

Pop Quiz: Assessing Knowledge Retention in International Relations With and Without Simulations

Luba Levin-Banchik*
Bar-Ilan University

In this paper I examine effectiveness of studying international relations with simulations, compared to active learning without simulations. I utilize a pop quiz on four topics, each taught with a different method: (1) simulation and in-class debriefing; (2) simulation only; (3) in-class discussions and an accompanying research essay; (4) in-class discussions only. I review simulation assessment in publications over the past sixteen years, and suggest pop quiz as a novel assessment tool for simulations. I then present the “Iranian Plane” simulation developed to teach decision making in crisis situations to international relations undergraduates. I analyze empirical evidence on knowledge retention with and without simulations based on students’ performance in the pop quiz two months after the simulation. The analysis shows that learning with simulation and debriefing together not only attains teaching goals set in advance, but does so better than other methods used. Simulation with debriefing was the most effective teaching mode in terms of knowledge retention, simulation only was almost as successful, but learning without simulation was significantly less efficient.

Keywords: assessment/evaluation, debriefing, simulation, active learning

Teaching and learning with simulations is fun. But do simulations contribute to students’ knowledge? Existing research gives mainly affirmative answer to this question, highlighting knowledge acquisition and skills development as immediate outcomes of simulations (Asal, Griffith and Schulzke 2014; DiCicco 2014; Elias 2014; Enterline and Jepsen 2009; Hatipoglu, Müftüler-Baç, Murphy 2014; Wilkenfeld and Kaufman 1993). This study focuses on long-term success of simulations, namely knowledge retention. It examines the effectiveness of studying international relations with simulations, compared to learning without simulations. The study suggests pop-quiz as a novel assessment technique, and presents findings from a pilot pop-quiz given to undergraduate students of “Introduction to International Relations” course at Israeli public research university two months past their simulation experience.

I begin this study with a review of assessment tools available in the simulation literature, and suggest pop-quiz as a potentially valuable addition to the existing pool of evaluation

techniques. Resting on previous research, I outline hypotheses on knowledge retention with and without simulations. I then specify the teaching goals set in advance before the simulation was constructed, describe the “Iranian Plane” simulation designed to meet these goals, and explain the methodology to test its effectiveness. The empirical section presents results from students’ performance in the pop-quiz, and addresses implications of these results for learning with and without simulation and for assessment by use of a pop-quiz. The findings clearly show that simulation with debriefing is the more efficient than teaching without simulation, as expected, and simulation without debriefing was only slightly less effective than simulation with debriefing. I argue that by the use of low-cost and non-punitive direct assessment techniques, such as pop-quiz, assessment of a simulation becomes an easy task from which both the educator and students can benefit.

Assessing Simulations Success: A Pool of Choices

Following Ben-Yehuda, Levin-Banchik, and Naveh (2015, 141), assessment is regarded in this study as “an activity in which the educator revisits simulation goals, grades students, and appraises the simulation project in terms of its study efficiency.” In light of this definition, a simulation is considered successful if it attains the goals set in advance by educator (Chin, Dukes, and Gamson 2009, 554). These goals may range from contributing to students’ knowledge (e.g. Horn, Rubin and Schouenborg 2015), which is the focus in this study, and to altering their attitudes (e.g. Stover 2007; Zappile, Beers and Raymond 2016), which is beyond the scope of this analysis.

How do we know the simulation was worthwhile and enhanced students’ knowledge? In their review of simulations assessment over forty years, Chin, Dukes, and Gamson (2009, 561) highlight that “there are no universal nor perfect data collection techniques for assessment.” Moreover, the term “assessment” itself is relatively new in the field of simulations, with most of the studies in the 20th century evaluating goal attainment without using this term (Chin, Dukes, and Gamson 2009, 554-5; Gosen and Washbush 2004).

In search for available assessment techniques of simulations in international relations, I reviewed all articles on simulations published in *International Studies Perspectives* from the journal’s first issue in 2000 and to the latest 17(1) issue in 2016. The search of term “simulation” returned 76 articles published in this period, of which 37 articles focused on simulation as a

primary topic. I systematically reviewed these roughly four dozen articles to identify whether and how they assessed their simulations.¹ The results of this overview are summarized in table 1.

Many of studies address assessment as integral part of simulation and clearly specify assessment methods. There is a considerable portion of other studies, however, that report simulation success but provide little indication of how they reach this conclusion.² Their reference to assessment, if exists, is very marginal and ambiguous. Effectiveness of simulations, per se and relative to other teaching methods, is a hidden assumption rather than a scientifically evaluated hypothesis. The reader is expected to believe the simulation is worthwhile based on the *subjective* judgment of its (probably biased) inventors. A little chance is given to the skeptical or cautious reader to use assessment data to replicate conclusions or independently decide if replication of the simulation can achieve specific teaching goals of a new user.

The issue of the subjective evaluation is also salient in studies that clearly specify assessment method. Table 1 reveals that the three most common ways to evaluate simulations are to consider (1) students' self-evaluation in simulation survey, (2) students' oral comments during post-simulation debriefing, and (3) a written essay which involves students' self-reflection paper or a research paper evaluated by educator. In other words, a typical way to assess simulations is to ask students to what extent *they perceive* they have learned, or to ask myself as an educator to what extent *I perceive* they have learned. This means that simulation is effective when the participants or educator *believe* it is such. Yet, if students' surveys are not-anonymous, which is often the case, they become inappropriate for evaluating knowledge gains – free-riders will be first to claim they've learned tremendous amount.³ Oral debriefing is also unreliable: not a single paper in the review provided information on how many students used their “right to remain salient” during debriefing and what these students think. But even if there would be such information, the judgment after all is made subjectively by educator, and without the full records of the debriefing discussion, the reader is expected to accept educator's conclusion as granted.

¹ Assessment mode was not reported in Dexter and Guittet (2014); McIntosh (2001); Simpson and Kaussler (2009). Asal and Schulzke (2012) suggested potential simulations without implementation.

² I avoid reference to authors' names, but a review of subtitles in articles may give some indication of this pattern.

³ Students self-reflection may be a valuable tool for assessing simulations that aim to alter students' attitudes or have teaching goals that are not limited to cognitive learning, but this is beyond the current study. See, Stover (2007).

Table 1. Assessment of Simulation Effectiveness: A Sample of Existing Methods

To assess simulation you can use...	Studies that use these methods include...
<u>COURSE EVALUATIONS</u> e.g. standard departmental or university forms at the end of semester/course	Butcher (2012); Chasek (2005); Crossley-Frolick (2010); Elias (2014); Kollars and Rosen (2015); Shaw (2004); Parmentier (2013)
<u>COURSE GRADES</u> e.g. comparison of students average grade and its dispersion in the course over time	Korosteleva (2010)
<u>FINAL COURSE EXAM</u> e.g. average grade; students' choice of examination questions; analysis of simulation as a reference case.	Asal (2005); Belloni (2008); Chasek (2005); Haack (2008); Kollars and Rosen (2015)
<u>ESSAYS OR WRITTEN ASSIGNMENTS</u> e.g. reflection papers on simulation; analytical papers on topic taught by use of simulations; extra-effort by students in their projects.	Asal (2005); Belloni (2008); Bridge and Radford (2014); Butcher (2012); Crossley-Frolick (2010); Glasgow (2014); Haack (2008); Hatipoglu, Müftüler-Baç, Murphy (2014); Hobbs and Moreno (2004); Lantis (2004); Mikalayeva (2015); Youde (2008)
<u>SIMULATION SURVEYS - STUDENTS' SUBJECTIVE SELF-EVALUATION</u> e.g. pre- and post-simulation surveys, or only post-simulations surveys, involving 1-to-5 scale responses with or without written comments; open-ended questions.	Bridge and Radford (2014); Brown and King (2000); Elias (2014); Enterline and Jepsen (2009); Horn, Rubin and Schouenborg (2015); Stover (2007); Kille (2002); Korosteleva (2010); Krain and Lantis (2006); Lantis (2004); Shaw (2004); Parmentier (2013)
<u>KNOWLEDGE QUIZZES</u> e.g. comparison of students responses in control and experimental groups; pre- and post-simulation objective quiz with self-assessment questions	Krain and Lantis (2006); Powner and Allendoerfer (2008)
<u>STUDENTS' PARTICIPATION</u> e.g. number of emails and posts	Bridge and Radford (2014)
<u>INFORMAL FEEDBACK TO THE INSTRUCTOR</u>	Parmentier (2013)
<u>STUDENTS' COMMENTS DURING POST-SIMULATION DEBRIEFING</u>	Asal (2005); Asal, Griffith and Schulzke (2014); Belloni (2008); Blanton (2013); Butcher (2012); Chasek (2005); Crossley-Frolick (2010); DiCicco (2014); Enterline and Jepsen (2009); Glasgow (2014); Hobbs and Moreno (2004); Kille (2002); Korosteleva (2010); Krain and Lantis (2006); Mikalayeva (2015); Morgan (2003); Parmentier (2013); Kollars and Rosen (2015); Youde (2008); Sasley (2010)
<u>FACULTY EVALUATION OF STUDENTS</u> e.g. in multi-course or multi-campus simulations; observation by instructors on use of simulation concepts after simulation. Mostly subjective.	Brown and King (2000); Keller (2014); Kollars and Rosen (2015); Van Dyke, Declair, and Loedel (2000)
<u>FACULTY OBSERVATION OF CHANGING STUDENTS' STRATEGY DURING SIMULATION</u>	Asal, Griffith and Schulzke (2014)
<u>INTERVIEWS</u> e.g. one-on-one or in focus groups	Hatipoglu, Müftüler-Baç, Murphy (2014); Zappile, Beers and Raymond (2016)
<u>THE CUSTOMER RETURN RATE</u>	Keller (2014)

Notes: The review of assessment modes is based on 37 articles published in *International Studies Perspectives* from 2000 to 2016. Some studies used several assessment techniques and appear several times in the table.

Some studies supplemented subjective evaluations with data on students' average grade in final exams or entire course, students' choice of examination questions, number of emails and posts in online simulation, or the customer return rate in paid simulations. Experimental design studies suggested using knowledge quiz to produce scientifically rigorous evaluation of learning outcome by use of simulation (Krain and Lantis 2006; Powner and Allendoerfer 2008).⁴

Krain and Lantis use both the knowledge quiz and students self-reflection questions, but emphasize that “changes in student performance on the quiz act as a more objective assessment of knowledge acquisition.” (Krain and Lantis 2006, 401) Comparing pre- and post-simulation responses of students in control and experimental groups, they show that simulation is an effective learning tool not only because students believe they gain knowledge, but also because their knowledge increases as a matter of fact. Powner and Allendoerfer (2008) use semi-structured knowledge quiz as an objective measure of simulation effectiveness, asking students five multiple-choice and five brief open-ended questions, with no questions on students' self-reflection. Comparing post-simulation responses of students in the control and experimental group, they find that simulation was more effective learning tool compared to a traditional lecture, but not compared to discussion classes.

Deriving from this research, I suggest using a particular variation of knowledge quiz – the pop-quiz – as an objective assessment tool for simulations. The features of the pop-quiz, discussed below, are useful for both measuring knowledge acquisition immediately after simulation as previous studies do, and for assessing longer-term retention of knowledge as it is done in this study.

Pop-Quiz as an Assessment Tool

Pop-quiz, in its simplest form, is an unannounced quiz (Cicirello 2009). It includes one or several questions to test the knowledge on a certain topic, given to respondents without prior notice. Thorne (2000, 204) defines pop-quiz as a “method of testing at unannounced, random intervals”. He suggests extra credit pop-quizzes as a supplement to traditional teaching and concludes that they are very useful in teaching introductory psychological statistics course. Sporer (2001) also suggests that “no-fault quiz” with multiple choice, or true/false questions is

⁴ For a review of other studies using knowledge quiz see Powner and Allendoerfer (2008, 76-79). See also pre and post-simulation knowledge quiz form in Ben-Yehuda, Levin-Banchik and Naveh (2015, 125-6).

an effective way to teach introductory science course in biology. Cicirello (2009) provides extensive analysis of pop-quizzes, and through experimental design demonstrates that pop-quizzes considerably enhance students' performance in programming course.

In international relations discipline pop-quizzes are included in some syllabuses, but only few studies refer to this way of teaching and assessment. Rofe (2011, 110), for example, uses pop-quizzes with three to four questions on a weekly basis as one of possible ways to enhance students learning in online international relations course. Watson, Hamner, Oldmixon, and King (2015, 162, 166-7) suggest using "100 percent on a pop-quiz" cards as "carrots" to enhance students participation in simulations. Gray and Walcott (1977) use non-punitive pop-quiz as an assessment tool for simulations of political science. They supplement the pop-quiz with self-evaluation questions and find, in experimental design study, that simulations are not significantly more effective for cognitive learning than tradition lectures, even though students say they learn more in simulations. In explaining their choice of the assessment method, Gray and Walcott (1977, 298) explain that "by employing the notorious device of the unannounced pop quiz, we tried to measure "raw" learning, uncontaminated by any special study". No other study implemented anonymous pop-quizzes to assess knowledge gains of simulations. I wish to (re)introduce "the notorious device" of the pop quiz as the objective assessment technique for simulation, extending it beyond knowledge acquisition to the analysis of longer-term knowledge retention.

Pop-quiz is more focused and limited in its scope than, for example, end of course exam which is supposed to cover most of the material taught during the course. Pop-quiz may not involve grading, or can be non-punitive exercise (Thorne 2000). Since grading is not an issue, the pop-quiz allows anonymous responses, so students should not be anxious of making mistakes. It is also more flexible in terms of timing, and can be suggested to students at any point of time during the course, as well as after the course ends. Most importantly, a pop-quiz is not announced in advance so it is possible to measure whether and what knowledge students learned and absorbed without prior preparation. The combination of these five features of a pop-quiz – limited in scope, non-punitive, anonymous, flexible in timing, and surprising – make it a useful tool for assessment of knowledge retention after the simulation. I discuss this in some detail.

First, the limited scope of pop-quizzes corresponds with the limited scope of simulation exercises. It will be unrealistic to expect that simulation can cover all the material an educator

plans to teach during semester. Even in the protracted simulations that involve repeated sessions, the educator need to decide what topics the simulation will focus on (Ben-Yehuda, Levin-Banchik, and Naveh 2015, 50-51). The proper assessment technique should be able to distinguish between topics covered by simulations and those that were taught with different methods, such as discussions, lectures, essays or their combinations. The pop-quiz meets this criterion. It can be designed as a test with few questions that focus specifically on the material the educator intended to teach with any particular teaching strategy. Answering few questions, especially if designed as closed-ended ones, would take only few minutes. The educator thus can give several pop-quizzes, each time assessing students' knowledge on a different topic.

Second, when they are non-punitive in terms of grading, pop-quizzes match the intrinsic, though sometimes implicit, goal of simulations to make learning a pleasant experience. They motivate students to learn for purposes of gaining knowledge rather than for purposes of passing a course or gaining a higher grade. When students are anxious for their grades, they may give different responses than otherwise. As Thorne summarizes this point, pop-quizzes that suggest students an extra-credit “encourage class attendance and preclass preparation, give students examples of test questions... provide feedback to the students on their level of understanding and acquisition of material in the course at the same time that they give the instructor feedback on the success of his or her teaching.” (Thorne 2000, 205). Assessment by grading may be irrelevant for the evaluation of knowledge retention, especially when pop-quiz is given to past simulation participants that are no longer enrolled in the course.

Third, anonymity of pop quizzes further reduces biases in students' responses. Instead of looking for the answers that students think their instructors want to see, the anonymous students are likely to respond what they think independently. This way the educator can assess whether or not the students genuinely learned the material.

Fourth, flexibility in timing makes pop-quizzes useful for the assessing short, mid and long-term effectiveness of simulations. They can be used for a pretest and a posttest, throughout simulation, immediately afterwards, few months and even few years later. Their timing depends on research goal of the instructor, and is not subject to structural constraints such as course schedule or simulation deadline. Using a free Google Forms application, for example, instructor can promptly create a survey with few questions on a relevant topic and send it to his students,

past or present, to answer the quiz anonymously online.⁵ Assessment of retention of knowledge in a long range without such temporal flexibility is hardly possible.

Fifths, and most importantly, the surprising elements of a pop-quiz, is what distinguishes it from other techniques of assessment. Pop-quizzes are given to students without prior notice, which makes possible to evaluate learning without prior preparation (Gray and Walcott 1977, 298). In some cases, especially when pop-quizzes are repeated several times, the students may be aware that they will be questioned at random occasions. Such anticipation can increase students' motivation to be prepared for any unpredicted test during the course. This by itself can improve students' knowledge, though this may also make it difficult to assess the source of knowledge when it comes to the analysis of pop-quiz responses.

Teaching Goals

In my discussion classes of "Introduction to International Relations" I have a rather limited time, two meeting of forty-five minutes, to teach decision-making in crisis situations to undergraduates, using the classical Alison's (1969) essay on "Conceptual Models and the Cuban Missile Crisis."⁶ I have three primary knowledge-oriented goals in teaching this topic.

My first goal is make students aware that any foreign-policy decision can be understood through different theoretical lenses. I want them realize that there is not a single and straightforward answer for the core question – *why leaders make a particular decision in a given situation*. Instead, there is interplay of elements from different theoretical models, which contribute together to a more comprehensive explanation of decision-making. As Allison (1969, 716) stresses, the theoretical models "are obviously not exclusive alternatives." The "demonstration that different analysts, relying predominantly on different models, produce quite

⁵ Google Forms application is available at: <https://www.google.com/forms/about/>

⁶ The "Introduction to International Relations" is a required course for undergraduate students with major or minor in Political Science at Bar Ilan University. The course consists of lectures taught by senior faculty member, and of discussion classes led by PhD candidates, like myself. The discussion classes take place throughout the entire academic year on a weekly basis, usually at a different day than the lecture, and involve small groups of up to thirty students. The discussion classes address the topics covered in lectures, through the order of the topics may be different. Participants in the discussion classes are asked to read each week a scholarly research on a relevant theoretical topic, and then discuss that paper in class with instructor, focusing on understanding the meaning of the theoretical concepts in the paper, and their application to real-life events. Although the discussion classes have some degree of autonomy, they are only a supplementary to the lectures. The material taught during discussion classes often intersects, intentionally, with that of lectures. The results reported in this study refer only to my discussion classes. This study should be viewed as exploratory only.

different explanations should encourage the analyst's self-consciousness about the nets he employs.” (p. 715). I stress this point in my classes regardless of the teaching method used.

My second goal is to make students aware that rationality of a decision is measured by quality of the decision-making process rather than by outcome of its implementation. In answering the core question – *is a particular foreign-policy decision rational* – I want students address the trade-offs between potential costs and benefits of the action for the goal attainment, compared to other alternatives. I also want them realize that sometimes a paradox happens, and that a rational decision, the one with seemingly lowest cost and highest benefits, may not lead to the desired outcome. A state can make a rational decision to escalate the crisis, but may nevertheless lose the war.

My third goal is to make students aware that in the setting of acute international crisis the decision-making process may change. I want them realize that in addressing the core question – *do crisis situations increase or impede leaders' ability to think rationally* – the personal and psychological factors of the decision-maker and his environment should be taken into account. Some perform well, and even better than usual, when they are at stress, others may be frustrated, and even mentally broken (e.g. Bar-Joseph and McDermott. 2008). When discussing Allison's research, I only briefly refer to this point, and address it in more detail later in course, when we study Ben-Meir's (1987) study on “Psychological Foundations” of decision-making and Hermann's (1969) classical essay on “International Crisis as a Situational Variable.” When we get to these two papers in our schedule, however, students that are routinely exposed to myriad of other learning material in their studying, may not recall the knowledge gained when studying Alison's paper.

To accomplish the three goals during my first years of teaching, I used to rely on the same method as in my other discussion classes. I used PowerPoint presentations with leading questions on the relevant research papers, and discussed these questions with my students. We also applied the material to different case studies, such as Israeli decision to invade Lebanon in 2006, or the United States decision to invade Afghanistan in 2001. Yet, when several years later I began teaching discussion class to Security Service students,⁷ I realized that many of them are skeptical about the value of theoretical models. Before exposing students to decision-making

⁷ During 2012-2013, I was instructor in discussion classes in both the Department of Political Science and in the Studies for Security Services at Bar Ilan University.

theory, I decided to try a simulation of semi-fictional “Iranian Plane” crisis. In doing so I intended stimulate students’ interest in the material and their active participation in discussions (e.g. debriefing), and increase the efficiency of my teaching in terms of attaining the three goals specified earlier. I felt that the simulation “breached the ice”, and I continue to use it in my regular discussion classes since then. Yet, beyond my subjective evaluation, is teaching with simulation associated with better knowledge retention, compared to other teaching modes? Does simulation worth the effort? The question is yes, and I will address it in detail in the remaining part of this paper, after a brief description of the simulation.

The “Iranian Plane” Simulation

I have developed the “Iranian Plane” simulation to teach decision-making in crisis situations.⁸ In this simulation students play the roles of Israeli decision-makers and face a surprising and stressful situation: they have to decide how to cope with a civilian airplane of an enemy state that has entered Israeli airspace and is approaching a strategic site, all while the airplane’s window shades are closed and the condition of civilians on the plane is unknown. Students have a very limited time to make their decision and announce it to other classmates, which ends the simulation and the discussion class at that week. From start to end the exercise takes about forty minutes.

Simulation Beginning

To create a sense of crisis, the simulation scenario needs look authentic and appear as a total surprise to students. So, I start the lesson as usual, without any indication of coming simulation. After few minutes, however, I look at my phone pretending I received some shocking message, ask students if they also receive news, and then open a slide with “breaking news” scenario prepared in advance. The scenario, presented in figure 1, announces that a civilian airplane, presumably of Iran, has violated Israeli airspace. The map of Israel shows city of Dimona, close to the Negev Nuclear Research Center location. I also explain that it would take about twenty-five minutes till the airplane reaches Dimona if it continues to flight in the same

⁸ The pedagogical aim of the simulation, in terms of knowledge acquisition, was identical to teaching without simulation – to accomplish the three teaching goals specified earlier.

direction.⁹ At this point students usually ask if this is true, some even go online to check news, but once they got the initial sense of a crisis situation, I explain that (this time) the event is only a simulation. I ask students to divide into groups of about six students, each representing Israel, and decide who of them takes the role of Prime Minister, the Minister of Defense, the Minister of Foreign Affairs, Attorney General of Israel, advisors of the government or any other role upon students' choice. Assignment of roles is important for later debriefing on Allison's (1969, 698-707) organizational process model of decision-making.

Once groups are located at different corners of the classroom, I project a countdown timer, illustrated in figure 2, to further exacerbate the sense of stress intrinsic of crises. The timer allocates twenty minutes to discuss and decide on how to deal with the Iranian Plane situation.

Figure 1. "Iranian Plane" Scenario: Surprise and Threat

EMERGENCY

A civil aircraft, apparently of Iran Air, en-route from Egypt has entered Israeli airspace just few moments ago.

WEST BANK
Jerusalem
GAZA
Dimona
ISRAEL
EGYPT
JORDAN

All attempts to contact the aircraft failed.

It is unclear who is on the plane

Figure 2. Countdown Timer: Time Pressure*



* Minimalistic Countdown Timer (Free PC & MAC version). Author: Igor Donkov countdownkings@gmail.com. Available at: <http://www.countdownkings.com/>

⁹ Later, after the simulation ends, I reveal that it might actually take only about six minutes for the civilian airplane to reach Dimona after entering Israeli airspace from its southern border (e.g. the distance between Beer Milka settlement near Egyptian border and Dimona is about 80 km, or 50 miles, while the average speed of commercial airplane is about 850 km/hours, or 530 miles/hour).

During the Simulation

While students deliberate on the intrusion of Iranian plane, I approach each group as an observer. My task is first of all is to verify that the discussion takes place. My passive presence is usually enough for even inactive students to raise their voice when I approach their group.

My other task is listening to the arguments put forward by participants, as some of these may later serve for a debriefing. For instance, one of students suggested his teammates to look for similar instances in past, and after searching web he even mentioned Libyan Plane crisis of 1973. The other teammates, however, disregarded this information. Later, during debriefing, they were amazed to reveal that I developed the “Iranian Plane” situation as an analogy of the Libyan Plane crisis (Brecher and Wilkenfeld 1997, 285-6). We use this example to discuss the concept of “contingency plan” and the barriers in filtering information during decision-making process.

Another purpose is to identify students that voice the strictest vision of situation and actively persuade others to follow their course of action. Such students are my best choice for assigning the role of “devil’s advocate” in midst of simulation. I give these students note saying “Keep this notice secret: Your role now is to be ‘devil’s advocate’, so that for any argument put forward by your teammates, suggest a counter-argument”. While other students in the group realize something changes after their most enthusiastic member receives a secret note from the instructor, it is not until debriefing that we learn conceptual meaning and practical importance of “devil’s advocates” in decision-making, especially when the decision is done in groups and “groupthink”, another concept we learn during the debriefing, may take place.

I also add filters of Allison’s political model into the discussion. I convey some students a message, such as “remember and remind your teammates that Israel is a democratic state”, or “remember and remind your teammates that parliamentary elections will soon take place”. Then during debriefing we discuss different constraints, including political regime and public opinion, which may shape the decision-making process.

In addition to secret messages conveyed to a few students in each group, I update all students on the ongoing developments. For instance, I inform that Israeli military jets are accompanying the airplane and even managed to get an eye contact with its pilots, but the Iranian Plane still continue its flight in Israeli airspace. I inform students that the pilots are not responding to the despatcher calls. In my first run of simulation I even mentioned to students that Iranian President Mahmood Ahmadinejad may be on the plane while returning home from visit

in Egypt (e.g. Kareem and El Sheikh 2013). During debriefing we address information flow, and discuss the possibility that the information available for decision-making may be flawed and filtered, and that government may not be completely informed.

All in all, the situation is pressing. The timer counts down, new information arrives all the time, leading students in each team suddenly change their minds and oppose any possible decision, while others emphasize political considerations even though the national security is at danger. To further add to this stress, five minutes before the time ends, I ask each team to make a decision and announce it in a one-minute speech directed toward any audience of their choice.

Simulation Ending

A representative of each team stands in front of the class and gives a speech explaining their decision. Some teams direct their message to ministers of Israeli government, some to Israeli public, and some to international community. I use this point to demonstrate later, during debriefing, that even after the decision is made, its implementation may differ.

The spectacular announcement by a representative from each team culminates the simulation meeting, and the entire discussion class of that week. Students usually curious about classmates' decisions, and it seems we all enjoy when some students "give a show" pretending of being real-life politicians. The decision made, in the vast majority of cases, is to down the plane. During debriefing, when we see pictures of a Libyan Plane, the practical implications of this decision become more tangible.

Debriefing

Crookall (2010, 907) emphasizes that "learning comes not from the game, but from the debriefing", namely discussion of simulation experience. I had already addressed most of the points discussed during debriefing after the Iranian Plane simulation in two previous sections. Here I only briefly summarize the key points.

Debriefing on the Iranian Plane simulation takes place during next meeting in a week. I ask students to recall what we did during simulation and what decision their team reached. In the simulation assessed in this paper, all teams decided to down the plane. I usually ask student if their decision was rational. Discussion then follows on definition of rational choice. Together, we re-evaluate the quality of decision-making process of students, stage by stage, and compare it

to the pure Allison's rational policy model. We then move to other models of decision-making and discuss whether and when some elements from these models were also present during the simulated decision-making process.

Except the direct reference to simulation, debriefing discussions are very similar to other discussion-classes we have during the course. Yet, as I show below, debriefing with simulation together are more effective for students learning than discussions without simulation. I now explain method used to assess simulation effectiveness.

Research Design

I use pop-quiz for objective evaluation of students' knowledge retention two months after the simulation. The quiz was suggested to students without prior notice in regular discussion class session and all students present at that session were granted an extra-credit.

Ten questions with yes/no/don't remember answers were asked on each of four topics taught with a different method.¹⁰ Table 2 summarized questions on decision making process taught by (1) simulation and in-class debriefing. Three additional tables in appendix summarize questions on topics of (2) international crises taught by simulation only¹¹; (3) actors in world politics taught by in-class discussions and an accompanying 10-pages research essay; and (4) power in world politics taught by in-class discussions only. Unlike multiple choice questions, the yes/no responses enabled to identify not only whether students recognize correct answers, but also whether they are able to recognize incorrect ones.

Overall, 30 students replied to the pop-quiz, 27 of them participated in simulation (N=27). For each correct answer on a given topic students receive 1 point, and they received 0 otherwise. Each student could gain from 0 to 10 points on each of the four topics. To analyze whether the teaching mode, a categorical variable, affects the same students' score in the pop-quiz, I used one-way repeated measures ANOVA (Field 2009, 457-82). The results are reported in the following section.

¹⁰ In addition to the objective question, the pop-quiz, as a pilot version, included not compulsory open-ended knowledge questions and self-evaluation survey. I do not report results from this part of the assessment herein.

¹¹ At the time students responded to the pop-quiz, they had experienced the crisis situation during simulation, but had not yet engaged in debriefing that would link theoretical knowledge on crises with experienced-based one. The debriefing after the Iranian Plane simulation focused on the decision-making and purposively left the topic of crisis for later (post-pop-quiz) discussions.

Findings and Discussion*Simulation with In-Class Debriefing*

To recall, my first teaching goal was to make students aware that any foreign-policy decision can be understood through different theoretical lenses. Based on students' performance in the pop-quiz, reported in table 2, this goal can be considered as achieved. When asked to apply their knowledge to a new case study, Israel's decision to launch the Operation Protective Edge in Gaza in 2014, all of the respondents mentioned at least two, and usually three, conceptual models as possible frameworks for the analysis. Rational Policy Model and Bureaucratic Politics Model were the most common choices, with 92.6 and 85.2 percent of students suggesting to use them, respectively.

Table 2. Pop-Quiz Performance: Topic Studied by Both Simulation and Debriefing

What model can be used to analyze Israel's decision to launch the Operation Protective Edge in Gaza in 2014?	Answered Correctly	Answered Incorrectly	Didn't Know/Remember
Rational Policy Model	92.6%	7.4%	0.0%
Organizational Process Model	55.6%	29.6%	14.8%
Bureaucratic Politics Model	85.2%	11.1%	3.7%
Sport and Politics Model	100%	0.0%	0.0%
Psychological Model	70.4%	22.2%	7.4%
Budget Model	63.0%	22.2%	14.8%
Average	77.8%	15.4%	6.8%
<u>A rational choice is a decision that</u>			
Leads to the desired outcome	77.8%	18.5%	3.7%
Accepted by consensus in a group of decision-makers	81.5%	14.8%	3.7%
Considered in terms of cost-benefit-risk-chance before the decision, and leads to a desired outcome	59.3%	37.0%	3.7%
Accepted after gathering information, setting goals, suggesting alternatives and weighting them in terms of cost-benefit-risk-chance	92.6%	3.7%	3.7%
Average	77.8%	18.5%	3.7%
Number of Respondents	27	27	27
Total Average	77.8%	16.7%	5.5%

Overall, almost half of the class, 48.1 percent, provided at least five of six correct answers on the alternative ways to understand Israel's decision, and another 14.1 percent of

students answered all six questions right.¹² Two months after the simulation and debriefing, and without preparation to the test, the majority of students demonstrated a firm knowledge on the applicability of decision-making models to an international relations event. Teaching by simulation with debriefing met my first teaching goal and kept it intact over time.

My second goal was to make students aware that rationality of a decision is measured by quality of the decision-making process rather than by its outcome. Students' responses in the pop-quiz demonstrated that this goal was achieved, but there is a room for improvement. On the one hand, the bulk of students, 92.6 percent, identified the correct answer and demonstrated their knowledge of what the rational choice is. On the other hand, many of them didn't single out what the rational choice is not. In particular, 37 percent of students mentioned that rational decision is not only calculated by cost-benefit calculations, but also leads to a desired outcome, and 18.5 percent mentioned that if the decision leads to a desired outcome it can be considered as rational regardless of cost-benefit calculations. As with previous question on decision-making models, here too most of the students answered correctly to at least three of four questions, or to all of them.¹³ Taken these findings together, it seems that two months after the simulation and debriefing, students retained their knowledge on the topic of rational choice, which meets my teaching goal, but about third of the class had not fully absorbed the material I aimed to teach.

In all, by looking at students' performance in the pop-quiz on the topic of decision-making taught by use of a simulation and debriefing together, this teaching method appears as a valuable tool. The next section compares its effectiveness to other teaching modes.

Comparing Teaching Modes – With and Without Simulation

It is a common practice in the literature to assess simulations without a comparison to other teaching modes (e.g. Horn, Rubin and Schouenborg 2015; Zappile, Beers and Raymond 2016). Given that the Iranian Plane simulation achieves my teaching goals, as specified above, and that running this simulation is of a great pleasure for me as an instructor, why should I compare it to other teaching modes? First, the simulation is time-consuming as it captures a lesson slot that I can use to discuss the same topic more extensively. Second, my primary goal

¹² On the conceptual models of decision-making, of 27 students, 11.1 percent answered right three questions, 25.9 answered four questions, 48.1 answered five questions, and 14.8 answered right all six questions.

¹³ On definition of rational choice, of 27 students, 3.7 percent answered right one question, 18.5 answered two questions, 40.7 answered three questions, and 37 percent answered right all four questions.

for using simulation is the same as the goal of using other teaching modes – enhancing students’ knowledge. Can I achieve the same goal more effectively by simulation than by other means?

The empirical analysis of students’ performance in the pop-quiz provides a clear answer to this question: yes, simulation with debriefing is considerably more effective for knowledge retention than teaching without simulation. I discuss this conclusion by looking at descriptive data on students’ performance in the pop-quiz, followed by discussion of results from one-way repeated-measures ANOVA.

Table 3 presents a comparative outlook on student’s performance in the pop-quiz on the topics taught by four different methods. The findings show that students’ retention of knowledge, in terms of correct answers in the pop-quiz, was greatest for the topics taught by the use of simulation with debriefing, slightly lower for topics taught by simulation only, and lowest for topics taught without simulation.

Table 3. Students Performance in the Pop-Quiz

Teaching Mode	Correct Answers			
	0-6 Poor	7-8 Good	9-10 Excellent	
<i>With Simulation</i>				
Simulation and in-class debriefing	14.8%	51.9%	33.3%	100%
Simulation only	25.9%	44.4%	29.6%	100%
<i>Without Simulation</i>				
In-class discussions and a research essay	44.5%	33.3%	22.2%	100%
In-class discussions only	44.5%	40.7%	14.8%	100%

Notes. N=27 students. The scores of 0-3 and 4-6 were collapsed as there were no meaningful differences between these categories and only three students were in 0-3 category (1 student in the category of simulation only, and two students in category of in-class discussions and a research essay). Pearson’s chi-square test is not performed because the assumption on the independence of data is violated – the same students are asked the same questions on each four topics taught by different teaching modes. The statistical analysis by use of is reported below.

The comparison of teaching by simulation with and without debriefing shows little difference, indicating that debriefing only slightly added to the retention of knowledge. The major difference related to the poor performance, which increased from 14.8 to 25.9 percent when students were asked on the topic not yet discussed in the classroom. The difference in good/excellent categories also existed but was less profound. The results from one-way repeated

measure ANOVA, in table 4, confirm this conclusion and show that students' retention of knowledge was not significantly different after simulation without debriefing compared to simulation with debriefing.¹⁴ So, while combination of simulation and debriefing increased students' success in the pop-quiz, the simulation alone was also a successful teaching mode.

Table 4. One-Way Repeated Measures ANOVA for Knowledge Retention and Teaching Modes

<i>Simulation with debriefing compared to...</i>	Type III Sum of Squares	df	Mean Square	F	Sig.
Simulation only	5.33 (112.67)	1 (26)	5.33 (4.33)	1.23	0.28
In-class discussions and a research essay	33.33 (150.67)	1 (26)	33.33 (5.80)	5.75	0.02*
In-class discussions only	33.33 (114.67)	1 (26)	33.33 (4.41)	7.56	0.01**

Notes. N=27 students. Retention of knowledge is measured by each student's score in a pop-quiz, with repeated measures for each of four topics taught by different teaching modes. Simulation with debriefing is chosen as a contrast to which other teaching modes are compared. Residuals are reported in parentheses. Mauchly's test indicated that the assumption of sphericity has been met, $\chi^2(5)=4.09$, $p>0.05$. Pop-quiz scores were significantly affected by teaching mode, $F(3, 78)=3.49$, $p<0.05$.

The comparison of teaching with simulation and without simulation provides strong evidence in favor of the former. Findings in table 4 show that the majority of students demonstrated good and excellent knowledge retention for the topic taught by simulation, but often poor knowledge retention on the topics taught by discussions with essay and by discussion only. Without simulation, almost half of the class, 44.5 percent, performed poorly in the pop-quiz, compared to only 14.8 and 25.9 percent of students with similar performance after simulation with or without debriefing. Findings from repeated measures ANOVA in table 4 confirm that the difference is statistically significant. Students performed significantly better in the pop-quiz when they answered on the topic taught by simulation with debriefing, than when they answered on topics taught without simulation, by discussion with essay¹⁵ or by discussion only¹⁶. The Iranian Plane simulation is thus an effective teaching mode not only because it reached teaching goals, but also because it did so considerably better than other teaching modes.

¹⁴ $F(1, 26)=1.23$, $p>0.5$.

¹⁵ $F(1, 26)=5.75$, $p<0.5$

¹⁶ $F(1, 26)=7.56$, $p=0.1$

This doesn't mean that teaching without simulation is ineffective. The pop-quiz, by its definition, was given without any prior notice and addressed topics students studied several months beforehand. So, I am not surprised that almost half of class experienced difficulty in answering questions, and I am happy (and proud) that other half of class performed good and excellent and demonstrated that they remember the material over time. With use of simulation and debriefing together, however, I can be even happier (and more proud) for the bulk of class.

Conclusions

I have developed the Iranian Plane simulation to teach decision-making in crisis situations, and I am always curious whether the knowledge students gain in class remains with them over time. This study shows that simulation is effective teaching tool, in terms of knowledge retention, and that it is considerably better than teaching by discussions with an accompanying essay and by discussion only. The same students remembered most of the material taught by use of the simulation, but only small part of the material taught without simulation. The use of pop-quiz to objectively assess knowledge retention added to the robustness of the results. The anonymous extra-credit pop-quiz let students demonstrate their knowledge without prior preparation, without being anxious for their grade, and without being afraid of making a mistake.

Depending on its timing, pop-quiz may also be a very useful for further studying and improvement of the knowledge. I personally used the pop-quiz in the class both to assess effectiveness of simulation, and to identify weak points that need more elaboration for understanding and absorption by students. Pop-quiz is a low-cost and high benefit assessment tool. It is a rational choice, though I guess I should avoid judging rationality by outcome.

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Appendix 1.

Pop-Quiz Performance: Topic Studied by Simulation without Debriefing*

	Answered Correctly	Answered Incorrectly	Didn't Know/ Remember
Identifying crisis situation			
The Iranian plane situation s is an international crisis	74.1%	25.9%	0.0%
International security crisis is a situation that necessarily involves			
Violence	81.5%	18.5%	0.0%
Heightened probability of escalation to violence (may not involve violence)	85.2%	14.8%	0.0%
At least one thousand people killed in a year	88.9%	7.4%	3.7%
Time pressure	66.7%	29.6%	3.7%
Military tools of foreign policy (e.g., troop movements, mobilization)	37.0%	59.3%	3.7%
Surprise	37.0%	59.3%	3.7%
At least one of the crisis actors is a nonstate actor	96.3%	3.7%	0.0%
Threat to interests or values	96.3%	3.7%	0.0%
United Nations', or other intergovernmental organization's involvement	70.4%	18.5%	11.1%
Number of Respondents	27	27	27
Total Average	73.3%	24.1%	2.6%

* See table 2 inside the study for results on pop-quiz performance on topic studied by simulation without debriefing.

Appendix 2.

Pop-Quiz Performance: Topic Studied by In-Class Discussions and Research Essay

	Answered Correctly	Answered Incorrectly	Didn't Know/ Remember
Identifying state and nonstate actors			
Is Gaza a state actor?	96.3%	3.7%	0.0%
Only states have...			
Population	70.4%	25.9%	3.7%
Territory	63.0%	37.0%	0.0%
Sovereignty	92.6%	7.4%	0.0%
Nationalism	55.6%	44.4%	0.0%
The right to vote at the UN	66.7%	29.6%	3.7%
Government/Authority	81.5%	18.5%	0.0%
Army	51.9%	44.4 %	3.7%
Embassies in other countries	33.3%	55.6%	11.1%
The right to manage domestic policy and foreign policy without the interference of other countries	51.9%	40.7%	7.4%
Number of Respondents	27	27	27
Total Average	66.3%	30.4%	3.0%

Appendix 3.

Pop-Quiz Performance: Topic Studied by In-Class Discussions Only

	Answered Correctly	Answered Incorrectly	Didn't Know/Remember
Identifying limits of power			
The United States is the strongest military power in the world and therefore will win in any confrontation it would be involved in	77.8%	22.2%	0.0%
Evaluation of statements on power			
Potential power is the power an actor desires to achieve in the future	59.3%	18.5%	22.2%
Potential power is the power an actor already holds in a "warehouse"	74.1%	11.1%	14.8%
Soft power and hard power are contradictory and cannot be used simultaneously	81.5%	14.8%	3.7%
Power always achieves influence	44.4%	44.4%	11.1%
Economic sanctions is an example of soft power	22.2%	74.1%	3.7%
Power is relative, to determine whether an actor is strong or weak, the actor must be compared to other actors	70.4%	14.8%	14.8%
Only state have military power	81.5%	11.1%	7.4%
Soft power is the ability to influence other actors without coercion or payment	81.5%	14.8%	3.7%
Distribution of power among the strongest actors indicates a structure of international system (unipolar, bipolar, etc.)	74.1%	0.0%	25.9%
Number of Respondents	27	27	27
Total Average	66.8%	22.5%	10.7%