

Year Zero Economics: Using Edu-Larping to Explore Economic Systems in the Ninth Grade

Abstract: The curriculum of the province of Alberta, Canada, stipulates that grade nine students learn about economics, comparing the United States and Canada (Alberta Education 2007). Supervisor Ken Koziej assigned Mikael Hellström to teach this unit to three grade nine classes during his practicum. Hellström had pioneered the use of edu-larps, game-based learning, and gamification as a sessional instructor at the Universities of Alberta and Calgary (Hellström 2016; 2017) and chose those methods to deliver the unit. The game design for the tabletop role-playing game *Mutant: Year Zero* (The Free League 2015) incorporates mechanics for play on three levels: character, for world exploration; resource extraction and world exploration; and base building. The latter two levels effectively create an in-game economy. Collaborating with his supervisor, Hellström adapted them for classroom use. The goal was to create a unit fulfilling Mochocki's (2014) criteria for edu-larp, in other words, that it is a) mono-disciplinary and targets a single school subject; b) knowledge-oriented and communicates textbook subject matter to students; and c) teacher-friendly, by not demanding time-consuming preparations. This paper describes the unit, the process of converting elements of *Mutant: Year Zero* for teaching, how students played the unit, and the post-game evaluation. While the unit did not fulfill all of Mochocki's criteria, student engagement was high, consistent with previous findings on game-based learning (Prensky 2005; Gee 2007; Hattie 2009).

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1. INTRODUCTION

The curriculum of Alberta, Canada, includes a unit of economics for grade nine students (Alberta Education 2007). Supervisor Ken Koziej assigned Mikael Hellström to teach three grade nine classes this unit during his practicum. Hellström had pioneered the use of edu-larps, game-based learning, and gamification as a sessional instructor at Universities of Alberta and Calgary (Hellström 2016; 2017) and chose those methods to deliver the unit.

The tabletop role-playing game *Mutant: Year Zero* (The Free League 2015) includes mechanics for world exploration and resource extraction, as well as for base building. Thus, the game integrates an economy, making it suitable for classroom use. Hellström's goal was to create a unit fulfilling Mochocki's criteria for edu-larp; in other words, that it is a) mono-disciplinary and targets a single school subject; b) knowledge-oriented and communicates textbook subject matter to students; and c) teacher-friendly, by not demanding time-consuming preparations (2014). This paper describes the unit, the process of converting elements of *Mutant: Year Zero* for teaching, how students played the unit, and the post-game evaluation. Interestingly, although the unit did not fulfill all of Mochocki's criteria, student engagement was very high throughout the unit, consistent with previous findings on game-based learning (Prensky 2005; Gee 2007; Hattie 2009).

2. THE UNIT

The curriculum of Alberta, Canada, includes a unit of economics for grade nine students (Alberta Education 2007). Supervisor Ken Koziej assigned Mikael Hellström to teach three grade nine classes this unit during his practicum. Hellström had pioneered the use of edu-larps, game-based learning, and gamification as a sessional instructor at Universities of Alberta and Calgary (Hellström 2016; 2017) and chose those methods to deliver the unit.

3. ADAPTING *MUTANT: YEAR ZERO* FOR CLASSROOM USE

Game-based learning and gamification is highly effective for creating student engagement and motivation (Prensky 2005; Gee 2007; Hattie 2009). Drawing on previous experiences with edu-larp and other forms of game-based learning, Hellström determined that positioning basic economics concepts in a fictional world where students had to experiment with building their own economies would make the concepts clearer. Such a method would facilitate a bird's eye view of how concepts apply to the Canadian and American systems.

In the role-playing game *Mutant: Year Zero*, players take the roles of members of a small colony of post-apocalyptic survivors. The colonists have to find food in the ruins of the old world or starve. The InIn

tabletop role-playing experience: players play the mutants of the colony and have to survive in a hostile world. The second level is communal: the players act as the collective, deciding what projects the colony should undertake to make it more productive. The third dimension concerns exploration of the environment surrounding the colony, using a map with a grid. Players explore the map's grid to find the scarce resources they need for colony development. Finding technological artifacts from the pre-apocalypse world, like advanced weapons, vehicles, or books, is particularly helpful. The latter two dimensions of game-play thus integrate an in-character economy into the design, making *Mutant: Year Zero* particularly well suited for an edu-larp unit on basic economics.

Some adaption was necessary. For example, Hellström removed the mutants from the setting, so that the mutant powers would not distract from the study of economics. He also simplified the character sheet considerably for easier run-time game mastering of 80 student players (see Figure 1).

Figure 1: The Year Zero Economics character sheet.

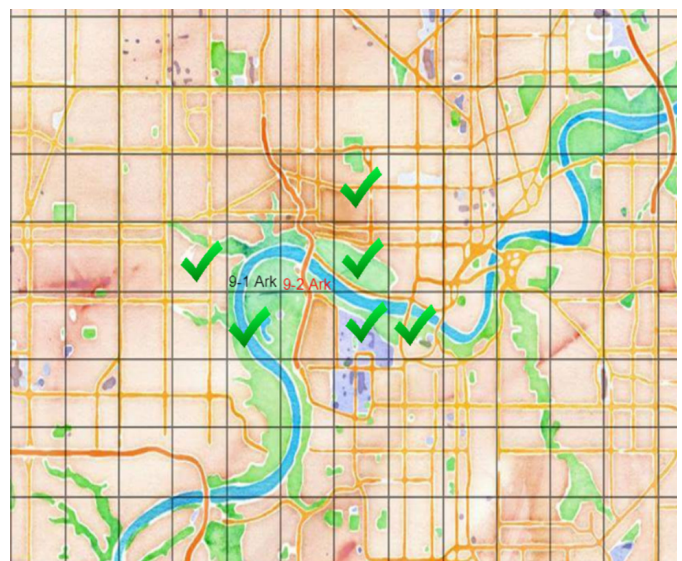
Attributes			
Health			
Social			
Skills			
Fight			
Research			
Exploring			
Caring			
Arts			
Labor			
Weapons, Artifacts, and Gear			
Grub	Dirty	Clean	Delish
Supplies			
Scrap			
Bullets			

Losing all health points meant that the character could not take any actions. Characters who did not consume a point of grub at the end of a class lost one Health point. Social points added to the health points for the unit's final score. The class with the highest Social + Health score would win the game. Players could use the skills for actions, e.g. exploring a map grid for more resources, building innovations for the colony, or healing other characters. A character with a high labor skill could build things faster than a character with a low labor skill.

Supplies, scrap, and bullets represented resources needed to improve the colony. For instance, characters used supplies to build anything from protective walls to sophisticated sanitation systems for cleaning dirty grub. Students designed these innovations as part of their assignments, applying their learning of economic principles as they described the economic impact these innovations had within the diegesis.

The class made up the diegetic colony in post-apocalyptic Edmonton. Hellström decided that the colony would have no system of government at the start, compelling students to decide what system of government the colony would have. The unit used a map of post-apocalyptic Edmonton for the exploration part of the game, designed by Haglund Hellström. Mikael Hellström projected it on the smartboard using the Roll20 app (The Orr Group). He decided that the three class colonies would share a diegesis. Consequently, characters from the different colonies might meet each other during play. The primary motivation for exploration, however, was to locate resources to improve the colony. For this process, Hellström used the artifact cards for *Mutant: Year Zero*, adapting the card game mechanics to suit the class game.

Figure 2: The Year Zero Economics map of post-apocalyptic Edmonton, Alberta. Two of the classes chose to place their colonies, called Arks, next to each other, close to what today is the downtown core to gain access to water. The green check marks represent areas that student characters explored for resources. This class had not yet discovered the third class colony. Map design by Anna Eleonora Haglund Hellström.



Finally, Hellström created assignments from the class reader and the exam questions Mr. Koziej used for past runs of the unit. He turned them into quests for students to pursue on the website Rezzly (Rezzly Education Technologies, LLC) during class time and as homework. Completing the quest assignments provided students with experience points, which leveled up their character skills. Thus, completing assignments about key economic concepts had in-game effects. That way, Hellstrom leveraged the game engagement as a positive incentive for students to learn about economics (Haskell 2013).

4. RUNNING THE GAME

When the unit began, Hellström presented the three grade nines with the scenario. The class constituted a colony of survivors emerging from their safe haven to explore the irradiated wasteland of post-apocalyptic Edmonton, Alberta. They would have to build their colony to avoid starving, deciding on how to govern their economy and manage resource scarcity. The three grade nines were playing this simulation in parallel on the same game map, accessed through Roll20, and so the three classes could discover each other's bases. When that occurred, they had to decide whether to co-exist peacefully or enter into conflict with each other.

The first sign that the game design had potential was when the students chose a location for their colonies on the map. All students chose to place their colonies in strategic locations with some form of connection to water. This decision, driven by a resource extraction analysis based on trying to minimize scarcity, is economic thinking on display, even though the students were unaware of that at the time. Even so, the Rezzly webtool confused students initially, and they had to learn how to navigate it, which always takes some time for first-time users. Once that was completed and they understood the game, it flowed smoothly.

A typical class proceeded as follows: Hellström presented a summary of student questions on course material submitted from the last class, and clarified key economics concepts as needed. Then, the simulation game started, continuing from where it left off last class, with Hellström introducing any new narrative twists or turns. Students then decided what actions their characters would take and those actions were resolved. The class ended with a 10 minute debrief session where Hellström connected their actions and used them to illustrate how students acted according to key concepts in economics. For example, students might be encouraged to forecast

how the cost of grub would develop over the next week. Hellström would then show the students how they used supply and demand mechanisms to do that forecast, and how that exercise mimicked the operation of contemporary stock markets.

Engagement was clearly on display in several ways. Students:

- Talked passionately about the game and economics during and between classes. Many of the students started negotiating across classes to plan their game actions.
- Designed innovative and well-motivated solutions for improving the colony, including sanitation systems, defenses, agricultural production, and art galleries.
- Specialized in skills when they noticed the resulting increase in cost-efficiency.
- Decided what government system the diegetic colony would use. One class chose to implement an oligarchic dictatorship and another class chose direct democracy. The play demonstrated the shortcomings of those governmental systems as students had to devote time to manage governance instead of producing the goods and services needed to improve the material standard of living.

This heightened engagement is consistent with research findings on the effects of using other types of games and gamification for learning (Prensky 2005; Deterding, et al. 2011; Sheldon 2012; Fui-Hoon Nah, et al. 2013; Haskell 2013).

5. POST-GAME CLASS DESIGN EVALUATION

When instructors use traditional, passive, teaching methods, students struggle to understand issues of macro-level economics: how society copes with scarcity and how government affects the economy and the distribution of goods in society. For example, governments may ask members of society to sacrifice their resources for the good of others. In the game play, students gained that deeper understanding of the effects of scarcity and the consequences of government decisions on the distribution of resources in society. Students were sometimes required to give up resources or complete tasks that they did not want to do to ensure they had the resources for survival. These moments in the game were often very emotional as students came to understand the difficult choices many societies must make when facing resource allocation issues. Students engaged in active debate over the possible positives, the

negatives, and the impact (long and short term) their decisions would have on their group. Some of the decisions led to positive outcomes, while other decisions put the group in very tough situations. This too deepened their understanding as they learned how a poor decision that gave short-term gain led to a larger long-term negative consequence for their society.

Students also developed deeper understanding of economic decision making at a micro level. That understanding came across in how they made decisions on what activities to undertake every turn. Thus, trading with each other, exploring, or designing an innovation for the colony all affected how many resources they had, could use, or could gain. Students often opted for skill specialization, much as people choose to develop their expertise in a particular occupation.

6. TESTING THE UNIT AGAINST MOCHOCKI'S CRITERIA

The first of Mochocki's criteria for an edu-larp is that the unit is mono-disciplinary and targets a single school subject. This unit fulfilled those criteria. It targeted the central concepts of economics consistently. Even when classes discussed colony governance, the continual focus was the consequences for economics. Mochocki's second criterion is that the edu-larp has to be knowledge-oriented, communicating textbook subject matter to students. In exam results of both multiple choice and short essay writing pieces, students were able to demonstrate a stronger and deeper understanding of the concept of scarcity than did previous student cohorts. They understood that sometimes societies must make very difficult decisions to ensure the vast majority of people have access to essential resources. Many found it difficult to answer the question, "How can some many have so much, as so many have so little?" After the game, over several weeks, Koziej's class discussions and debates centered on the topic of access to resources. The game generated some deep student thought and true engagement around issues of economic fairness, equality (gender, geographic, and political), and the effective use of resources to meet needs and wants. These findings and experiences are consistent with previous research showing that increased engagement tends to result in deeper learning (Sorcinelli 1991; Bates and Poole 2003; Twigg 2003; Hattie 2009). The unit thus did fulfill Mochocki's second criterion.

However, Mochocki's third criterion for a good edu-larp is that the larp is teacher-friendly and does not demand time-consuming preparations. The time

Hellström needed to design the unit was available to him as a student of education. It is not clear whether he would have been able to design the unit as a practicing teacher. Nor is it clear whether other teachers would be able to pick up the material and use it to teach their students. Thus, it may not fulfill Mochocki's third criterion. The edu-larp needs to be modified so that it becomes easily accessible for teachers who want to use a tool like this to teach economics.

The study is limited by the nature of the post hoc evaluation. This was not a planned study with a control group. Rather, it emerged as Mr. Koziej identified the value added of using the class design during the practicum and the need to capture the results. As such, an opportunity to run the unit once more with a control group would be welcome. The next step for Koziej, Haglund Hellström, and Mikael Hellström is to adapt the unit so that it becomes easily transferable and accessible for other teachers. For future research, Hellström is exploring the possibility to use edu-larps in immigrant settlements.

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