992; Reeves & Okey, 1996; Wiggins, 1993) ☐ opportunities for students to be effective performers with acquired knowledge, and to craft polished performances or products (Wiggins, 1989; Wiggins, 1990; Wiggins, 1993) ☐ significant student time and effort in collaboration with others (Kroll, Masingila, & Mau, 1992; Linn, Baker, & Dunbar, 1991) ☐ complex challenges that require judgement, and a full array of tasks (Linn et al., 1991; Torrance, 1995; Wiggins,1993) ☐ assessments that are seamlessly integrated with the activity (Reeves & Okey, 1996; Young, 1995,) ☐ multiple indicators of learning (Lajoie, 1991; Linn et al., 1991) ☐ validity and reliability with appropriate criteria for assessing varied products (Hooper, 1992; Lajoie, 1991; Resnick & Resnick, 1992; Wiggins, 1990; Young, 1995)

Annexures
Part: II

Annexure 2.1: Characteristics of Complex Adaptive Systems

(Glouberman & Zimmerman, 2002: 10)

Theory cluster
• Non-linear (rather than linear): inputs and outputs are not directly correlated • Tension, noise and fluctuations not suppressed but seen as opportunities • Solution as part of the system/s (not external to it) • Interaction with multiple elements of a dynamic (not adaptation to a static) environment
Causality cluster
• Mutual (not simple) causality • Adaptive and emergent (not deterministic) outcomes • Uncertainty (not certainty) • Recognised elements of non-predictability (rather than assumed predictability) • Focus on arrows (rather than boxes) • Structures and relationships are interactive (rather than deterministic of relationships)
Evidence cluster
• Holism/synthesis (rather than Reductionism/analysis) • Outliers seen as possible key determinants (rather than relying on the dominance of averages in which outliers are seen as irrelevant) • History regarded primarily as a mechanism of change, and systems evolve in part based on where they have been (rather than ignoring historical evidence because systems tend towards equilibrium) • Functioning of actual relationships and feedback loops: +ve and –ve (rather than a focus on measures of efficiency, fit, and best practice)
Planning cluster
• Divergent (rather than convergent) thinking • Emergent (rather than reductive) characteristics • Decision as emergent procedure (rather than decision as an event) • Developing insights into own practice (rather than environmental scan) • Butterfly effect: size of existing change does not determine size of subsequent change (rather than, e.g. a big issue needing a big change)

Annexure 2.2: Public policymaking as a game

(Mayer, n.d.: 62)

Learn to view policy-making as a strategic game	Policy Substance	Policy Process
Winning a policy game requires both analytic AND strategic insights and skills.	To play and win you must (learn to) use and understand the tools (e.g. characteristics of analysis-like models, simulations etc.).	To play and win you must (learn to) interact with others (political sensitivity).
Know and learn the rules of the policy game.	To play and win you must (learn to) understand the rules of the system, e.g. cause-effect elationships, economics, social behaviour, etc.	To play and win you must (learn to) understand the rules within the actor-networks and arenas.
A policy game is always played within a defined context of time and space.	To play and win you must (learn) the back story: the (stable) knowledge basis and policy assumptions (paradigms).	Actors have stable values, interests, means, relations and prior histories.
Rules and elements of a policy game are ambiguous.	Information/knowledge insufficient or overload.	Perceptions, interpretations, meanings, intuitions, errors and mistakes.
A policy game is never closed: always open and volatile.	Information, knowledge, insights, main points of change (to learn).	Actor-network constellations change.
In a policy game there are usually multiple and ambiguous game objectives.	Objectives on different system levels: individual, organisational, and the system as a whole.	Actors have individual game objectives but can also have collaborative game objectives.
Succesful policy game strategies are very often adaptive.	Adaptation = learning.	Adaptation = incremental.
The outcome of a policy game is emergent and cannot simply be a-priori deduced from the policy game elements.	Surprising results through the complex two-way interactions from cause-effect relationships.	Surprising results through the strategic behaviour of actors.

Annexure 2.3: Taxonomy of Serious Games

(Sawyer & Smith, 2008)

	Games for Health	Advergames (games using advertising)	Games for Training	Games for Education	Games for Science & Research	Production	Games as Work
Government & NGO	Public Health Education & Mass Casualty Response	Political Games	Employee Training	Inform Public	Data Collection/ Planning	Strategic & Policy Planning	Public Diplomacy, Opinion Research
Defence	Rehabilitation & Wellness	Recruitment & Propaganda	Soldier/Support Training	School House Education	Wargames/ planning	War planning & Weapon Research	Command & Control
Healthcare	Cybertherapy / Exergaming	Public Health Policy & Social Awareness Campaigns	Training Games for Health Professionals	Patient Education and Disease Management	Visualisation & Epidemiology	Biotech manufacturing & design	Public Health Response Planning & Logistics
Marketing & Communication	Advertising Treatment	Advertising, marketing with games, product placement	Product Use	Product Information	Opinion Research	Machinima	Opinion Research
Education	Inform about diseases/risks	Social Issue Games	Train teachers / Train workforce skills	Learning	Computer Science & Recruitment	P2P Learning Constructivism Documentary?	Teaching Distance Learning
Corporate	Employee Health Information and Wellness	Customer Education & Awareness	Employee Training	Continuing Education & Certification	Advertising / Visualisation	Strategic Planning	Command & Control
Industry	Occupational Safety	Sales & Recruitment	Employee Training	Workforce Education	Process Optimisation Simulation	Nano / Bio-tech Design	Command & Control

Annexure 2.4: Classifying serious games

Breuer & Bente (2010)

Table 2.1: Tag categories for classifying serious games[59]

Label/Tag Category	Exemplary Labels
1. Platform	Personal Computer, Sony PlayStation 3, Nintendo Wii, Mobile Phone
2. Subject Matter	World War II, Sustainable development, Physics, Shakespeare's works
3. Learning Goals	Language skills, historical facts, environmental awareness, persuasion
4. Learning Principles	Rote memorisation, exploration, observational learning, trial and error,
5. Target audience	High school, law students, general public, military recruits, post-graduates
6. Interaction mode(s)	Multiplayer, co-tutoring, single player, massively multiplayer, tutoring agents
7. Application area	Academic education, private use, professional training
8. Controls/Interfaces	Gamepad controlled, mouse & keyboard, Wii balance board
9. Common gaming labels	Puzzle, action, role-play, simulation, card game, quiz

[59] From Breuer & Bente (2010)

Annexure 2.5: Simulations and the 5 Cs of the policy process

(Based on Geurts et al., 2007: 545, 547, 548, 550, 551).

Category	Effective ingredient of the Simulation element in Policy Sims	Effective ingredient of the Gaming element in Policy Sims	Impact of each effective Ingredient on Strategy	
			Sim Games help to:	Sim Games help to prevent:
Complexity 545	• Develop a systems perspective on a strategic issue • Integrate/organise knowledge base • Ability to test & assess strategies for possible effects & side effects • Helps to understand & explore the future as a set of uncertainties & possibilities • Reveals potential differences between short & long-term effects	• Conveys a systems perspective • Integrate hard & soft data • Understand the dynamic characteristics of the system • Allows user to look back from & reflect on many different futures & the whole process	• Create, integrate, & analyse a specific decision and broad knowledge base • Arrive at logically sound & actionable conclusions • Allow for evaluation of effects & side effects based on many different criteria	• Jump-starting from a biased and narrow knowledge base
Communication 547	• Simulation models & tools focus, clarify, & structure communication • Introduces new & situation-specific shared concepts & language.	• Multilogue: the simultaneous & well-structured dialogue of different people using different modes in parallel. • Games stimulate an open discussion climate	• Install practical, interactive strategy-making using all know-how • Engage many different perspectives & stakeholders & arrive at integral & multifunctional outcomes	• To a priori exclude and alienate important voices & partners
Creativity 548	• Confrontation of modeled data with tacit models • Counterintuitive simulation results stimulate new ideas	• Free & safe format of serious play • Repeated trial & error experimentation allows new ideas to mature quickly • Presence of diversity in roles stimulates out-of-the-box thinking & captures the creativity of many	• Construct a set of creatively different & integral responses to strategic issues • Safely test new combinations	• Accepting & then pushing the first option that comes to mind
Consensus 550	• Clarifies different positions & separates real from assumed differences • Puts individually biased proposals to a critical test • Simulation outcomes identify winners or losers but also suggest potential win-win solutions	• Rival perspectives engage in benign competition • Safe environment for fierce debate • Levels the playing field for different contributions	• Establish procedural justice & fairness • Identify sources of resistance & the need & room for negation	• Group-think & after-the-fact, mutual blaming battles • Idea imposition by those in power
Commitment 551	• Simulation outcomes are early warnings of the risk of failure • They reveal essential contingencies & conditions for success • A long time horizon reveals the need for consistency & endurance	• All participants are actively involved • Play creates bonding & levels institutional defences • Mastering the simulated challenges creates confidence & trust	• Create commitment • to action in those • whose energy and • wisdom are essential • for the success of • a strategic • initiative	• Group-think & escalation of commitment

Annexure 2.6: Design considerations of policy simulations

The literature suggests that in general terms all simulations, be they analog or digital, follow similar overall design steps, such as the five step model of Geurts et al. (2007), namely:

Phase I.	Setting the stage
Phase II.	Clarifying the problem, e.g. systems analysis
Phase III.	Designing the policy exercise
Phase IV.	Developing the exercise
Phase V.	Application

A further step ought to be added, the importance of which is too often underestimated (Crookall, 2009). Hence:

Phase VI:	Reflection, debriefing, review (formal or informal debriefings may feature at different times throughout a simulation, especially if it is of a long duration).

Again, space and scope place limits on detail, but in its essence the simulation design process is generally straightforward. With reference to creating a public policy simulation, the process generally occurs as follows:

A course convenor, preferably with input from (internal and/or external) colleagues and students, and in response to a perceived learning need, will write a scenario which forms the basis for the simulation. This scenario and its key decision dilemmas typically draw on relevant case studies or evaluation reports of real public policy decision-making situations.

Designer(s) will usually disguise their scenario and add fictitious events to surprise participants. The chosen scenario can be highly specific and directly relevant to the particular course, or could pertain to the field more generally. The designers will specify the learning outcomes to be achieved, their mode of assessment,[60] the monitoring and debriefing procedures, and create all the necessary documentation (e.g. the scenario script: who does what and when, etc.) and artefacts to be used in the scenario, such as faxes, letters, news reports, etc. (Tonks, 2002; Boin et al. 2001; Crookall, 2010). One must also consider: (a) if one Sim will achieve all the desired learning outcomes, or whether several smaller SSims would do so more effectively; and (b) what other learning methods can be effectively used to augment the Sim and better address certain learning requirements (Fortmüller, 2009).

At this point it is definitely good practice to run a small pilot to ensure the scenario will deliver on its intended learning. Course or workshop participants will then be invited to participate in the simulation exercise. They will receive the necessary briefings and information about their roles, tasks and responsibilities and about the scenario that is about to unfold. To enhance fidelity, the room, its equipment and the artefacts used should as much as possible correspond with reality. A Sim team of individuals acting as referees guide and supervise the entire process, often also using a separate room from

[60] The assessment of simulations is a topic in its own right. A detailed discussion is clearly beyond the scope of this report, but key issues are identified in the section concerning 'Efficacy' below.

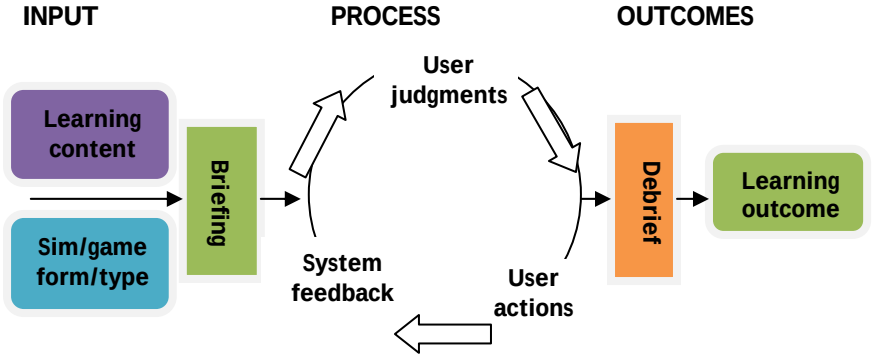
which they can monitor participants through an audio and video uplink. At an appropriate time the staff members will pass on information on behalf of various actors, using artefacts such as telephone messages, faxes, emails, tweets, messengers, and, for example, pre-recorded news bulletins, etc., in line with the developing course of events. At appropriate times the scenario staff members will escalate the requirements of the emrgency with information and requests such as with messages, phone calls, requests for interviews, press conferences, etc., to simulate real-life decision-making pressures.

During the simulation, the facilitator will monitor group and individual behaviours and performance, such as decision-making processes, organisational adaptations, information and communication dynamics, etc., in line with the learning outcomes. The staff members also monitor the integrity of the simulation scenario, modifying the simulation with improvised messages as participants respond differently to a situation which was not envisaged in the pre-formulated script. On this point the designers need to decide beforehand the degree to which participants will have a free hand, or to which the simulation staff members will control the simulation and force participants back to the original scenario.

Rule-based or free form simulations?
Sims for policy development offer participants opportunities to interact with each other and experience the results of changing the rules of the game. A less rigid structure enables participants to deal with a dynamic policy environment (Joldersma & Geurts, 1998).

Simulations typically conclude with an oral debriefing, sometimes followed by a written evaluation and completion of the assessment process. Figure 2.8, below, depicts the design-and-build process in terms of an input-process-outcomes model (Garris, Ahlers, & Driskell, 2002: 445).

Figure 2.8: Input-Process-Outcomes Simulation model[61]



Key ingredients for an effective policy Sim

- *Create a credible script*. All details need to be correct: the script must reflect appropriate levels of realism and demonstrate an accurate grasp of public policy decision-making patterns (Boin et al. 2004).
- *Begin your Sim with an effective briefing*: it is essential to introduce the Sim method, learning outcomes, and roles and rules, especially those that must be obeyed and which need to be clearly identified. The extent to which participants are free to devise their own rules and interpret roles must also be made clear (Kriz, 2010).
- *Use a highly skilled facilitator*: someone capable of dealing with all of the uncertainties, complexities and dynamic momentum of the simulation actions. They must provide guidance to facilitate participants' self-organisation and be attentive to participants' decision processes and group dynamics in order to make appropriate

[61] Adapted from Garris, Ahlers, & Driskell, (2002:445)

regulatory interventions. They are to engage in "active inactivity" and provide useful and timely feedback (Boin et al. 2004; Kato, 2004; Leigh & Spindler, 2004; Kriz, 2010).

- *Plan for debriefing opportunities from the outset*: e.g. arrange for observers, videotaping and/or forms of computer-based data collection when applicable ("Debriefing is too important to be left until the end of the game": Fred Goodman, in Crookall, 2010: 907). Engage in effective data collection for debriefing using multiple tools for reflection, e.g., learning diaries, circular questions, etc., to ensure that participants' reflections on their experiences with assessment of mental, social, and systems processes will lead to effective transfer to real situations beyond the gaming simulation experience (Peters, & Vissers, 2004; Kriz, 2010; Lennon, 2010).

  Crookall (2010: 907) laments that proper debriefings are not getting the attention they deserve, given that it is these occasions for reflecting on and sharing the Sim experiences that translate the activity into learning outcomes. He stresses that "If we accept the basic idea that the real (solid, lasting, meaningful, and deeper) learning comes not from the game, but from the debriefing, then we as gamers are shooting ourselves and our learners in the foot … some serious and other gamers seem to have forgotten that the learning comes from the debriefing, not from the game" Crookall, 2010: 907). Many others also consider debriefing to be the most critical part of the simulation/gaming experience (Crookall, 1995; Lederman, 1992; Lederman & Kato, 1995; Kriz, 2010).

  Debriefings
  If we are going to take our serious gaming seriously, and if we wish educational authorities to accept them as a legitimate source of learning, then we need to do it seriously, which means debriefing seriously. In many of the games I run, the debriefing is longer and more engaging for participants than the game itself.
  (Crookall, 2010: 908)

- *Consider the degree to which your Sim will be rigidly rule based, principle-based, or free-form*: it is the linkages between the rules and resources that define differences in Sim forms: namely, important though underplayed distinctions between rule-based, principle-based or free-form Sims (Klabbers, 2006):

  In *rule-based* Sims, participants have to play by the rules without being able to question them. These Sims typically start off with the instruction, "This is the problem: how will you solve it?" The Sim is geared towards a convergence of ideas and/or actions (Klabbers, 2006).

  The initial emphasis in early military games lay on rigid (rule-based) gaming. "The rigid-form game is characterised by the pre-specification of objects and rules that, taken together, determine the legitimacy of play and rigorously define the game" Mayer, 2009: 829). While reasonable for some contexts, this is certainly not the case when dealing with soft systems such as in PPM and its socio-political complexities. Moreover, Sims can conform too rigidly to set scenarios and rules. Participants soon realise that they cannot seriously affect the final outcome because the situation will escalate no matter what they decide. "An overload of pre-formulated messages and predesigned interventions by the simulation staff almost guarantees that the participants will act and decide in accordance with the preconceived outcome of the scenario (Boin et al., 2004: 383). This rigidity in format can easily undermine the success of Sims as participants recognise that in some ways they are being forced into unalterable circumstances and simply lose interest. In response, different forms of gaming emerged: forms that provided more opportunities for input from participants.

  In *principle-based* Sims, participants are given the opportunity before acting of interpreting the rules, based on underlying norms. They have the freedom to explore

the meaning of the rules and the principles upon which they are based, and to act accordingly.

Free-form Sims only feature a small number of ground rules, such as the start and end times, the location in which the scenario takes place, and the role of the facilitator or facilitation team, etc. Though a Sim director or team guides and monitors the process, participants can challenge, create and improve positions, roles, objects, and rules. Hence, all other applicable rules "evolve during the game and are being negotiated and shaped by the actors themselves. Therefore free form games are self-organising or self-reproductive systems" (Klabbers, 2006: 18). Because free form Sims allow for minimal formalisation, incomplete information and contingency factors, the process depends more heavily on the subject matter expertise and experience of the participants, the Sim director/team, and the quality of the scenario (Mayer, 2009). Free form Sims tend to commence with, "This is the situation: how will you deal with it?" and as such are more open to divergence and an acceptance of multiple realities.

Again, this is not a matter of either/or decisions, but where on the 'rigidity-freedom continuum' a Sim is best placed to meet simulation-game expectations of the participants as well as the desired learning outcomes set by the Sim team. The choice, as Klabbers (2006: 46), points out, "depends on purpose, context of use, and the intended audience".

The architecture of policy Sims

Making decisions about the design of policy Sims means making decisions about a simulation/game as a social system. Here decisions about actors, rules and resources are juxtaposed against the criteria of form, content and usage (Klabbers, 2006), as shown in Table 2.1 below. Klabbers (2006: 50) proposes that "combining the social systems and linguistic approaches to gaming brings forward a generic framework for defining the morphology of games and simulations in great detail … and allows making fingerprints of any game". The matrix in Table 2.1 provides a rudimentary Sim design checklist.

Table 2.1: Basic ingredients of Sim architecture[62]

Architecture of simulations			
Social system	**Syntax form**	**Semantics content**	**Pragmatics usage**
Actors	• No of participants • No of game places of actors	• Roles • Composition of roles in social organisation	• Learning context: o Types of steering (game governance, e.g. rigid or free) o Learning goals o Kinds of knowing
Rules	• Game manipulation set • Preparatory rules • Start & stop rules • Rigid rules • Principle-based rules • Free-form rules • Initial game positions • Allowable moves	• Relationships between roles, communication rules and procedures • Evaluation of places for resource allocation, and relative position within team of participants	• Team of Sim game facilitators • Format and instructions for rigid vs free-form • Assessment functions • Evaluation functions

[62] Adapted from Klabbers (2006:50)

	• Final game positions		
Resources	• Game space • Set of game • Set of pieces	• Positioning of pieces: meaning of cultural, socio-economic situation • Set of occupied and available positions	• Materials: o Equipment o Paraphernalia o Facilities

Annexure 2.7: In-house organisational policy simulations

(Geurts, 2007).

Organisationally situated policy SSims are somewhat different from those deployed in academic settings. Participants are members of an organisation and act within their organisational roles, and the simulation game addresses an immediate organisational problem. However, they are worthy of note for those working in the academic sector, even if for no other reason than to demonstrate the confidence of major institutions and organisations in the power of simulations to help their senior staff respond to critical real-life problems.

A case in point is the military. Having long ago recognised the learning power inherent in gaming, military organisations—especially in the more affluent West like the U.S., the U.K., and Australia—rely heavily on state-of-the-art simulations. For example, the U.S. military "is the world's largest spender on and user of Digital Game-Based Learning" (Prensky, 2001: 3). Two important points are worth noting here. First, they are not just used for low-level skill-based training, but also feature at the highest levels of command in dealing with the complexities of strategy and logistics. Second—and for our purposes even more telling—is the fact that "right from the beginning, rather than *hide* the fact that there is a game behind the corporate-speak of 'training challenge' or 'competition,' the military instead *flaunts* the product's 'gameness.'" (Prensky, 2001:3).

In terms of policy-making, Geurts et al. (2007) refer to eight such strategic change projects in which policy simulation/gaming was the major methodology. These include: a pharmaceutical company seeking expansion; a major U.S. railroad facing deregulation; a university hospital negatively impacted by structural devolution; the reorganisation of the Office of the U.S. Secretary of Defense; the design of a strategic management information system for the Dutch government's new National Social Employment Program; the International Joint Commission (IJC) on the Great Lakes that needed a shared framework for an interdisciplinary science-policy dialogue; a large American automotive firm involved in a restructure; and the UK's National Health Care System having to deal with the introduction of market principles. The bottom line is that many large organisations and institutions recognise the power of Sims, both face-to-face and digital (Prensky, 2001). While academics might quibble over empirical evidence, practitioner and institutional confidence have long ago already given their verdict.

Case studies cited in Geurts et al. (2007)

Pharmaceutical company expansion project

A new and important strategy of a pharmaceutical company was to start an R&D facility in Europe. An earlier decision to expand had not gone well. A policy simulation required management to explore issues and options and their implications. As a result, the leading option at the outset was rejected in favour of a cheaper and quicker alternative that emerged as the simulation progressed.

Deregulating Railroads

A major US railroad faced with the threat of deregulation employed a policy Sim for its top management to better understand the implications of deregulation. Through the simulation new opportunities were envisioned. The exercise was then used to lobby members of Congress and to enlist the support of competing transport systems.

Strategising in a University Hospital

A University Hospital devolved its organisation structure into eleven new divisions. However, no one took responsibility for the hospital as a whole. As a result of the policy simulation, hospital management became more aware of these problems and devised proposals for productive decision-making vital for collective success in the future.

Reorganising the Office of the Secretary of Defense

Colin Powell, as the new Chair of the Joint Chiefs of Staff, elected to review the organisation of the Office of the Secretary of Defense. The Army, Navy, and Air Force submitted different plans based on their own vision. A policy simulation compared the three proposals. The simulation enabled the successful negotiation of a single compromise plan.

Management Information in a Governmental Social Program

A policy simulation helped the Dutch National Social Employment Program to develop a strategic Management Information System (MIS) that supported the introduction of a radically different system of budget financing. The policy exercise resulted in proposals for several profound changes in the MIS.

Science policy for the Great Lakes Ecosystem

The International Joint Commission (IJC) on the Great Lakes adopted an ecosystems approach to establish research priorities for the Great Lakes basin. This required a shared framework for an interdisciplinary science—policy dialogue that included both human and natural systems. The IJC policy simulation developed research policies and communicated these to stakeholders.

Cultural change within the Technical Components Industry

A big American automotive firm had elected to spin off a major component division to compete with other major automotive suppliers. Management used a policy simulation to support a highly interactive learning process that would permit the group, through self-discovery, to identify new opportunities to learn and to practice new skills.

Restructuring a National Health Care System

Drastic proposals to bring market mechanisms into the UK's national health system drew serious concerns from managers, clinical staff and policy-makers in Cambridge. They engaged in a Sim, the results of which were disastrous. Participants and commentators were convinced that what happened in the Sim would occur in practice. The results received regional and national attention.

Annexure 2.8: SIIRAN: A Simulation of Complex Negotiations[63]

Author: Roberts, J.C. (2006). SIIRAN: A Simulation of Complex Negotiations. Paper presented at the 47th annual meeting of the International Studies Association. San Diego, CA. March.

Abstract

Complex negotiations occur when players must negotiate positions within groups before they negotiate positions between groups. Such negotiations are common in business, international relations, and interest politics.

SIIRAN models these negotiations with a scenario in which players are organised into groups representing an oil rich country and two oil companies. The companies must negotiate new leases with the country while all sides must maintain a balance of conflicting interests within the groups. Within each company team, players have competing interests that represent the CEO, the stockholders, and the workers. Within the government of Siiran, players have competing interests between the dominant party and a weaker party in a coalition government. Play proceeds as each company team makes bids to operate existing wells in Siiran for the coming year. Before the company teams can successfully negotiate with Siiran, they must negotiate internally to determine a bidding strategy. Scoring of the bidding results permits cooperative outcomes in a competitive setting. Each team models its bids using a computer worksheet (hard copy worksheets can also be used).

The goal of the simulation is to teach the players what it is like to engage in negotiations with external groups while keeping competing internal interests at bay. SIIRAN can be used to train midlevel managers in the intricacies of such negotiations or to teach students about bureaucratic politics.

Playing time is 30 minutes for briefing, 60 minutes for play, and at least 30 minutes for debriefing.

SIIRAN: A Simulation of Complex Negotiations (James C. Roberts, Towson University & Syracuse University)

Basic Data

- **Instructional objective:** to learn strategies for complex negotiations where bargaining must take place within groups before bargaining can be conducted between groups.
- **Game Objective:** for each player to achieve his or her winning condition, which varies from player to player.
- **Target Audience:** adult or teen players who need to learn negotiation strategies.
- **Playing time:** 90 minutes: 30 minutes to brief and 60 minutes to play.
- **Debriefing time:** 30-60 minutes.
- **Number of Players:** 9–20; ideally 12.
- **Materials Required:** bid and contract forms and three computers running Microsoft Excel-compatible spreadsheet programs, or bid modelling and bid evaluation forms. All forms and worksheets are available at: www.towson.edu/~roberts/siiran
- **Equipment:** if available, three computers running spreadsheet programs that can read Microsoft Excel worksheets.
- **Room Setup:** a large room that can be separated into three areas, or three separate rooms near each other.

[63] Retrieved March 1, 2012 from: http://citation.allacademic.com/meta/p_mla_apa_research_citation/0/9/8/7/5/pages98757/p98757-1.php

Introduction

The purpose of this simulation is to introduce students to the problems of complex negotiations in which bargaining between groups depends on positions reached through negotiations within each group. The scenario concerns two international oil companies negotiating for oil leases with a small Middle Eastern country. The scenario establishes competing interests within each of these groups that must be addressed as the bargaining for leases goes on between the groups.

Siiran is a small fictitious Middle Eastern country with a wealth of oil deposits that are currently being developed by two international oil companies, Wilson Petroleum and Advantec Petrochemical. Siiran has just undergone a change of government at the same time that the oil leases for the two companies are to be renewed. The new coalition government comprises two parties: the major party generally supports a continuation of the oil leases with the international companies; the minor party represents workers and wants to nationalise the oil industry. The government will fall if either party withdraws from the coalition. The two companies are similar in structure, although the costs of their operations vary. Each company faces the difficult problem of negotiating the new leases with Siiran while bargaining with competing interests within the corporate structure.

Play of the game proceeds as a series of bids submitted by each company to Siiran for operating the wells, followed by Siiran's response. The bids and the responses must first be negotiated within each company and within Siiran.

Players are divided into three teams with, ideally, four players on each team. The number of players can be increased either by adding an additional labour representative to each team or by adding one more company team. The teams are composed of the following roles:

1. SIIRAN: a small, oil-rich country somewhere in the Middle East.
    a. President
    b. Negotiator
    c. Members of parliament from the major coalition party
    d. Members of parliament from the minor coalition party

2. ADVANTEC PETROCHEMICAL INTERNATIONAL: a multinational oil firm that operates oil wells and ships and sells oil products.
    a. Chief Executive Officer (the boss)
    b. Negotiator
    c. Chief Financial Officer
    d. Labour Union Representative

3. WILSON PETROLEUM COMPANY: a multinational oil firm that operates oil wells and ships and sells oil products.
    a. Chief Executive Officer (the boss)
    b. Negotiator
    c. Financial Officer
    d. Labour Union Representative

Flow of the Game

Play begins with each company submitting a bid on well licenses and the operation of wells by completing a Bid Form. The time of the bid and name of the company must be placed at the top of the form. For each well on which the company intends to bid, the form should show the license fee that the company is offering and the proportion of operation proposed by the company. These bids are reviewed by Siiran, which can present

counter-offers or reject the bids outright. Companies may negotiate with each other to present joint bids or they can compete for the wells. The bid/response process continues until Siiran finds a set of bids that it is willing to accept. When agreements have been reached, a Contract Form must be completed and signed by the appropriate parties. Bargaining among competing interests within each team continues throughout this iterative bid/response process. The simulation ends either when an agreement is signed for all wells or at the end of 60 minutes of play.

Calculations and results can be modelled for each team using Excel worksheets or they can be computed using the Company Bid Modeling Form and Siiran Bid Evaluation Form. Initial conditions should be given to each team at the start of the simulation. Each team's information should be kept secret from the other teams, since bargaining positions vary from team to team.

Rules regarding international negotiations:

- Only the Negotiator from a team may talk with members of another team. A Negotiator may talk with any member of another team at the discretion of that team's leader.
- The only items open to negotiations are:
  a. the number of wells operated by a company;
  b. the cost of a license per barrel;
  c. the proportion of operation of the well by a company (any well can be operated by any combination of the three teams); and
  d. the labor costs per barrel, which are negotiated within each team.
- Any team that operates a well incurs its costs and accrues its revenue. If a company enters into a joint operation agreement, it shares the costs and the profits with Siiran or the other company, pro-rated by the proportion of its operation.
- Costs are calculated only in terms of labor and the license fee. Both costs are calculated per barrel. Revenue is calculated as the price per barrel multiplied by the well output.
- The sale price of the oil is set at $55 per barrel and it is not negotiable. Production levels are set and remain constant for each well. There is no drilling for new oil. All oil is sold.
- All agreements must be written and signed by the appropriate parties.
- All calculations of fees, wages, and operation are for a one-year period commencing at the end of the simulation. That is, players are negotiating for the future, not the present.
- Operation of any well that has does not have a renewed license agreement reverts to Siiran at the end of the simulation.

Rules regarding decision-making within Siiran:

- The President directs negotiation through the negotiator and signs any agreements.
- The Minor Party member(s) may choose to withdraw from the government by giving a NO CONFIDENCE card to the facilitator. This shuts down all negotiations until the Minor Party member takes back the NO CONFIDENCE card from the facilitator.
- Winning conditions vary by player. The President, Negotiator, and Major Party Members win if they increase Siiran profits. The Minor Party Member(s) win if they increase Siiran's labour costs (they represent workers).

Rules regarding decision-making within each company:

- The CEO makes decisions for the company and signs any agreements.
- The Financial Officer may elect to withdraw support for the CEO. If this happens, the CEO and Financial office might switch positions at the facilitator's discretion.

- The Labour Representative may elect to go on strike by giving a STRIKE CARD to the facilitator. This shuts down all negotiations until the Labour Representative takes back the STRIKE CARD from the facilitator.
- Winning conditions vary by player. The CEO and the Negotiator win if they increase the company's revenue. The Chief Financial Officer wins if he/she increases the company's profits. The Labour Representative(s) wins if he/she increases the company's labor costs.

Notes to the Facilitator

SIIRAN is an open simulation with little restriction on players' activities outside the rules of the game specified above. This means that players will often be innovative and adventurous in conducting negotiations. SIIRAN was developed in a simulation workshop at Syracuse University. Over the years the graduate students in this workshop, all students of international affairs, have come up with solutions that include proposals for military threats, direct foreign aid from fictitious external countries, and proposals for a company to hire local Siiran workers, which are not modelled by the simulation. Some players have attempted to edit the worksheets to change the calculation of results. The facilitator must judge whether or not to reign in adventurism. Innovation should be encouraged, but not to the level that it steps outside the model or threatens the flow of the game.

While the Bid Modelling Form and Bid Evaluation Form work satisfactorily, it is highly recommended that players use the computer worksheets to model and prepare their bids and responses. With use of computers SIIRAN is a fast-paced simulation: the computer worksheets permit players to focus on the negotiations rather than the mechanics of the bids. Most players today are familiar with worksheet programs, and laptops are commonplace.

Although negotiations may be fast-paced, players are often reluctant to commit themselves by submitting bids. The facilitator can set a deadline for the first bid, but it is better if the facilitator encourages the Siiran team to set the deadline. This establishes the proper hierarchy of teams by emphasising that the companies must please the country. The facilitator should move with the game. That is, in order to conduct the debriefing properly the facilitator must know what deals are being negotiated and therefore must be present in discussions between teams. It is the facilitator's discretion to decide whether or not a player increases his or her condition enough to score a win.

Variations

SIIRAN is best played with three teams comprising four players each. It can be played with as few as nine players or with as many as twenty. Reduce the number of players by doubling up duties. For example, the negotiator could also play the role of the labor representative or the Chief Financial Officer. Increase the number of players to sixteen by adding an additional labour representative or minor party member. For over fifteen people it is recommended that a third company team be added rather than expand the size of each team. Teams with greater than five players become unwieldy and quiet players are often left out of the negotiations. The initial conditions are set to establish different bargaining positions for each team. These conditions can be altered to model different relationships between the teams.

Debriefing

The facilitator should begin the debriefing by summarising the flow of negotiations and indicating which teams were successful (or not) at obtaining a contract. Describe the evolution of the outcome. It is useful to make the final Contract Form available for all the players to see. At this point in the debriefing, explore the players' initial impressions of the simulation with questions such as the following:

- What did you think about the simulation as a whole?
- What aspects of negotiations within your team did you find most frustrating?

- What aspects of negotiations between the teams did you find most frustrating? It is important to get inside the thinking of each team. Ask each team first to explain their negotiating strategy and then to describe the individual decisions that brought them to the conclusion of the simulation. At this point in the debriefing, try to focus on individual teams and suppress discussion between the teams. Questions that might work at this point include:
- What was your overall strategy?
- What agreement did you make with your labour representative (or minor party member)?
- What did you do to implement your strategy?

Next, explore the interactions between the teams. The facilitator should direct pointed questions to each team about why they chose to make specific decisions during the simulation. Interaction between the teams should be encouraged at this point. Focus on the actions of individual players as well as the team as a whole. Often, misperceptions about other teams' actions and motives will be revealed at this point. Explore these misperceptions and how they affected the play of the game.

Finally, discuss the mechanics of the game and the achievement of learning objectives. Remind the players that the purpose of SIIRAN is to learn about the process of complex negotiations, not the international oil business. Questions that might be used include:

- What were your major frustrations and problems in the game?
- Did the forms or the worksheet facilitate or obstruct your play of the game?
- How did the negotiations within your team affect your negotiations between the teams?

Conclude the debriefing by letting the players free associate about the play of the game. Encourage them to focus on what worked and what did not.

The Development of Siiran

Siiran was developed for the Workshop in Simulation Design for Conflict Analysis in the MA in International Relations program at Syracuse University. The simulation workshop was part of a suite of one-credit intensive weekend skills courses. Students in the professional MA program were required to take three of these one-credit courses during their studies for the Masters degree. Other one-credit courses included courses in teleconferencing, web design, and presentation software.

The purpose of the workshop was to teach the elements of simulation for understanding conflict analysis. Siiran was developed to accomplish two objectives within the course. First, the instructor lectured on the process of designing and implementing simulations for training and research using Siiran as an example. Topics covered included: identifying audiences, objectives and goals; developing the core interactive model; developing rules and resources for the simulation; and briefing and debriefing strategies. Second, the students played Siiran to experience a simulation first-hand. The workshop concluded by dividing the students into groups. Each group was responsible for developing a simple simulation overnight to play with the other students the next day.

The students found the course to be useful and they found Siiran to be a valuable part of the course. Data from five years of course evaluations are shown in table 1 below.

Enrollment varied from eight to forteen students. A total of 45 surveys were collected over the years from 2001–5. The questions on the survey were scaled accordingly: 4=excellent, 3=good, 2=fair, and 1=poor.

Table 1. Siiran Simulation Student Evaluations

Question	Number of Respondents	Percent Excellent	Average on 4-point Scale
The lectures on designing simulations	43	67.4%	3.67
The instructions on playing Siiran	45	68.9%	3.64
The utility of the Siiran Instruction Analog	43	55.8%	3.51
The amount you learned from Siiran	45	65.4%	3.64
Overall quality of the workshop	45	82.2%	3.82

One comment written on an evaluation made all of the effort worthwhile: "After having been in so many simulations I thought it would be much easier to run one. Now I know I need to pay attention!"

Syracuse no longer offers the *Simulation Design for Conflict Analysis* workshop in its curriculum. The Siiran simulation, however, is being used in a new course entitled *Qualitative Skills in International Relations*.

SIIRAN - A SIMULATION OF COMPLEX NEGOTIATIONS
BID FORM
Company Name: _____ **Time of Bid:** _____

WELL	WELL OUTPUT	PROPOSED LICENCE FEE In $ per barrel	PROPOSED OWNERSHIP BID In % of Operation
1	100		
2	200		
3	100		
4	300		
5	200		
6	400		
7	500		
8	200		
9	100		
10	300		
11	100		
12	400		
13	200		
14	300		

CONTRACT FORM

This form is to be submitted by the Siiran Group: submission of this form ends the simulation.

				Required Signatures (initials will do)		
1. Well	**2. Proportion Operated by Advantec**	**3. Proportion Operated by Wilson**	**4. Licence Fee**	**5. President of SIIRAN**	**6. Advantec CEO (If col. 2 > 0)**	**7. Wilson CEO (If col. 3 >0)**
1						
2						
3						
4						
5						
6						
7						
8						
etc.						
14.						

COMPANY BID MODELLING FORM

Current Labour Costs (LC) _____ Time of this Proposal _____

A. WELL	B. WELL OUTPUT	C. PROPOSED OPERATING PROPORTION (show in 2 decimals, e.g. 25% as .25)	D. PROPOSED LICENCE FEE FOR EACH WELL	E. REVENUE OF PROPOSED BID (55 * B * C)	F. LABOR COSTS OF PROPOSED BID (B * H * LC)	G. LICENCE COSTS OF PROPOSED BID (B * H * D I)	H. PROFITS FROM PROPOSED BID {E - (F +G)}
1	100						
2	200						
3	100						
4	300						
5	200						
6	400						
7	500						
8	200						
9	100						
10	300						

11	100						
12	400						
13	200						
14	300						

SIIRAN BID MODELLING FORM

Bid Submitted By: _____ **Time of Bid:** _____

		ADVANTEC BID		**WILSON BID**		**SIIRAN**				
A. Well	B. Well Output	C. %	D. Licence Fee	E. %	F. License Fee	G. % Operated by Siiran 1- [C+E]	H. Labour Cost B * G * LC	I. Fee Revenues B*[C*D+E*F]	J. Revenue From Oil G * 55	K. Profits (I + J) - H
1	100									
2	200									
3	100									
4	300									
5	200									
6	400									
7	500									
8	200									
9	100									
10	300									
11	100									
12	400									
13	200									
14	300									
TOTALS										

INITIAL INFORMATION FOR EACH TEAM

WELL	WELL OUTPUT	OPERATED BY:	CURRENT LICENCE FEE PER BARREL:
1	100	ADVANTEC	$22
2	200	ADVANTEC	$22
3	100	ADVANTEC	$22
4	300	ADVANTEC	$22
5	200	ADVANTEC	$22
6	400	ADVANTEC	$22
7	500	WILSON	$22
8	200	WILSON	$25
9	100	WILSON	$25
10	300	WILSON	$25
11	100	WILSON	$25
12	400	WILSON	$25
13	200	SIIRAN	N/A
14	300	SIIRAN	N/A

Annexure 2.9: Sample Foreign Policy Crisis Simulation Syllabus

PAUL H. NITZE SCHOOL OF ADVANCED INTERNATIONAL STUDIES
The Johns Hopkins University
Crisis Simulation 2010-2011
Fall 2010
Professor Andrew Hoehn

LECTURER MARA KARLIN

Office hours generally occur immediately before and after class, or by separate arrangement.

Mr. Hoehn can be reached by telephone at (703) 413-1100 x5916 and by e-mail at: hoehn@rand.org

Ms. Karlin can be reached by telephone at (414) 350-7851 or by e-mail at: marakarlin@gmail.com

For class-wide communications, please use crisis-sim@rand.org

I. COURSE OBJECTIVES

- identify key factors motivating principal actors during international crises through the use of a comparative case study approach;
- develop working knowledge of crisis scenario design and management of a foreign policy crisis simulation;
- Sharpen policy analysis skills through reading and writing assignment.

II. SCHEDULE

Week 1. (Aug 30) Introduction to Crisis Simulation (Hoehn and Karlin)

- Discuss history and purposes of simulation in the foreign policy context.
- Role of the control group, players, and press.
- Expectations regarding participation and assignments.

Lincoln Bloomfield and C.J. Gearin, "Games Foreign Policy Experts Play: The Political Exercise Comes of Age," *Orbis*, Winter 1973, pp. 1008-31.

Alexander George, "Crisis Management: The Interaction of Political and Military Considerations," *Survival*, September/October 1984, pp. 223-34.

Aaron Levin, "Virtual Crisis," *Johns Hopkins Magazine*, June 1992, pp. 7-13.

Week 2. (Sept 13) Making Decisions Through Memos; Simulations as a Tool of Policy Analysis; Simulation Design Exercise

Scott Stossel, "North Korea: The War Game," *The Atlantic Monthly*, July/August 2005

Clive Thompson, "Can Game Theory Predict When Iran Will Get the Bomb?" *The New York Times Magazine*, 12 August 2009. (http://www.nytimes.com/2009/08/16/magazine/16Brucet.html?pagewanted=all)

Greg Jaffe and Karen DeYoung, "U.S. Tested 2 Afghan Scenarios in War Game," *The Washington Post*, October 26, 2009. http://www.washingtonpost.com/wpdyn/content/article/2009/10/25/AR2009102502633.html

David Ignatius, "Who Loses the Iran Game," *The Washington Post*, December 6, 2009. http://www.washingtonpost.com/wpdyn/content/article/2009/12/04/AR2009120403074.html

Kenneth M. Pollack, "Osiraq Redux: A Crisis Simulation of an Israeli Strike on the Iranian Nuclear Program," *The Brookings Institution*, February, 2010. http://www.brookings.edu/reports/2010/02_iran_israel_strike_pollack.aspx

David E. Sanger, "Imagining an Israeli Strike on Iran," *The New York Times*, March 26, 2010.
http://www.nytimes.com/2010/03/28/weekinreview/28sangerintro.html?pagewanted=all

Eliot Cohen, "Some Thoughts on Writing"
http://www.sais-jhu.edu/academics/functional-studies/strategic/cohen/writing.htm

Week 3 (Sept 20) Manipulation of Risk: The 1973 Arab-Israeli War (Hoehn and Karlin)

Thomas Schelling, *Arms and Influence*, Yale, 1966, pp 92-125.

Michael Oren, *Six Days of War*, Chapter 11, pp. 305-27.

Michael Dobbs, "Cool Crisis Management? It's a Myth. Ask JFK." *The Washington Post* 22 June 2008.

David Korn, *Stalemate: The War of Attrition and Great Power Diplomacy in the Middle East*, 1967-1970, pages 89-98; 116-119; 143-204; 225-78.

William Quandt, *Peace Process*, pp. 148-182.

UNSCRs 242 and 338:
http://www.yale.edu/lawweb/avalon/un/un242.htm
http://www.yale.edu/lawweb/avalon/un/un338.htm

Graham Allison and Philip Zelikow, *Essence of Decision: Explaining the Cuban Missile Crisis*, Longman, 1999 (excerpts to be assigned).

Week 4 (Sept 27) What's Our Vision of the World? What's Our Question? (Hoehn & Karlin)

Kennedy, Paul. *Preparing for the Twenty-first Century*, Vintage, 1994.

Fareed Zakaria, *The Post American World*, W.W. Norton, 2008.

Thomas L. Friedman, *The World Is Flat: A Brief History of the Twenty-First Century*, Farrar, Straus, and Giroux, 2005.

Charles Krauthammer, "The Unipolar Moment," *Foreign Affairs* 1990/91.

Christopher Layne, "The Unipolar Illusion Revisited: The Coming End of the United States' Unipolar Moment." *International Security* 31, no. 2 (2006): 7-41.

Parag Khanna, "Waving Goodbye to Hegemony," *The New York Times Magazine*, 27 January 2008.

Mahbubani, Kishore, *The New Asian Hemisphere: the Irresistible Shift of Global Power to the East*, Public Affairs, 2008.

Krepinevich, Andrew, *7 Deadly Scenarios: Military Futurist Explores War in the 21st Century*, Bantam, 2009.

Mandelbaum, Michael. *The Case for Goliath: How America Acts as the World's Government in the Twenty-First Century*, PublicAffairs, 2006.

Week 5 (Oct 4) What's Our Vision of the World II? What's Our Question II? Simulation Administrivia (Hoehn and Karlin)

This class will include short group presentations on students' visions of the world being simulated, and a larger group discussion to establish the parameters of this world.

Week 6 (Oct 11)

Federal Holiday: no class.

Week 7 (Oct 18) Simulation Design and Execution (Hoehn and Karlin)

This class will include discussion about simulation designs. Game designs will be distributed prior to the class meeting.

Week 8 (Oct 25) Crisis Decision Making – September 11, 2001 (Mr. Frank Miller)

The 9/11 Commission Report, W.W. Norton, 2004, pp. 1-46; 325-38.

Clarke, Richard A. *Against All Enemies: Inside America's War on Terror*, Free Press, 2004, pp. 1-34.

Whittaker, Alan G., Smith, Frederick C., & McKune, Elizabeth (2007). *The National Security Policy Process: The National Security Council and Interagency System*. (Research Report, November 2006 Annual Update). Washington, D.C.: Industrial College of the Armed Forces, National Defense University, U.S. Department of Defense (skim).

Week 9 (Nov 1) Crisis Decision-Making II: A Policymaker's Perspective (Speaker TBD)

Kissinger, Henry. *White House Years*, Little, Brown, 1979, pp. 1-70 (esp. 17-70).

Rodman, Peter W. *Presidential Command: Power, Leadership, and the Making of Foreign Policy from Richard Nixon to George W. Bush*, New York: Alfred A. Knopf, 2009 (final chapter on lessons learned).

Week 10 (Nov 8) Gaming and Simulation Roundtable (outside speakers)

Simulation (Hoehn and Karlin)

The first hour of this class will feature speakers from the gaming and simulation community. Speakers will focus on the role of gaming and simulation; how to structure effective simulations; procedures for adjudicating moves; and assessing simulation results.

The second hour of this class will involve a class-wide simulation.

Frederic Wehrey, David E. Thaler, Nora Bensahel, Kim Cragin, Jerrold D. Green, Dalia Dassa Kaye, Nadia Oweidat, Jennifer Li, "Dangerous but not Omnipotent: Exploring the Reach and Limitations of Iranian Power in the Middle East," RAND, 2009 (entire). (free PDF available online at: http://www.rand.org/pubs/monographs/MG781/)

Patrick Clawson and Michael Eisenstadt, "The Last Resort: Consequences of Preventative Military Action Against Iran), The Washington Institute for Near East Policy, 2008 (entire). (free PDF available online at: http://washingtoninstitute.org/pubPDFs/PolicyFocus84.pdf)

Week 11 (Nov 15) Scenario Proposals (Hoehn and Karlin)

Student presentations.

Week 12 (Nov 29) Scenario Selection (Hoehn and Karlin)

Week 13 (Dec 6) Simulation Planning (Hoehn and Karlin)

Game dates: TBD

There will also be a 5-8:30 pm meeting tentatively set for January 26, 2011 (after winter recess), with dinner provided. This session will include the final selection of players, a detailed planning of crisis preparation, and the weekend simulation itself.

III. WRITING ASSIGNMENTS

A. Two short papers (not more than three single-spaced pages) making a policy recommendation to the President. Paper should be written from the standpoint of a member of the National Security Council or the White House Chief of Staff. Papers will:

- Outline issue or concern
- Discuss options (include brief coverage of pros and cons)
- Recommend a course of action and steps needed to implement course of action

Papers will address topics covered in weeks 3 and 8. Papers will be due the week following the discussion (e.g. week 3 topic due week 4). Please bring two hard copies of your paper to class for the instructors.

B. One short paper (no more than one single-spaced page) outlining five characteristics of the simulation's world and a five-minute presentation on this topic. Papers should be emailed to all class members by 0900 on 2nd October so that all students have an opportunity to peruse them. Please bring two hard copies of your paper to class for the instructors.

C. Scenario presentation (include scenario sequence and key players) to be considered for use during the Crisis Simulation weekend. The draft scenario will include a brief description of the question to be tested (Week 5 discussion); the world situation leading up to the crisis; precipitating events; and four specific scenario moves that would provide the context for the simulation. Details will be discussed in Week 4. Presentations will be given to the class on Week 11. Group presentations are encouraged.

D. One Op-Ed (not more that 800 words) seeking to influence consideration of options (including constraint of options) regarding topics discussed during Weeks 2, 3, 8, or 9. Students have the option of addressing a different topic, but only if approved in advance by Professor Hoehn or Ms. Karlin. Paper will be due one week during Week 10. Please bring two hard copies of your paper to class for the instructors.

E. Threat/Situation Report to be used in Crisis Simulation. Details to be discussed in Weeks 10, 11, 12, 13.

Annexure 2.10: Readings for national security specific simulations

Further reading in NSPM Simulations

Alker, Jr, Hayward, R., & Brunner, R. D. (1969). Simulating international conflict: A comparison of three approaches. *International Studies Quarterly* 13 (1) March: 70-110.

Anderson, Robert H., & Hearn, A. C. (1996). *An exploration of cyberspace security R&D investment strategies for DARPA: "the day after... in cyberspace II".* Santa Monica: RAND Corporation.

Andreozzi, G. (2002). *Manhattan 2001 political-military game.* Fort Belvoir: Center for Army Analysis.

Babus, S., Hodges, K. & Kjonnerod, E. (1997). "Simulations and Institutional Change: Training US Government Professionals for Improved Management of Complex Emergencies Abroad" *Journal of Contingencies and Crisis Management*. 5: 231-40.

Beriker, N, & Druckman, D. (1996). Simulating the Lausanne peace negotiations, 1922-1923: Power asymmetries in bargaining. *Simulation & Gaming* 27(2) June): 162-83.

Brewer, G. (1984). Child of Neglect: Crisis Gaming for Politics and War. *Orbis, A Journal of World Affairs,* 27(4) Winter: 803-12.

Caffrey, L. M. J. (2000). Toward a history-based doctrine for wargaming. *Aerospace Power Journal* 14(3): 33-56.

Hanley, J. T. (1991). On war gaming: A critique of strategic operational gaming. Unpublished Ph.D dissertation, Yale University.

Kahan, J. P., Lawrence, M. F. Darilek, R. E., Jones, W. M., Platt, A. A., Romero, P. J., Schwabe, W. & Shlapak, D. A. (1987). *Testing the effects of confidence- and security-building measures in a crisis: Two political-military games.* Santa Monica: RAND Corporation.

Kahan, J. P., Rydell, C. P & Setear, J. (1995). A game of urban drug policy. *Peace and Conflict: Journal of Peace Psychology* 1, (3): 275-90.

Lartigue, L.J. (2008) *Wargaming and the Interagency*. Carlisle Barracks: U.S. Army War College

Lempert, R. J., & Schwabe, W. (1993). *Transition to sustainable waste management: A simulation gaming approach.* Santa Monica: RAND Corporation.

Mandel, R. (1977). Political gaming and foreign policy making during crises. *World Politics* 29, (4): 610-25.

McCown, M. M. (2005) Strategic Gaming for the National

Security Community. Joint Forces Quarterly, 39: 34-9

McCown, M. M. (2009) "Designing Exercises for Teaching and Analysis" *Joint Force Quarterly*, 55: 4: 173-5.

McCown, M. M. (2009a) "War gaming the 21st Century" *Joint Force Quarterly*, 52: 1.

McCown, M. M. (2009b) "Gaming the 21st Century: What to Game?" *Joint Force Quarterly*, 54: 3.

McCown, M. M. (2010) "Analyzing Global Strategic Challenges: Wargaming the Flu". *Joint Force Quarterly*, 56: 1.

Millot, M.D., Molander, R. & Wilson, P.A (1993). "*The day after..." study: Nuclear proliferation in the post-cold war world.* Santa Monica: RAND Corporation

Robinson, C., Tomisek, S. & Kligge, K. (2009), "Perspectives from Fragile Crescent: A South Asia Crisis Simulation." *INSS Proceedings*.

Starkey, B. A., & Blake, E. L. (2001). Simulation in international relations education. *Simulation & Gaming* 32, (4) (December 1): 537-51.

Thomas, M.A. (1982). *An energy crisis management simulation for the state of California.* Santa Monica: RAND Corporation.

Annexure 2.11: Game web links

All links are operative as at March 3, 2012

Game/simulation title	URL
ABC (Aust.) Serious Games Initiative	http://www.abc.net.au/tv/seriousgames/examples.html
All About U	www.allaboutu.org.uk/
America's Army	www.americasarmy.com/
Ardcalloch	www.ardcalloch.ggsl.strath.ac.uk/introduction/
ARQuake	http://wearables.unisa.edu.au/projects/arquake/
Ben's game	www.makewish.org/site/pp.asp?c=bdJLITMAE&b=81924
Big Game	www.thebiggame.org/
Brain Trainer	www.brain-trainer.com/
Brigadoon	http://braintalk.blogs.com/brigadoon/2005/01/about_brigadoon.html
Business Game	www.btplc.com/Societyandenvironment/Businessgame/index.htm
Campus: Second Life	http://secondlife.com/education
Civilisation III	www.civ3.com/
Dr Kawashima's Brain Training: How Old Is Your Brain?	www.braintraining.com.au/
Environmental Detectives	http://education.mit.edu/ar/ed.html
Everquest	http://eqplayers.station.sony.com/index.vm
EyeToy	www.eyetoy.com/shared/locale.asp?returnURL=/index.asp
Far Cry	www.farcry-thegame.com/uk/home.php
Full Spectrum Command	www.ict.usc.edu/content/view/56/108/
Full Spectrum Warrior	www.fullspectrumwarrior.com/gm_faq.php
Future of City Centres 2025	http://scenariothinking.org/wiki/index.php/Future_of_the_City_Centre_2025
Grangeton	www.grangeton.com/
Hazmat: Hotzone	www.etc.cmu.edu/projects/hazmat_2005/screenshots.php?page=0

Game/simulation title	URL
Homicide	www.homicidethegame.com/
Key skills trainer	www.keyskills4u.com/
Knights of Honor	www.knights-of-honor.net/
Live2Give	http://secondlife.com/
Majestic	http://en.wikipedia.org/wiki/Majestic
Mekong e-Sim	http://services.eng.uts.edu.au/~robertm/mekong/default.htm
Myst	www.riven.com/myst_home.html
Neverwinter Nights	http://nwn.bioware.com/
~~Nitrogenius~~	~~http://www.spreegames.com/node/30~~
Oaklands Game	www.unigame.net/html/project_game.html
Outbreak Quest	www.academiccolab.org/resources/documents/OutbreakQuest.pdf
Pulse!!!	www.sp.tamucc.edu/pulse/index.shtml
Quake 4	www.quake4game.com/
Racing Academy	www.futurelab.org.uk/download/projects/racing_academy.php
Re-Mission	www.re-mission.net/
Revolution	www.educationarcade.org/revolution
Roller Coaster Tycoon 3	www.atari.com/rollercoastertycoon/
Savannah	www.futurelab.org.uk/showcase/savannah/index.htm
ScudHunt	www.scudhunt.com/
Second Life	http://secondlife.com/
Sim City	http://simcity.ea.com/
Sims 2	http://thesims2.ea.com/
Skillswise	www.bbc.co.uk/skillswise/
SnowWorld	www.hitl.washington.edu/projects/vrpain/
Strike and Retrieve	www.mofunzone.com/download_games/nte_strike_and_retrieve.shtml
Student Survivor	www.studentsurvivor.org.uk/2/
Supafly	http://ieeexplore.ieee.org/iel5/7756/33539/01593575.pdf?isnumber=&arnumber=1593575
Supercharged!	www.educationarcade.org/supercharged
Theme Hospital	http://compsimgames.about.com/od/themehospital/
Ultima Online	www.uo.com/

Game/simulation title	URL
Unigame	www.unigame.net/
Urban Tapestries	http://urbantapestries.net/weblog/
Virtual Hallucinations	http://secondlife.com/
Virtual Leader	www.simulearn.net/leadershiptraining.html
Webwise	www.bbc.co.uk/webwise/
Wireless Explorer	http://newsroom.cisco.com/dlls/2005/prod_081605b.html
World of Warcraft	www.worldofwarcraft.com/
PROJECTS	
Making Games	www.childrenyouthandmediacentre.co.uk/projects.asp?Completed=no&TableName=Overview&RowID=6&ResearchProjectsID=35
Mlearning project	www.m-learning.org/
Mobilearn	www.mobilearn.org/
Serious Games- Engaging Training Solutions	www.londonknowledgelab.ac.uk/graphics/projectsheets/sg.doc
Virtual Reality (VR) Assessment & Treatment of Combat-Related Post-Traumatic Stress Disorder (PTSD) project	www.ict.usc.edu/content/view/31/84/
TECHNOLOGY/TOOL	
Game Maker	http://www.gamemaker.nl/
Magic Wall	http://www.cs.umd.edu/hcil/kiddesign/
StoryRooms	http://www.cs.umd.edu/hcil/kiddesign/storyrooms.shtml
WEBSITES	
Consensus Building Institute	http://cbuilding.org/cases
MySpace	http://www.myspace.com
Social Impact games	http://www.socialimpactgames.com/
Spree Games	http://www.spreegames.com/node/41

Annexure 2.12: Case study: The Press Briefing

The case study below outlines a role-play designed for first-year undergraduates undertaking a business studies degree. Students' reflection on the role-play is assessed within a module entitled Global Business Context. This module replaced a more traditional course in introductory economics and seeks to inform students about competitive aspects of the global environment for business. The module places a strong emphasis on understanding the motivation of stakeholders and the implications of their actions for business. It is straightforward to identify stakeholders in international trade: governments, businesses, consumers, workers in different countries, NGOs, etc., and contrasting viewpoints on the benefits of international trade are often presented in stark terms. For these reasons it was decided that a role-play would help students to investigate issues in international trade in an interesting way.

The detailed instructions given to students are presented in a handout (see below). Students are asked to work in groups. Each group chooses one issue in international trade as their focus, and the group as a whole is required to research that issue from the standpoint of a specified stakeholder. They are required to provide a press release and a press information pack and to make a presentation as if they were that stakeholder.

The role-play takes the form of a press conference, where the conference presentation must be given in role, and the relevant supporting materials must also reflect the presenting group's perspective. The press release provides an abstract of the group's position. It is to be given out at the time of the press conference, and students are to be advised that the media will base their choice of headline on the content of the press release. The press pack contains the details and offers an in-depth analysis of the group's standpoint. Students are encouraged to use a variety of resources within the pack, including material written by the group, supporting articles from other sources, statistics, and suggestions of sources of further information (such as websites). Students are informed that the strength of the press pack is in how it adds to the relevance of the group's argument. The presentation—no longer than 15 minutes in length—needs to articulate the press briefing. As with the briefing and the press pack, the presentation must be undertaken in role.

Instructions to students on the Press Briefing role-play

Introduction

I am sure most of you have at some point in your life seen a press conference on TV. Well, for this assignment you have the opportunity to give one. As group members you will be expected to consider an issue in international trade, with each of you delivering a presentation to the rest of the group. The twist is that you will be expected to present to the group from the perspective of a given stakeholder, whose views may be fundamentally different from your own.

A detailed assignment brief is set out below: *please read it very carefully.*

What is being assessed?

This assignment consists of three assessed components:
- a press release (10%);
- a press pack (40%);
- a presentation (50%).

The press release. The press release should take the form of a single-sided A4, which is to be given out at the press briefing. The release should identify the main issues you support and the policies you propose, as well as

giving the media a headline!

The press pack. The press pack should offer the reader an in-depth analysis of your views and standpoint. It should include a wide variety of resources which you feel help to support your case. Such a press pack will include material written by the group, articles from other sources, statistics and research sources. The press pack should be well-structured and organised. It should include no more than 2000 of your own words (articles, statistics and research sources are in addition to this). The key to a good press pack is relevance and how it adds to your argument.

The presentation. The presentation must be no longer than 15 minutes in length. In this time you will be expected to outline your position on your given issue and make a case for your policy suggestions. The presentation must be in PowerPoint (a laptop and data projector will be provided). The presentation you make must be in role. It is not expected that you will present a balanced argument, but an argument from a particular viewpoint, expressing particular concerns and offering particular policy suggestions based upon these concerns.

Additional: group diary. Together with the submission of the press pack, each group must present a group diary. This should include a list of all group members, and a list of their responsibilities in the group work. The diary should also include a schedule of all group meetings, who was in attendance, who was absent, and why. The diary must be signed by all group members as recognition that its contents are accurate, and submitted along with the press pack.

Groups

Groups will be selected at random prior to your first meeting and will be no larger than five students. At your first meeting you will be given a Blackboard chat room password, unique to your group. This will enable you to keep in easy contact with one-another throughout the assignment. You are advised at this first meeting to schedule meeting times, devise a work schedule, and provisionally allocate work tasks. You might wish at this stage to appoint a team leader to oversee the group's efforts, to ensure that each team member is moving in the same direction, and that deadlines are kept. Alternatively, you might have a more devolved group structure in which all group members supervise everyone else. The choice is very much up to each group concerned. If you do adopt a group leader approach, this may result in additional rewards at the time of assessment (see below).

You must also decide, as a group, what is likely to be the most effective strategy in completing this assignment. This will invariably involve a division of labour following the initial phase of information gathering. Remember: your group will be more effective if you work together as a team.

The assignment is run to a very tight and short deadline: this is intentional. You are being put under pressure to turn the work around fast: a phenomenon that you will invariably experience throughout your working lives. You have only two weeks from your allocation into groups to your presentation, so it is crucial that you are well organised and have a clear focus on who is going to do what, and by what deadline.

Please note: it is the responsibility of students who fail to turn up in the week that groups are allocated to contact either me or their workshop tutor to determine who their group is, and then to contact their group. Failure to do so will result in a zero mark, unless extenuating circumstances can be proven. One final point regarding group work: in your group you must respect all group members and treat others as you expect to be treated yourself. Threatening behaviour of any sort will not be tolerated.

Topics

There are six topic areas identified that are currently significant issues in international trade. Each topic area must be considered from the perspective identified:

- Free trade and the environment: from the perspective of an environmental pressure group, such as Greenpeace.
- Child labour: from the perspective of a pressure group advocating its abolition, such as Save the Children.
- Genetically modified food: from the perspective of the EU.
- Trade-related intellectual property (Trips): from the perspective of a lobby group representing the interests of western business, such as the pharmaceutical industry.
- Bananas: from the perspective of an African, Pacific and Caribbean (ACP) banana producing country, such as the Windward Islands.
- Trade and less developed economies: from the perspective of the World Trade Organization (WTO).

On Blackboard there will be a discussion room set up for each topic. You are strongly advised to visit and contribute to the ongoing debates. This would be an excellent forum for exploring issues surrounding the role-play element of this assignment. What values and views would inform a perspective from Greenpeace, or the EU? How does this fit with your understanding?

Marking scheme: The following marking scheme should be considered when completing this work.

The press release
Clarity and organisation 50%
Headline potential 50%

The press pack
Content 40%
Organisation 20%
Presentation 20%
Resources used and sources discovered 20%

The presentation
Use of PowerPoint (visual) 30%
Clarity of presentation including content/organisation and communication 40%

Role play 30%

Marking and mark allocation

At the end of this assignment, each group of students will receive a pool of marks. The pool of marks will be derived by totalling the marks from the three assessment elements of the assignment: press release; press pack; and presentation. This total mark will then be multiplied by the number of group members. It will then be the group's decision to allocate such marks among group members as they see fit. The allocation of marks should reflect effort and the volume of work done. The allocation of marks must be confirmed to your group tutor within one week of the assignment pool mark being returned. Failure to agree on a mark allocation will involve a process of arbitration by other students in the class. In the event of failing to reach an agreement after such arbitration, then marks will be allocated in the final instance by me. Hopefully this will not be necessary.

One point of clarification on deriving the group's pool mark: if the group has five members, but one does not attend, then the group will be classified as having only four members. You will only be able to claim marks for the number of members that actually took part in the group work.

National Security College
The Australian National University
Acton ACT 0200
T 61 2 6215 6480
E national.security.college@anu.edu.au