Business Students Meet the Real World: Creative Problem-Solving Via a Complex Role-Playing Simulation

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We describe engaging business school students in a specially-designed, complex, real-world simulation at the intersection of an environmental crisis associated with acid mine drainage (AMD) involving a national mining industry, the geosciences, budgetary restraints, and severe competing funding priorities for education, healthcare, etc.

The Witwatersrand Basin in the Republic of South Africa (RSA) is the largest gold producing region in the world. Over 40,000 metric tons of gold have been extracted (Pratt 2011). Mines are as deep as four kilometers below the surface with an average gold mine comprised of a total of 362 km (225 miles) of tunnels. Some 5,000 scattered and abandoned mines filled up with water, became highly acidic, and dissolved a multitude of toxic metals. Recurring outflows of this toxic water from the mines (AMD) pose threats to flora, fauna, agriculture, and human settlements. Underground the mines continuously expand as acid eats through rock layers horizontally and vertically.

The simulation was developed for and used in two business school courses on “business with a social conscience” and “creativity management.” This chapter highlights important aspects of the design of the simulation. It then describes a wide array of things that occur during the simulation that lead to divergent and potent learner outcomes. We highlight along the way a series of student comments about the design aspects of the simulation and their insights regarding how the course’s design features promote student engagement, motivation, persistence, out-of-the-box thinking, and critical decision making during the week.

1. Evolution of the Simulation

This simulation arose from an article on AMD in RSA in Earth, a magazine of the American Geosciences Institute (Pratt 2011). Simulations immerse learners in a teacher-designed “world” in which they must navigate a contrived situation with associated ambiguities. The outcomes of a simulation are greatly influenced by the inherent design of the simulation and by learners’ creative responses in role-playing, problem-solving, and decision-making. The simulation was first used in a very simple format involving dyads of students with assigned roles in a “simulated public hearing” as a component of a semester long BBA course with about 60 students at the National University of Singapore Business School in 2011. Results seen in students’ growth in understanding of themselves in such a situation as well as their acquisition of knowledge about AMD were encouraging.

An opportunity arose in 2013 to take over an existing M.Sc. course on “Creativity Management” at IÉSEG School of Management (IÉSEG) in France and teach a one-week, English-language
only, intensive module at both their Paris and Lille campuses. The course was an elective within the Innovation and Entrepreneurship track and open to M.Sc. in Management, Master of International Business (MIB), and undergraduate (foreign only) BBA students. In 2017-2018, IÉSEG reported 5,150 students, including 2,270 international exchange students from 69 nations. The course has been completed by 543 students in 10 cohorts in Paris and Lille (2013, 2015-2018).

The decision was made to focus the course on student use and further development of a blend of cognitive and non-cognitive (CNC) skills through a specially-designed, complex four-day simulation experience. The need for attention to a mix of CNC skills in business schools and throughout formal education goes back to at least the 1991 release of the U.S. Department of Education Secretary’s Commission on Achieving Necessary Skills (SCANS) report which used data across 50 occupations to identify what a useful mix might entail (Kautz et al., 2014). Recent studies converge around the importance of three dimensions to such skills: information, communication, and ethics and social impact as delineated by Ananiadou and Claro (2009). Skills would include those essential for research endeavors, problem solving, decision making, creativity and innovation, critical thinking, responsibility, collaboration, persistence, motivation, and learning to learn (cf. Kautz et al., 2014; Pellegrino and Hilton, 2012). The design of this course is well aligned with the goals of the newest IÉSEG strategic plan and its efforts on improving teaching and learning (Ammeux & Roussel 2016; IÉSEG School of Management 2016). The importance of diverse CNC skills has even more recently been underscored by CEOs of global companies (PWC, 2018) with 77% of them saying “the availability of key skills is the biggest threat to their businesses” and that they are struggling to “find the creativity and innovation skills they need.”

2. Design of the Simulation

Activation and improvement of CNC skills required the creation of three distinct sets of information which would engage all students: 1) detailed information about 60+ creativity techniques for different identified purposes, 2) information on the various assigned “roles” within the simulation and information on the RSA economy, education, employment, politics, and other essential background, and 3) information on select geosciences and sociotechnical aspects of AMD in RSA. The guiding principles for selected materials included: 1) English language only, 2) sources ranging from semi-popular sources to technical ones, 3) sufficient but not exhaustive content, 4) some disagreements among the various sources as to certain facts or the importance of them, 5) relevance to AMD issues in RSA with some external examples to act as provocations or prompts for student ideas, and 6) a sufficient but not exhaustive catalog of some important creativity techniques students could use to stimulate their own ideation, analysis, refinement, and promotion of possible solutions.

Materials were organized into labeled folders on the institution’s online learning system as both individual files and zip folders for rapid download. Students accessed the folders and two external websites (both of which dealt with creativity techniques – one in French and one in English). Access or use of other knowledge from the Internet, newspapers or other print materials, friends or family, or social media was not allowed as part of the “game rules” for the simulation. This rule was for two reasons: 1) to maintain almost total information symmetry across the teams, and 2) to bound the complexity of the simulation to help ensure students’ success at the challenging requirement to find one or more potentially viable solutions to AMD.
in RSA within just four days. Students were permitted to use information already known to them at the start of the course. There has yet to be a student specifically familiar with AMD and exceedingly few were familiar with either the mining industry (even in home nations) or RSA.

Materials given to students regarding AMD matters have varied over time as some items were withdrawn and new ones added. These changes included updates to existing documents and new materials to respectively advance or limit complexities within the simulation. The annual package included several thousand pages of materials organized into two AMD folders: one labeled “Essential Readings” and the other “Optional Readings.” The span of items cover topics such as: 1) annual reports of select mining companies operating in the RSA, 2) annual RSA national budget summaries (as well as the most recent full budget – a 400+ page document which the National Treasury had to master and which other teams have to know important aspects related to specific roles), 3) position papers issued by various nonprofits, 4) scholarly papers and international documents related to AMD issues, 5) geochemical information related to AMD (in both simple and more advanced forms), 6) economic and labor information, 7) overviews of RSA mining industry, 8) overviews of relevant RSA laws and regulations, 9) information concerning corruption in RSA, 10) large scale maps of the mining areas, and 11) reports on other pressing national issues, e.g., health and safety, fresh water, and droughts (e.g., there has been a three-year intense drought in western RSA, including Cape Town, since 2014).

A one-hour opening lecture is delivered by the professor. It highlights the nature of the course and the designed experience students will soon be enmeshed within, expectations regarding their performance, demands that the course imposes on individuals, teams, and the entire class, the 360° grading process that will be used, and the interrelationships among the simulation, imagination and creativity, and business knowledge. Students are urged to take risks in this “safe” environment and to step out of their own cultural norms and usual ways of conducting themselves. The importance of experimentation and the rewards and non-punitive nature of the course that is required for success are underscored – including working on their oral and written English-language skills. Even native English speakers learn new things, as one student volunteered that “. . . I had to place myself in my teammates’ positions so that my speaking would be clear and understandable . . . to practice patience as sometimes teammates that were not as fluent in English took longer to understand the given concept or point of discussion. Once everyone understood the topic, it was amazing to see how our various experiences and cultures combined offering incredible brainstorming.”

The lecture also emphasizes the need to challenge each other and to draw the very best out of every member of their team and other teams across the class. Finally, students are encouraged to “have (serious) fun.” A break is then taken. During the break, students who wish to volunteer to be considered for the important and challenging role of the International Consulting Group (ICG) are briefly interviewed by the professor and the team is constituted. All who volunteer and were not chosen are placed on other teams where their background and talents will likely prove useful. The ICG receives some very quick suggestions from the Professor and then is sent off to a separate room to plan knowing they must provide initial instructions to the entire set of teams within 10-12 minutes.

Upon their return from the break, all other students are randomly assigned to one of 14 teams by the professor, making 15 teams in all counting the ICG as seen in Table 1. All but the ICG correspond to actual RSA organizations; the ICG corresponds to many well-known consulting
companies for whom some of these business students may work. It also highlights one important role that business often provides across sectors within society as consultants to governments and other public and private sector actors. The number of teams was determined by considering a variety of factors including: 1) sufficient differences of values and goals across the teams to make for disputes, resistance, informal alliances, and differing views of AMD and its importance sufficient to generate tensions, challenges, and possibilities for resolution in the allotted time, 2) the large size of the class (usually 90-110 students; in smaller classes 1-2 teams are eliminated from those within the same societal sector with a minimal team comprised of three members), and 3) the management tasks that the ICG would need to undertake to track and interact with all the various subtasks and smaller groupings that inevitably occur once the simulation commences. Random team assignments ensure that students work across cultures and among people with varied life experiences, first languages, and educational backgrounds while using English as the required *lingua franca*. It also means they must adjust to representing well a role and position that may not correspond to their personal views. This helps foster perception and understanding of the “other,” an important life skill. An Indian student reflected that “to be able to interact and work with all these ethnicities and trying to come up with valid compromises and solutions was challenging. Language, difference in opinions, different views of the world due to upbringing were small barriers . . . . But I learnt how to deal with these issues through the simulation.”

The simulation’s content and processes are bounded by the following parameters: 1) nearly complete symmetry of information across all teams to eliminate undue advantage, 2) each team plays an assigned role as they believe their real-world counterparts would, and 3) the penultimate task of collaboratively and mutually deciding on a suitable course of action to address AMD across RSA.

### Table 1: Teams for the Simulation

<table>
<thead>
<tr>
<th>International Consulting Group (ICG- the class leader)</th>
<th>Federation for a Sustainable Environment (NGO)</th>
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</thead>
<tbody>
<tr>
<td>Mining Communities Federation (NGO)</td>
<td>Office of the RSA President</td>
</tr>
<tr>
<td>Cape Town Chamber of Commerce (Business federation NGO)</td>
<td>National Treasury of RSA</td>
</tr>
<tr>
<td>Congress of South African Trade Unions (NGO)</td>
<td>Committee on AMD, RSA Parliament</td>
</tr>
<tr>
<td>National Union of Mine Workers (NGO)</td>
<td>RSA Department of Water and Sanitation</td>
</tr>
<tr>
<td>Johannesburg Chamber of Commerce (Business federation NGO)</td>
<td>RSA Department of Health</td>
</tr>
<tr>
<td>Government of Johannesburg (largest city in RSA)</td>
<td>South African Democratic Alliance (largest opposition party in RSA)</td>
</tr>
<tr>
<td>Chamber of Mines (mining industry NGO)</td>
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</tbody>
</table>

After all students are assigned, the simulation commences under the direction of the ICG. The professor now assumes the role within the simulation of an international expert on AMD who has been contracted by the RSA President’s office to provide only scientific and technical information about AMD upon demand of the various teams throughout the four days. All process and procedural questions are directed to the ICG. An Italian student reported that the course was “. . . unexpected, exhausting, realistic, and full of surprise . . . unexpected because after a short
introduction, we needed to face the entire project on our own. The role of the professor was only the one to provide technical info about some aspects without helping in other fields.”

The first step is for all teams to meet independently, get to know one another, and together read and briefly discuss the Pratt article. A mini-tutorial in private is given by the Professor to the Office of the President team during this time because their role is critical to the entire tenor of the simulation. Then the President of the RSA (decided by that team) greets the attendees of this important “National Consultation on AMD in RSA” to which all organizations (teams) have been summoned to aid their country. The last fifteen minutes of each class are given over to the professor providing a high-level view of key insights as to how teams are doing and process reflections. All other class directions, work flows, assigned tasks, etc., are mediated by the ICG. The Professor daily meets with the ICG to debrief and assist them (but not overly so) in their assigned role as well as responding outside of class to their email communications. Figure 1 shows the overall process flow across the four days of the simulation as it has organically developed from the first to the tenth cohort. This general schema has naturally emerged each time with just slight variations (this flow chart has never been shared with the students themselves – once again by design).

Teams work outside of class and utilize their own processes and procedures to share information, track their ideas and arguments, compile their evidence and presentations, prepare to defend their positions, etc. They are free to utilize any social media and work sharing platforms and means of communication that they desire. Routinely they choose to create their own Facebook groups, SMS/texts and emails, and use presentation and analysis software and online work exchange platforms in the public domain and/or those provided by IÉSEG. Most also utilize face-to-face meetings at cafes or other venues including small rooms they can reserve or common areas at IÉSEG. Students who are ill and unable to attend class are expected to be in touch with their teams via social media and support their team as fully as if they were physically present. The class is very demanding of students’ time, their attention and full use of their minds and spirits. They acquire and make sense of an enormous amount of information over a very compressed period. The professor and the ICG utilize various technologies to keep track of the ever-shifting locations of teams, cross-team meetings, “secret” meetings unknown to anyone but the ICG and professor, etc.

Each Wednesday morning, the President of the RSA welcomes his personal guest, the Honorable Archbishop Desmond Tutu, Nobel Peace Prize winner - a role played by the professor in African attire. Tutu delivers his carefully crafted remarks to the entire consultation which is covered “live by international media.” He reminds them of the importance of their efforts, the need to persevere in their difficult task, insights from the long and difficult anti-apartheid struggle that highlight the importance of ethics, the vital role of the nation’s women, the pressing demands of social justice, the potential to lead the world on this important issue of AMD, and his own belief that the world will help RSA in its AMD efforts if it can fully and honestly face itself, resolve to make a difference on this issue, and put in place effective mechanisms that give promise of effectively addressing the many issues raised by AMD. The entire class receives an electronic copy of the speech within minutes of its delivery. Tutu departs, and the class returns to its ongoing debates, problem solving, and coalition building. There is plenty of evidence from students’ subsequent actions as well as oral and written responses that this speech spurs students to dig deeper within themselves, renews the resolve of some who were flagging in their frustrations at the many seemingly intractable aspects the AMD problem presents, and alerts
everyone to some considerations that had not yet entered their minds. For many teams it releases their anxieties, opens their minds, and causes them to “double-down” to create new paths towards resolution.

Grades for the course are comprised of two components:

- The simulation which counts for 70% of their grade: 50% of the 70% is derived from students’ assessment of their own team members, including themselves and the performance of all other teams in the simulation, including their own team. The professor holds the other 50% for both individuals and teams.
- Two essays which count for the remaining 30% of their grades. The essay topics have varied; the most recent version is as follows: The first essay is a reflective essay as to what they learned about themselves, their team, and managing creativity during the week. The second essay is selected from three set questions: 1) what they think should be done regarding AMD in the RSA, 2) if they were to start a business focusing on aspects of the AMD problem what they would launch and how, and, 3) a critique of two creativity techniques they used during the week (they are not allowed to write about the widely known “brainstorming” or “mind map” approaches).

3. Insights from Two Participants who Speak for Many Others

A Canadian student reflectively captured some emotions and actions that rippled across all 10 cohorts during this simulation: “What stuck with me most during the week-long simulation was the feeling of guilt, ignorance, and fear for people I did not know, regions of the world I never
visited, especially after I realized this is not only a problem made up for our class to role play, it is happening right now on our planet. I did not expect to care about an issue beyond myself so quickly. I believe the emotions I felt were part of the reason why I wanted to be involved in class and discussions, because I am usually not as active in classes that require participation. As soon as we learned about what is required of us for this class, my immediate response was fear. Fear of having to be awake in the morning, fear of having to do ‘real work’ in class. I wanted to give up right away and try to find the easiest way possible. However, what I did not expect was for this issue to become interesting to me, and as soon as my fear turned into curiosity, I wanted to get to know the issue more, see the outcome and other people’s solutions, and I naturally became more involved. As someone who is not always an active participant in class, this was surprising to me. As soon as my brain was ‘on,’ I put in more effort to think and brainstorm, which generated ideas I otherwise would not be able to, and ideas I did not know I can think of.”

A Nigerian student spoke for many by noting that “During the simulation, it got frustrating at times when I figured out that the information we had was never enough to make a decision. Every time we came up with an idea, we realized that there were roadblocks that would not allow the idea to scale through. I remember the Professor saying that it was at the point when you seemed to be all out of options that ‘creative thinking’ will start to kick in. True enough towards the end of the third day and into the fourth day, we were able to start trying to think out of the box to find solutions to solve the AMD crisis.”

References


IÉSEG School of Management (2016). IÉSEG teaching and learning strategy. Lille, France: Author.


