

Designing for Agency

How the game Feast of Proportions was created for learning.

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Abstract

Games have incredible potential to act as experiential learning opportunities by offering players agency that is not present in everyday life. Drawing from Thi Nguyen's theory of agency as an inherent aesthetic of games media, this thesis explores how games may be leveraged as a form of learning-by-doing in a pedagogical setting. This argument is explored through the analysis of existing games, as case studies, and my design prototype of a new augmented reality game, Feast of Proportions. John Law's material semiotics approach is applied to play and learning in order to understand the relationships between the designer, game, and player. The research through Feast of Proportions' design offers reflections on the iterative design of a game for learning and a final product that speaks to potential future for the application of games in education.

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Preamble

In my teaching practice as a K-12 math, science, and computer science teacher, I am oriented towards having my students engage in learning by doing. My identity as a learner, maker, tinkerer, and designer informs my teaching practice. As I matured as a math and science teacher, I researched how thinking by doing aligned well with the curriculum. At times, but not always, didactic lectures or Socratic seminars aligned well with other curriculum demands. However, these strategies cemented the student's identity as a student in formal education systems, not as a designer, inquirer, or creative. This tension led me to explore learning theory. I learnt that my teaching was rooted in the student-centred, constructivist theories of Dewey, Piaget, and Vygotsky. These theories pushed me to delve further into project-based learning, maker education, and constructivist education, yet I faced incredible tension between my perspective on teaching and school structures, curricula and student who just wanted a grade.

When I started teaching computer science and product design courses, I was freed further to delve into the dynamics of learning through doing. I noticed many parallels between game design and teaching when I started teaching game design. The tasks I was asking students to do, along with their struggles, mirrored what I was doing as a teacher, and the challenges I faced. Game design became a lens with which I could perceive the experience I was designing. I wondered how a deeper practice in game design would inform my teaching practice.

When I entered the Digital Futures program at OCADU I assumed that I would be working on interactive experiences, and that I could leverage my teaching practice to support and explore these experiences, but I was skeptical of this line of research. I am not a fan of edutainment media that puts educational content into games to make them more 'fun,' or of

gamification that creates point systems and achievements to reward 'learning'. However, this attitude changed while reading Thi Nguyen's book, *Games: Agency as Art*¹. His notion of player agency in games resonated with the value I saw in games and learning. One evening, while reading the book, I was also helping my partner, who is also a teacher, with her lesson plan. She was planning a fantastic activity where students wrote letters to a doctor and an aboriginal leader in traditional medicine to ask questions about health. She was running out of time for the activity, and I suggested they write the letter as a class. She didn't like this idea; she wanted them to take ownership of their action. She was designing the activity with their agency in mind. Educational theories have not effectively articulated what my partner knew, and I was starting to learn. This was the start of this thesis, exploring how games might be used to explain educational activities like those above. The results, presented here, also delve into some ways in which games are themselves educational experiences.

¹ C. Thi Nguyen, *Games: Agency As Art* (Oxford University Press, 2020).

Key Terms

Aesthetics (element of game): When used in relation to the technology, mechanics, and narrative of a game, the aesthetics represent the game's visual, audio, and tactile representations, often in a recognizable theme or style.

Aesthetics of agency: From Nguyen, this term refers to the judgments players can make on a game based on their experienced agency within the game. This is discussed further in Chapter 4.

Agency: This text refers to two related concepts of agency. First, from media studies, agency is the ability to take actions and see the outcome of those actions. Second, from actor-network theory, agency can be seen as all the possible relationships with all the objects (human and non-human) in an individual's environment, which may include potential interactions with those objects.

Agential Distance: The difference between the objects a game designer or learning designer inscribes in an experience and a player's actual experience when dynamically interacting with those objects and their mechanics.

Constructivism: A theory of learning that argues learners need to build knowledge out of pre-existing knowledge through interacting with their environment.²

Diegetic: In game studies, elements are considered diegetic when their presence is perceived through the character played by the player and not the player outside the game world. Audio is a commonly referenced game element that can be made diegetic, for example, music through an in-game radio.

Game Object: Both non-human and human, game objects are material, virtual, or

² Elizabeth Murphy, "Constructivism: From Philosophy to Practice," 1997, [Link to article](#).

imagined semiotic representations that serve some purpose in a game, which could related to the mechanics, narrative, or aesthetic function.

Ludic, lusory: Originally from Johan Huizinga, as he refers to non-real-world experiences of play and competition. Bernard Suits extends this notion to include lusory attitudes towards play and pre-lusory goals that define the prescribed end of a game.

Ludic Relationship: A term introduced in this thesis to build on Huizinga's notion of ludic spaces while taking a material semiotics approach that would argue these spaces are composed of many relationships between actors or objects. Ludic relationships are, therefore, built for the purpose of play or a game.

Mechanics: The designed behaviour of game objects in the game as they respond to player actions or the game's progression.

Network, web, assemblage: Coming from several related theoretical backgrounds, these terms emphasize that everything is relational. This thesis uses the term network when considering a single actor and a given set or relationships in its environment. The term web refers to a set of actors connected by many relationships. The term assemblage emphasizes that everything is connected materially and semiotically through space and time.

Para-linguistic Learning: The term used in this thesis describes learning that happens before or in spite of the abstract representation of knowledge through words and symbols. This learning is routed in the learner's identity and is exposed through their habits as they interact with their environment.

Pedagogy: "The art, science, and practice of teaching."³

Practice: A concept introduced in educational theory that points to professionals' disciplinary habits and skills that students should imitate to gain an appreciation for their work.

³ "Definition of PEDAGOGY," March 4, 2024, [Link to website](#).

Striving Play: From Nguyen, play is driven by the player's interest in the actions that can be taken in a game and their agency. It is opposed to achievement play that is driven by some external value such as glory or material gains.

Technology: Refers to how different objects (such as emergent technology tools) change the way we behave. The term comes from Ursula Franklin's perspective of technology as practice. In games, technology defines how players interact with the game's objects.

1 Introduction

How people learn is too complex to develop a single model for the types of experiences educational systems should value. Yet, current systems clearly emphasize abstract knowledge building to prepare students for standardised tests and credentialization. As Sir Ken Robinson put it, “we start to educate them progressively from the waist up and then we focus on their heads and slightly to one side.”⁴ My research inquires into some of the ways learning happens at the interface of learner and their environment. These environments, whether they are material, imaginative, virtual, or spiritual, give learners agency and this agency changes how they think, feel, and behave. This learning doesn’t need to be articulated or categorised, instead it exists before language - it is para-linguistic learning. Using games as a lens for the design of meaningful experiences, this research explores the notion of agency and its relationship to para-linguistic learning.

Throughout this thesis the term agency is used to describe two related ideas about how people interact with their environment. First, from interactive media theorist Janet Murray who defines agency as “the satisfying power to take meaningful action and see the results of our decisions and choices.”⁵ Second, through a new materialist, flat ontology, that looks at the world through the relationship between objects, both human and non-human, agency is seen as the amalgamation or assemblage of relationships an object holds.⁶ Murray’s definition can be seen as a particular instance of this broader, messier agency. A key text in my research is Thi

⁴ Sir Ken Robinson, “Sir Ken Robinson: Do Schools Kill Creativity? | TED Talk,” accessed February 15, 2024, [Link to video](#).

⁵ Janet H. Murray, *Hamlet on the Holodeck, Updated Edition: The Future of Narrative in Cyberspace*, Updated ed. edition (Cambridge, Massachusetts: The MIT Press, 2017), 126.

⁶ See: Ian Bogost, *Alien Phenomenology, or, What It’s like to Be a Thing*, Posthumanities 20 (Minneapolis: University of Minnesota Press, 2012) pp. 11-19; Diana Coole and Samantha Frost, “Introducing the New Materialisms,” in *New Materialisms: Ontology, Agency, and Politics*, 2018, 1–43 pp. 11-18.

Nguyen's book, *Games: Agency as Art*, in which he argues that "games constitute a library of agencies, in which we may discover and familiarize ourselves with new modes of agency."⁷

Throughout the examples of games presented in this thesis, a variety of agencies are explored. Of interest here, are the ways these agencies are created and how they might inform meaningful learning.

1.1 Research Through Design for Educational Games

An essential outcome of this research, that leans on research through design, is creating a game that attempts to leverage the lessons learned through literature reviews, precedence-setting games, and interviews with designers. The game *Feast of Proportions* started as an exploration into systems thinking practices, like those presented by Donella Meadows.⁸ Meadows' models of the acquisition and sales of goods, and of biological systems, presented valuable perspectives on the world. As the game evolved along with research into games for education, its purpose shifted towards player agency. The game aims to promote collaborative resource management, and uses augmented reality (AR) technology to bridge the affordances of both video games and board games. Video games support play by using computation to manage the game rules instead of the players, while board games tend to provide more tactile, interpersonal experiences. The game is further detailed and evaluated at the end of this thesis. Throughout this text, references to the creation and testing of *Feast of Proportions* are used to illustrate the connection between theory and design research. In these moments, the voice of the text changes to the first person, which is myself, the author, and the game designer.

⁷ Nguyen, *Games*, 76.

⁸ Donella Meadows, *Thinking in Systems: International Bestseller*, ed. Diana Wright, Illustrated edition (White River Junction, Vt: Chelsea Green Publishing, 2008).



Figure 1: *Feast of Proportions* game play.

Feast of Proportions is a two-player collaborative game that engages players in resource management. The two players act as community leaders on adjacent sides of the game board. Players look at the board through their mobile devices for information about the game. The players' only interaction is moving game pieces (trees) around the board. Their two communities have an annual feast every year, where it is a tradition to make a stew of ingredients found in the surrounding environment, such as shellfish, vegetables, and herbs found in varying abundance around the game board. Collectively, the players must collect as many ingredients as possible in equal proportions. Each player is responsible for two gatherers from their community. Using 3D-printed trees as markers, players send their gatherers to collect resources. Gatherers cannot travel to or through locations with a bear. Some locations have

powerups to increase the gatherer's speed or carrying capacity. After a set amount of time (15 minutes), the game ends, resources are combined, and the ingredients they have are the fewest of the stew their community can make. The Game Design Document for *Feast of Proportions* can be found in Appendix A: Game Design Document.

1.2 Games and educational activities

At the intersection of games and educational activities lies interactive experiences. These two modes of experience have more in common than most experiences life offers. Consider the intent with which the two modes of experience are designed. Both games and learning activities are designed with some goal, such as getting points, completing tasks, or solving problems, but the goal of the task is only present to engage the participant in the activity at hand. Nguyen calls this a motivational inversion.⁹ The distinction between the two is complicated because games are notoriously tricky to define. If someone chose to take a math test for fun and have it graded, could we consider that a game? Professor of Game Design Jeremy Gibson Bond hesitates to use the term game and instead prefers the term “interactive experience,” which he defines as “any experience created by a designer; inscribed into rules, media or technology; and decoded by people through play.”¹⁰ Under the assumption that learning can and often should be playful, both games and learning activities can be considered interactive experiences.

⁹ Nguyen, *Games*, 8.

¹⁰ Jeremy Gibson Bond, *Introduction to Game Design, Prototyping, and Development: From Concept to Playable Game with Unity and C#*, 3rd edition (Hoboken: Addison-Wesley Professional, 2022), 18.

To analyze and design interactive experiences, Bond builds on the work of game theorists to create what he calls the “layered tetrad,” which exposes more similarities between learning activities and games. The four parts of the tetrad include technology, mechanics, aesthetics, and narrative¹¹; each is discussed further in this thesis. These four parts are shown in Figure 2 within his layered model.

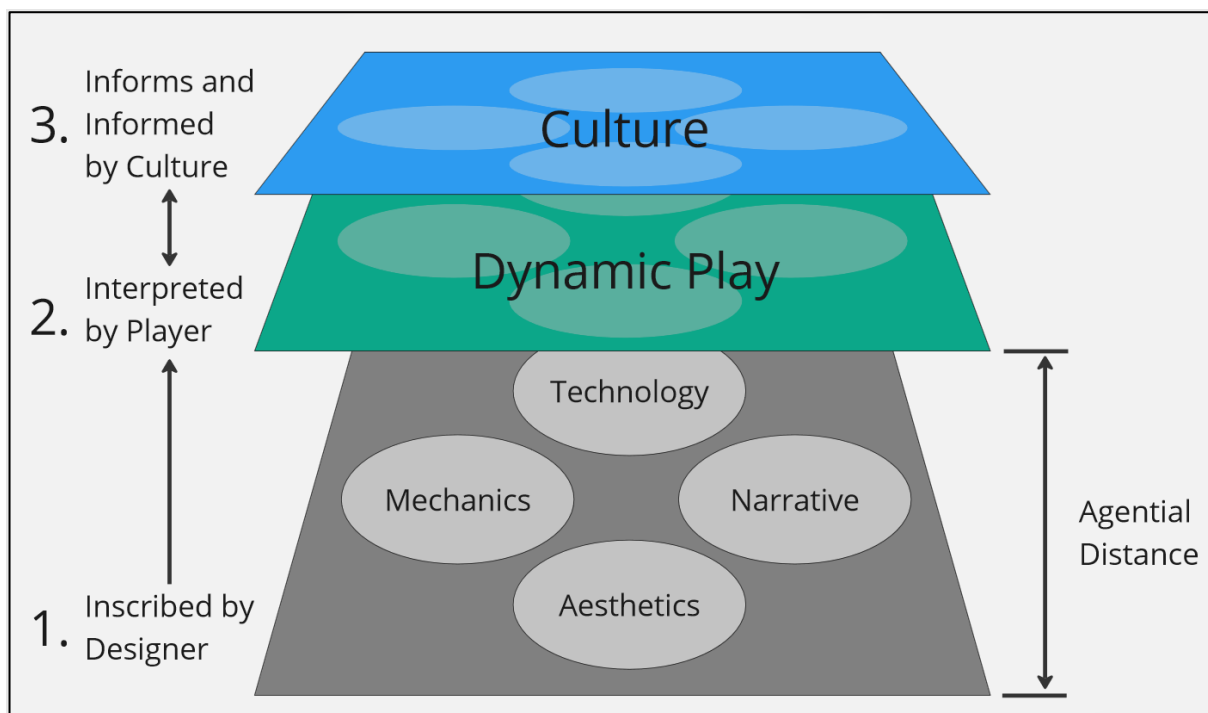


Figure 2: Interpretation of Bond’s layered tetrad that includes agential distance.

For now, Bond’s layers further demonstrate how educational activities and games serve as similar modes of interactive experience. The inscribed layer is the designed objects and rules of the interactive experience. This layer is put into action in the dynamic layer when players engage in the game. The distance between the inscribed and dynamic layers is both a challenge and an opportunity for interactive experiences. Designers need to test and refine their activities to ensure that the rules and boundaries of the activity promote the desired agency of

¹¹ Bond, *Introduction to Game Design, Prototyping, and Development*.

the player or learner. Still, it also means the player or learner has agency in the experience. Thi Nguyen calls this phenomenon “agential distance.”¹² The greater the distance between the game as inscribed by the designer and the game that is played, the more agency the subject of the experience has. The rules (or mechanics) of video games, board games, and sports form their agential distance. In table-top games like *Dungeons and Dragons*¹³, a facilitator, usually called the ‘dungeon master’ or ‘game master,’ facilitates the agential distance, such as creating boundaries of play or introducing new characters into the world. They adapt the game's rules, adding and removing game objects to promote the type of experience they desire for the players. In education, teachers often act as the dungeon master for learning activities. Otherwise, educational activities like tests and worksheets often have constrained tasks to limit the agential distance. Games, however, can expand the agential distance for learners within a desired set of rules that form a desired agency. The distance between the inscribed and dynamic layers is as important in learning activities as it is for games.

The third and outermost layer of Bond’s model is the cultural layer, which works in two directions, culture informs how the interactive experience dynamically unfolds through, as an example, playing a game and the experience informs that culture as players bring this experience with them; through sharing experiences, such as the creation of game modification (modding) or writing fan content based on the games narrative and characters. Similarly, education is culturally significant, preparing students for the society they are part of and used as a tool for social change or control. Bond’s model aids designers in attempting to see the full impact of design decisions.

¹² Nguyen, *Games*.

¹³ “Dungeons & Dragons | Official Home of the World’s Greatest Roleplaying Game,” D&D Official | Dungeons & Dragons, accessed March 14, 2024, [Link to website](#).

This research builds on the similarities between these two modes of interactive experiences, but it also needs to account for the differences. The most significant being the purposes of the two modes. A common misunderstanding is that games must be aimed at entertainment. Edutainment games and gamification attempt to coalesce this concept of entertainment into educational environments, with mixed success. However, Nguyen argues that the aesthetic joy of games comes from the opportunity to take on different agencies that may not be available in everyday life.¹⁴ Taking this view on the value of games means games for education don't need to be designed for enjoyment. Instead, they should provide the aesthetic qualities of capacity, action, and solution. Games need to be engaging (or even purposefully disengaging) to bring players into a learning about possible agency. Games for education should offer new forms of agency, regardless of fun, through imaginative worlds that engage players in meaningful ways. Unfortunately, what engages one individual in play won't necessarily be engaging for another, which leads to an even more problematic potential difference between games and education; play as voluntary. One of the earliest definitions of play was given by Johan Huizinga,

play is a voluntary activity or occupation executed within certain 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 consciousness that it is 'different' from 'ordinary life'.¹⁵

A significant difference exists between asking and requiring a student to engage in play. Requiring a student to play a game does not mean they will be playful. Removing the voluntary nature of play creates work. Games for playful learning will always have a dialectic tension between play and work that cannot be resolved. It can be accounted for by providing opportunities to spectate an activity or to remove oneself from an activity.

¹⁴ Nguyen, *Games*.

¹⁵ Johan Huizinga, *Homo Ludens: A Study of the Play-Element in Culture* (Beacon Press, 1955), 27.

Similarly, when there are required objectives for an activity, such as specific skills to practice or explicit knowledge to be memorized, the playfulness can be further removed. Another way of saying this is that when a student's agency is constrained, the agential distance of the activity becomes too short to allow for an aesthetic of agency. Some of the biggest constraints on games being used for learning, particularly in schools, are the restriction on curriculum, school rules, and classroom dynamics. They leave little room for longer agential distances.

The corollary to voluntary play is the idea that learning experiences need to have some sort of concrete outcome that learners can take with them to their lives or future learning experiences. Teachers are often encouraged to present students with why a learning activity will be valuable to them in the future. Play, on the other hand, is meant to be spontaneous and emergent. My research doesn't accept the notion that learning needs to be concrete. Yet, the cultural expectations and systems of schools and curricula demand that it is addressed to a certain degree.

To summarize, games and learning activities have a lot in common. They are both designed with intent, but the designer only inscribes parts of the experience because the participant needs to decode them into a whole experience, within a cultural context. While it may seem like games and learning experiences have different goals, when Nguyen's perspective is taken around the aesthetic of agency, both can be seen as aiming to engage participants in potentially new agencies. However, the optional nature of games will always be in tension with the prescriptive nature of many formal educational systems. Through this introduction, the questions of 'How can games be used in education?' becomes 'How can games be used for learning new agencies?'

1.3 Scope of learning activities

The design perspectives presented in this thesis are not for the sole purpose of classrooms and schools. The systems and structures of schools, from their walls and technology to their timetables, curriculum, and report cards, encourage teachers to be oriented in a certain way, specifically towards lectured instruction and other teacher-led activities. School leadership has increasingly worked to disrupt this system through flexible scheduling, interdisciplinary projects or courses, and student-directed learning credits. Teachers also use and design activities that work inside and despite of the system. However, there will always be tensions between goals and expectations. When presenting design ideas to educators, they often ask, “how do you see this being used,” with the assumption that the design needs to follow school structures. There is also an assumption that learning needs to happen in schools or other official learning environments. While this work doesn’t aim to be critical of these environments, it is critical in the broadest sense of how learning happens. This work doesn’t speculate on a possible future of education. Instead, it aims at experiences that learners can engage in despite any school structures, technology-filled futures, or grade level of learners.

Following the opportunities that Nguyen’s notion of agential distance provides, the aims of the experiences explored here do not expect learners to build domain knowledge. Instead, it aims at the tacit, para-linguistic knowledge students gain in their relationships with environments, other people, and themselves. The distinction between linguistic and para-linguistic knowledge isn’t new. William James’ observed a distinction between “knowledge about” and “knowledge of acquisition,” which he sees as procedural: “The words *feeling* and *thought* give voice to the antithesis. Through feelings we become acquainted with things, but only by our thoughts do we know about them. Feelings are the germ and starting point of

cognition, thoughts the developed tree.”¹⁶ More recently, Nonaka and Nishiguchi use the distinction to encourage organizational leaders to explore the dynamics of institutional knowledge. They distinguish between ‘explicit knowledge’ that “can be expressed in words and numbers and shared in the form of data, scientific formulae, specifications, manuals, and the like” and tacit knowledge that “is highly personalized and hard to formalize.”¹⁷ They see tacit knowledge as difficult to verbalize and “is deeply rooted in an individual’s action and experiences, as well as their ideals, values, or emotions he or she embraces.”¹⁸ It is impossible to separate these two forms of knowledge, as both continuously reform an individual’s understanding of the world. David and Alice Kolb argue these two types of knowledge are dialectic. In that, learners “must be able to involve themselves fully, openly, without bias in new experiences” and also “be able to create concepts that integrate their observations into logically sound theories.”¹⁹ Both need to happen despite the affordances of different experiences and the dispositions of the learner. This research focuses on tacit knowledge through direct experience while accepting that explicit knowledge about the world is needed for any experience and will grow because of the experience.

This thesis uses the term ‘para-linguistic’ instead of tacit, because the type of learning sought here isn’t absent of language, instead it is what comes before abstract words and symbols. It is a term most commonly used in affect theory and additional language education.²⁰

¹⁶ William James, *The Principles of Psychology*. (Henry Holt and Company, 1913), 222, [Link to article](#).

¹⁷ Ikujiro Nonaka and Toshihiro Nishiguchi, *Knowledge Emergence: Social, Technical, and Evolutionary Dimensions of Knowledge Creation* (Oxford University Press, 2001), 14.

¹⁸ Nonaka and Nishiguchi, 14.

¹⁹ Alice Y. Kolb and David A. Kolb, *The Experiential Educator: Principles and Practices of Experiential Learning* (Kaunakakai, HI: Experience Based Learning Systems, 2017), 26.

²⁰ Donovan O. Schaefer, *The Evolution of Affect Theory: The Humanities, the Sciences, and the Study of Power*, Elements in Histories of Emotions and the Senses (Cambridge New York, NY Port Melbourne New Delhi Singapore: Cambridge University Press, 2019), [Link to article](#); Elsadig Mohamed Khalifa and Habib Faddal, “Impacts of Using Paralanguage on Teaching and Learning English Language to Convey Effective Meaning,” *Studies in English Language Teaching* 5, no. 2 (May 18, 2017): 295, [Link to article](#).

Effectively describing para-language, Schaefer describes affect theory as

aspects of embodied life that emphasises the role of non-linguistic and non- or para-cognitive forces. As a method, affect theory asks what bodies do — what they want, where they go, what they think, how they decide — and especially how bodies are impelled by forces other than language and reason.²¹

Para-linguistic learning therefore calls for changes to the habits of individuals through changes to their environment. The learning sought in this research considers what individuals say and don't say, do and don't do. It is a form of learning that has been of increased interest in education.

A growing body of work in education is adapting to the changes caused by new information and communication technology, like the internet, mobile phones and, more recently, artificial intelligence tools. These technologies impact education in two ways using James' terms: First, they place an over-emphasis on *knowledge about* the world, and second, the forms of *knowledge of acquaintance* these technologies create with objects and other people are rapidly changing. Chris Dede summarizes this change by saying, "for the first time in human history people are inundated by enormous amounts of data that they must access, manage, integrate, and evaluate."²² In education, the body of work aiming to adapt to these changes calls for '21st Century Skills', emphasizing skills such as innovation, collaboration, adaptability, and social responsibility. Dede compares 20th-century learning with 21st-century learning by arguing, "education's ultimate objective is learning a specific problem solving routine to match every situation, rather than developing expert decision making and metacognitive strategies that indicate how to proceed when no standard approach seems applicable. Around the world, governments are adopting educational standards that include these skills."²³ The American Next

²¹ Schaefer, *The Evolution of Affect Theory*, 1.

²² Chris Dede, "21st Century Skills: Rethinking How Students Learn," in *21st Century Skills: Rethinking How Students Learn*, ed. James A. Bellanca, 1st edition (Bloomington, IN: Solution Tree Press, 2011), 52.

²³ Dede, 53.

Generation Science Standards include practices such as modelling and asking questions, arguing that the standards “must take into account that students cannot fully understand scientific and engineering ideas without engaging in the practices of inquiry and the discourses by which such ideas are developed and refined.”²⁴ While research that focuses on para-linguistic knowledge is limiting in the context of educational systems, the development of explicit knowledge-building games is far too common for the needs of a 21st century learner. The games chosen for study in this research do not aim for explicit knowledge-building. The focus is on para-linguistic skills such as those demanded by ‘21st Century Skills.’

1.4 Scope of games

Play in games takes many forms, from free and open play, commonly engaged in by young children, to the serious play of training exercises and creative activities of professionals. Mary Flanagan argues that critical play happens at all levels where the play “means to create or occupy play environments and activities that represent one or more questions about aspects of human life.”²⁵ This research focuses on gameplay, which incorporates all these forms of play while being part of an instance of “constructed play scenarios.”²⁶ In work on game design, two crucial distinguishing factors emerge: Games have rules that govern the boundary of play, and they have “a quantifiable outcome/goal, an ending state in which players can either be considered the ‘winners’ or the ‘losers.’”²⁷ Nguyen presents two additional forms of gameplay: Striving play, driven by the aesthetic act of playing, and achievement play, which focuses on the

²⁴ National Research Council et al., *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas* (National Academies Press, 2012), 218.

²⁵ Mary Flanagan, *Critical Play: Radical Game Design* (Cambridge, Mass. London: MIT Press, 2013). 6.

²⁶ Katie Salen Tekinbas and Eric Zimmerman, *Rules of Play: Game Design Fundamentals*, Illustrated edition (Cambridge, Mass: The MIT Press, 2003) as cited in Flanagan. *Critical Play*, 80.

²⁷ Flanagan, *Critical Play*, 80.

notions of winning and losing.²⁸ Nguyen's thesis on the aesthetics of agency exists within striving play. This thesis's reliance on his work is also limited to striving play. Both forms of play can happen simultaneously in an experience, as points are an essential tool for tracking the game's progress and creating a currency of exchange. All the examples of games chosen motivate striving play. None include scoreboards, leaderboards, or explicit recognition for the winner if there is one.

Another important distinction in the evaluation of games and the choice of exemplar cases presented in this thesis is the designer's intent versus the player's agency. A repeated mantra for game designers is to 'follow the fun.'²⁹ However, if the design of learning experiences requires certain behaviours or habits to emerge, unlike games for entertainment that can shift in favour of play that might make the game more commercially successful. It is another instance of the tension between play's voluntary nature and education's prescriptive nature. Sandbox games like *Minecraft* and *Roblox* have proven helpful in constructivist educational practices. Within these games, teachers can implement specific goals to direct the play. However, the original design of these games was meant to provide players with an opportunity for open play. Educationally, these games are more interesting for how learners create their own environments and goals. Games of interest in this research have been designed with set goals or objectives for players.

²⁸ Nguyen, *Games*.

²⁹ Jason Vandenberghe, "The 4 Fs Of Game Design," *Game Developer*, December 2012, [Link to article](#).

1.5 Methodology

Interactive experiences are what Bruno Latour would call hybrids as they span both the technical and the social domains of research.³⁰ To study the design of games for learning, the social and psychological context of the player needs to be considered while simultaneously looking at the game design strategies put into the game. For example, Nguyen uses aesthetics to observe player motivation, while Bond's layered tetrad effectively illustrates the elements of games. The two texts indirectly speak to each other, and this work is interested in that intersection. When looking at learning, this research focuses on the learner's relationship with actors, both human and non-human, that make up the play experience. The material nature of objects and the semiotic significance of those objects need to be considered in parallel. This hybrid approach to interactive experiences requires a perspective that works across domains, zooms in to the personal experience, and zooms out to social context and natural phenomena³¹. Latour's actor-network theory provides this perspective.

Material semiotics, an analytical research method built out of actor-network theory, treats all phenomena as interacting actors that form stable webs of semiotic meaning. The notion of an actor is very loose. John Law presents an incomplete list to demonstrate its breadth; "objects, subjects, human beings, machines, animals, 'nature,' ideas, organizations, inequalities, scale and sizes, and geographical arrangements."³² For Law, everything is relational. A person's ability to sit in a chair is only possible because of the chair's affordance of being sat on, the chair's history of manufacturing and its location in a room. The approach to

³⁰ Bruno Latour, *We Have Never Been Modern*: (Cambridge, MA: Harvard University Press, 1993).

³¹ Ontologically, this research follows Latour's pre-modern or non-modern world view, as it necessarily requires weaving between domains and in and out of scopes provided by the flat ontologies of material semiotics.

³² John Law, "Actor Network Theory and Material Semiotics," in *The New Blackwell Companion to Social Theory* (Oxford, UK: Wiley-Blackwell, 2008), 142, [Link to article](#).ch7.

interactive experiences presented in this thesis follows Law's description of the process; "to trace how they pattern themselves in weaves, webs, or networks, and to explore the consequences of their patterning."³³ This research focuses on objects within games and questions why the designer included them and their effect on the player as a learner.

The case studies presented throughout this thesis are needed to work through the breadth of theory introduced. Additionally, the cases chosen aim to explore the technical aspects of games that expose Nguyen's notion of agency, sitting well with a material semiotics approach that looks at the multitude of agencies within a network. As a method, case studies "investigate a contemporary phenomenon (the "case") in depth and within its real-world context."³⁴ The phenomenon under study extends from the design of games to how they are played. This is a significant methodological challenge, as the notion of a 'real-world' demands that data can be collected throughout this phenomenon. While multiple sources of data have been collected in this research, including gameplay by the author, secondary sources of research on the use of games, and interviews with game designers, the breadth of data is not consistent across each case. Ideally, detailed notes on the games' design and gameplay would be collected. Instead, different data sources have been gathered for different cases, such as close readings of games that the author has played, surveys of designer perspectives, and secondary sources of research. In a sense, the breadth of data collected should be seen as studying a particular case of game design for player agency, while each instance of this case is used to navigate through the web of networks between designers and players. Law's perspective on material semiotics supports this navigation through connections within and between contexts, which "takes social inquiry to be contexted and situated which means that impartial overviews are impossible. But most of all, it is because the approach works through

³³ John Law, "Material Semiotics," *Open University*, January 2019, 3, [Link to article](#).

³⁴ Robert K. Yin, *Case Study Research*, 5th edition (Los Angeles: Sage Publications, 2013), 16.

cases in which theory and the empirical cannot be levered apart.”³⁵

The weaves followed throughout this research are driven by and drove the research through the design of *Feast of Proportions*, as modeled in Figure 3. The author, as a designer, gained sensibilities to the practice of game design. Law comments on this as

a set of sensibilities to practice, to process, to the weaves of materiality and narrative, to the irredeemably situated character of those weaves (its own included), to difference, and to the idea that there is no single machinery at work behind the complexities of the social.³⁶

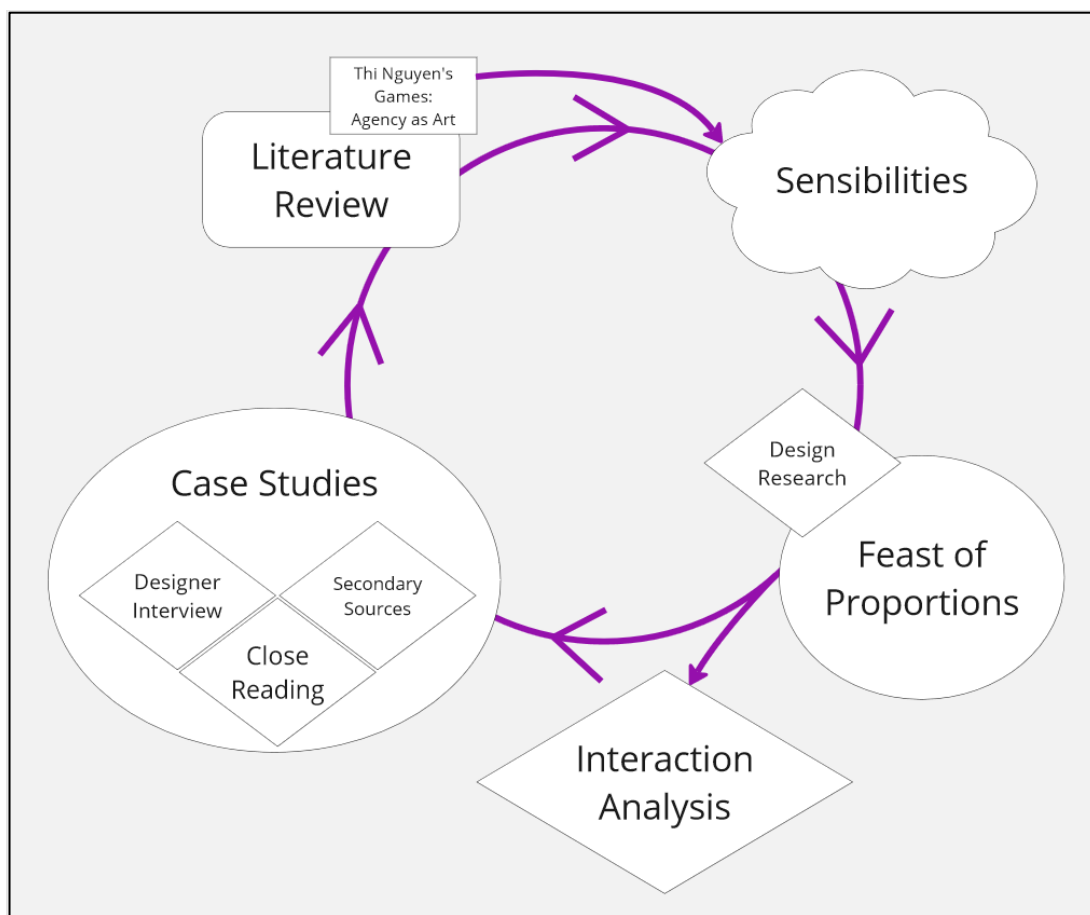


Figure 3: Research process as a cycle.

The design of the game shifted focus between sensibilities observed in the cases, such

³⁵ Law, “Material Semiotics,” 2.

³⁶ Law, 15.

as when the game objects were made less abstract, or when power-ups were added to the game to encourage more interesting decisions for players. Zimmerman and Forlizzi's description of research through design states, "designers move iteratively between phases, developing sketches, models, and prototypes along the way to producing an ultimate particular in the form of a *thing* that suggests a future state."³⁷ The future state that *Feast of Proportion* suggests crosses both the technical and social. The game's technical achievement is in its innovative use of augmented reality on mobile devices. Although this technical achievement is not the aim of the research, its novelty helps suggest future educational uses of games. It illustrates the sensibilities developed through the case study, informing the opportunity and challenges of developing games for learning.

A final method, multi-modal interaction analysis is presented in Figure 3 and Figure 4. This method was seen as an outcome to evaluate the effectiveness of *Feast of Proportions* at engaging players in collaboration resource management. However, it fell outside the scope of this master's thesis. It is worth noting this method here as it played an important role in framing the goals of the game's design. As described by researcher Carey Jewitt,

The focus is on the action taken by a social actor with or through multimodal mediational means, that is, how a variety of modes are brought into and constitutive and social interactions, identities and relations, with a particular interest in habitus and embodiment.³⁸

Jewitt also notes that in the design of the method, it is critical to keep the unit of analysis in consideration. For *Feast of Proportions*, the unit of analysis started as any instance of communication between players and evolved into this communication at key points during the game play, particularly when the game's design called for collaboration. Through each iteration

³⁷ John Zimmerman and Jodi Forlizzi, "The Role of Design Artifacts in Design Theory Construction," *Artifact: Journal of Design Practice* 2, no. 1 (March 1, 2008): 42, [Link to article](#).

³⁸ Carey Jewitt, ed., *The Routledge Handbook of Multimodal Analysis*, 2 edition (London New York: Routledge, 2016).

of the design this perspective served in making design decisions. Although a full analysis wasn't completed in my research, it is recommended for future study at the end of this thesis. While a full interaction analysis wasn't completed, playtesting was completed to gather data on how player's engaged with the game, including a reflection on how well they collaborated. A game testing plan can be found in Appendix B: Game Testing Plan.

1.6 What Lies Ahead

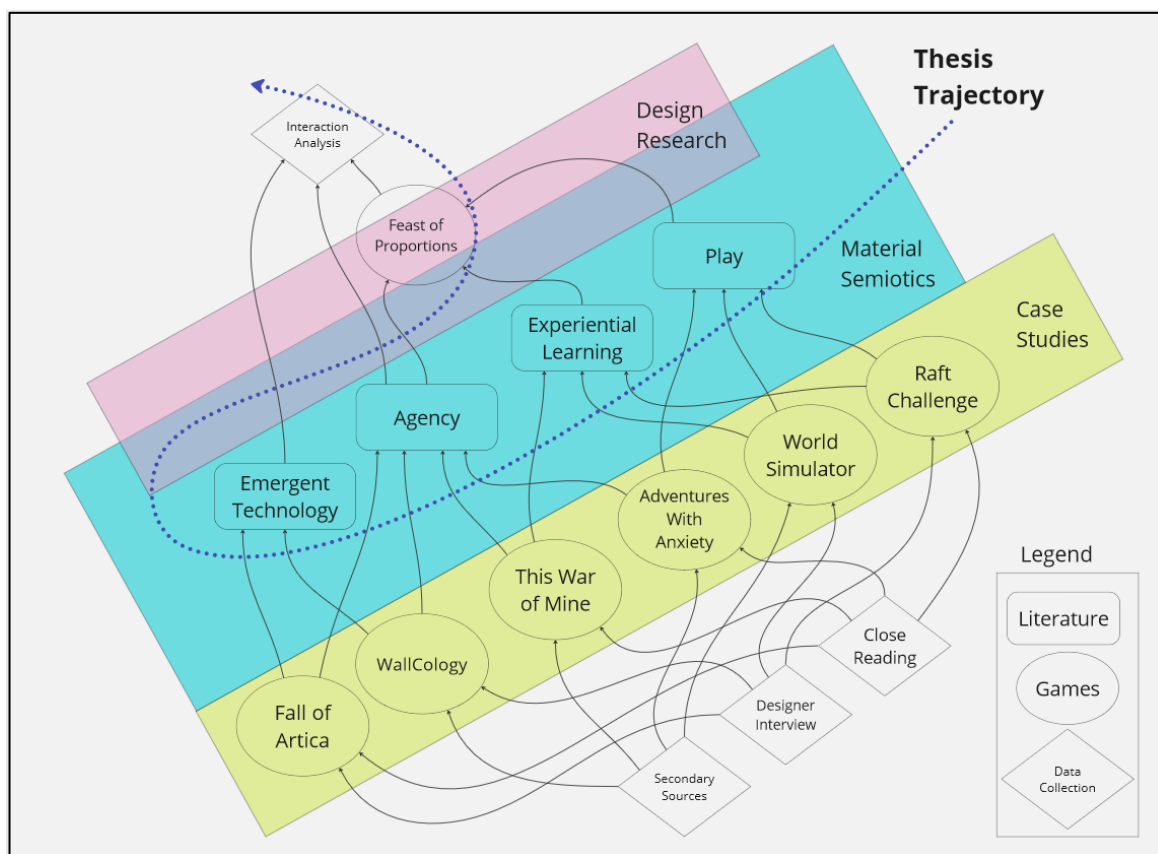


Figure 4: Thesis trajectory through the data acquired in the research.

This introduction has presented many concepts that will carry through the chapters that lie ahead. Bond's layered tetrad, represented in Figure 2, with the all-important dynamic layer and its agential distance, will be developed to identify how games may support the para-linguistic aspects of 21st Century Skills. The trajectory of this thesis is driven by the theories that

support a material semiotic analysis of games for learning, and how these theories drove the development of *Feast of Proportions*, as presented in Figure 4. These sensibilities support in answering the research question: How might games be used for para-linguistic learning? Through the games studied, this question is answered by exploring how games engage players in meaningful agency. Additionally, this research considers how player agency in games is extended and limited, to answer the question: What is a valuable balance between learner agency and designer intent in games for learning.

This thesis continues with Chapter 2: On Play, where games are approached from two perspectives: that of the game designer and that of the player. The theory presented develops the necessary vocabulary for the rest of the text. The sensibilities gathered from the theories provide a framework for analyzing the games. In Chapter 3: On Learning, two learning theories support games for para-linguistic, guided play-based, and experiential learning. As neither of these fully defines the type of learning sought here, a new learning model is proposed that includes the learner's environment, identity, and habits. Chapter 4: On the Aesthetics of Games focuses on the arguments presented by Nguyen for the value of games as offering an aesthetics of agency. Then, through the case studies, his theories support the value of reflection on the experiences games offer. In Chapter 6: Research Through Design, the learnings from designing *Feast of Proportions*, discussed throughout the text, are summarized, and filled in with points on the technology used, the ludic relationships in the game and the effectiveness of the game's goals. The concluding chapter summarized the sensibilities that were developed throughout the research in answering the research questions.

2 On Play

Games can be seen as networks of actors or objects, both human and non-human, that relate to each other, the player, and their cultural context. For the remainder of the text, the term game object will be used instead of actor, or even worse game actor, which could be taken out of context. How do designers choose and build these objects to ensure they have a meaningful role in the experience? Where should an analysis of a game start, and to what ends? The goal of a game complicates player relationships with game objects, which is discussed in section 2.2 Play Theory. Bond's layered tetrad provides a helpful vocabulary for how these objects relate to the player. In contrast, a broader understanding of play theory will support the distinction between the agency of the objects and the agency given to the player. These theories and perspectives on play, are needed to understand how games may be used for learning.

2.1 Layered Tetrad

The four game elements presented by Bond were originally theorized by Jesse Schell³⁹. Schell's elemental tetrad comprises interrelated technology, mechanics, aesthetics, and narrative elements. The aesthetics of a game, unlike the proposed aesthetics of agency for Nguyen, is primarily based on the look and feel of the game. While the cultural implications of a chosen aesthetic are worthy of analysis, this is beyond the scope of this study. Notably, a game's chosen aesthetics have important implications for the semiotic representation that can drive gameplay. Similarly, the narrative of gameplay is often taken as the explicit story that a video game may provide. However, as seen in Chapter 4, the transformations of player agency are equally an interesting narrative worth considering. Like the phases of a chess game, its

³⁹ Jesse Schell, *The Art of Game Design: A Book of Lenses, Third Edition* (Milton, UNITED KINGDOM: CRC Press LLC, 2019), [Link to book](#).

opening, midgame, and endgame, games often have an emergent story throughout the play. Unlike the aesthetics and narrative features of games, a deeper understanding of the technology and mechanics of game elements is needed to support the analysis of games in this thesis.

In Schell's terms, the technology of a game refers both to the technology in terms of things, "such as paper and pencil, plastic chits, or high-powered lasers,"⁴⁰ and in terms of practice, as they enable the game "to do certain things and prohibits it from doing other things."⁴¹ Bond focuses on things "such as console hardware, computer software, rendering pipelines, and such,"⁴² which helps plan a game's design but doesn't support a deeper analysis. Instead, the game object's networked role with the player is better considered through *technology as practice*, which Ursula Franklin describes well as "the way things are done around here."⁴³ In this sense, technology refers to the agential interface between players and the presented game objects. This could be the randomness of a dice role, WASD keys in a first-person video game, or the creepy sounds that alert the player of danger in a horror game.

The game's mechanics are consequentially the interface between the game objects and the game rules, how those objects are meant to behave with respect to the gameplay. As Schell describes,

Mechanics describe the goal of your game, how players can and cannot try to achieve it, and what happens when you try. If you compare games to more linear entertainment experiences (books, movies, etc.), you will note that while linear experiences involve technology, story, and aesthetics, they do not involve mechanics, for it is mechanics that make a game a game.⁴⁴

The mechanics in board and social games are often described in a rule book, and the players

⁴⁰ Schell, 54.

⁴¹ Schell, 54.

⁴² Bond, *Introduction to Game Design, Prototyping, and Development*, 34.

⁴³ Ursula Franklin and Michelle Swenarchuk, *The Ursula Franklin Reader: Pacifism as a Map (Between the Lines, 2006)*, 137.

⁴⁴ Schell, *The Art of Game Design*, 28.

must interpret the rules before playing. The mechanics in video games, existing as lines of code, can be introduced in less direct ways, often only requiring brief tutorials or help menus.

In material semiotics, everything is relational, and everything is performative. Therefore, Bond's dynamic layer of a game that emerges when playing the game isn't unique to games. As Law describes in speaking about economics and biology:

We are no longer dealing with construction, social or otherwise: there is no stable prime-mover, social or individual, to construct anything, no builder, no puppeteer... Rather we are dealing with enactment or performance. In this heterogeneous world everything plays its part, relationally. The shift is easily misunderstood, but it is crucial. The metaphor of construction – and social construction – will no longer serve.⁴⁵

Studying the designer's inscribed perspective alone cannot fully describe the experience of playing a game. The designer needs playtesting to develop the sensitivity to a player's response to game objects, the designer isn't a puppeteer. With the goal of developing sensibilities that explain both the designer's and player's perspectives, a brief review of play theory is needed to understand the nature of play, and the dynamics of agential distance.

2.2 Play Theory

Play theorists have worked to understand the role of play in society and the different forms it can take. In recent years, theorists have been applying new materialism, such as material semiotics, to unfold the web of play. However, as early as 1938, Dutch cultural theorist Johan Huizinga defined play as freedom from ordinary life, creating order, and not dependent on material interests.⁴⁶ Through this definition, Huizinga argues that contests, even those that involve life or death, are fundamental cultural phenomena. This definition is too broad for the type of play sought here, but importantly, his emphasis on the human necessity for play underlines a cultural function. In 2005, Bernard Suits took a different approach to play theory,

⁴⁵ Law, "Actor Network Theory and Material Semiotics," 255.

⁴⁶ Huizinga, *Homo Ludens*.

focusing on the playful attitude or ‘lusory attitude’ and how games create this attitude through ‘lusory means’ that achieve ‘pre-lusory goals.’⁴⁷ In golf, the pre-lusory goal is getting the ball in a hole. In real life there are several means by which you could get the ball to the hole, but the rules of golf limit these to a lusory means of hitting the ball with a stick. Suits provides an essential perspective on games and play:

In games, of course, we are interested only in means which are permitted for winning, and we are now in a position to define that class of means, which we may call lusory means. Lusory means are means which are permitted (are legal or legitimate) in the attempt to achieve prelusory goals.⁴⁸

Suits’ notion of games and its relationship to goals inspired much of Nguyen’s thesis, leading him to say: “Goals, abilities, and environment: these are the means by which game designers practice their art. And we experience the game designer’s art by flexing our own agency to fit.”⁴⁹ This definition of the game designer’s role fits all the above criteria for play. Suitsian goals and Huizinga’s environments freed from everyday life, can be taken together to engage in how play emerges.

2.3 Feast of Proportions: Game Concept

In the early stages of developing *Feast of Proportions*, I was stuck on using flowing resources for systems thinking, inspired by systems diagrams in the “Thinking in Systems” book.⁵⁰ I imagined players adjusting flows that cause feedback effects and trying to move liquid or some resource from point A to point B, maybe collaboratively or competitively. However, this idea was fraught with challenges that the play theorists aid in describing. The play was very pragmatic and only culturally significant for the discipline I decided to use. Civil engineers would

⁴⁷ Bernard Suits and Thomas Hurka, *The Grasshopper: Games, Life and Utopia* (Peterborough, Ont: Broadview Press, 2005).

⁴⁸ Suits and Hurka, 51.

⁴⁹ Nguyen, *Games*, 1.

⁵⁰ Meadows, *Thinking in Systems*.

benefit from a game of fluid flow, economists for a game of supply chain dynamics. This limitation locked the game into more of a simulation than a game. Choosing the appropriate mechanics was also challenging. Randomness was needed, but that randomness needed to be hidden and at the same time knowable. Similarly, the types of interactions, like adjusting flow rates or changing directions, was abstract and unrelated to the possible goals of the game. While thinking critically about the goal of the game, it made the most sense to collect resources. In seeking a culturally agnostic theme, I started seeing food, a cross-cultural phenomena, as an essential object of play. The themes, gameplay and gameboard emerged from this idea.

2.4 Objects of Play

Toy designer Cas Holman creates interesting toys that spur children's imagination. Her toys are purposefully abstract. She argues that “most toys come with pre-defined identities and stories, which rob children of the joy of imagining these things.”⁵¹ With her toys, children get to do their own meaning-making, such as Riggamajig shown in Figure 5.

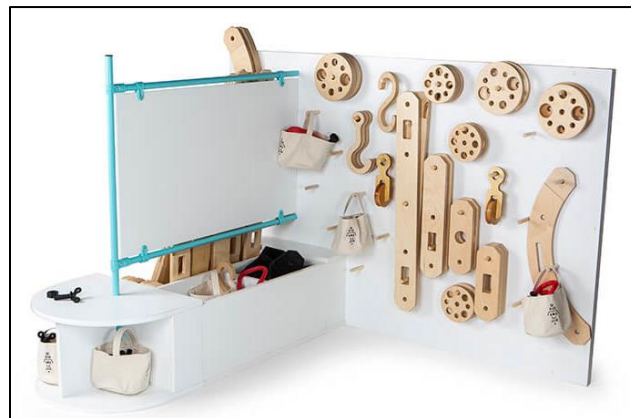


Figure 5: Children's toy, "Riggamajig" by Cas Holman. Cas, Holman. "Workshop-Panel-1.Jpg (JPEG Image, 800 × 538 Pixels)." Rigamajig. Accessed April 24, 2024. [Link to website](#). Used with permission.

⁵¹ Cas Holman, "The Case For Letting Kids Design Their Own Play," Fast Company, July 13, 2015, [Link to article](#).

While Holman designs her toys for free play, unlike this research that is aimed at the more structured form of games, her understanding of imagination and play and the relationship players have with objects is essential for understanding how the objects in games can promote or deter a playful attitude.

Understanding the relationships between designer and game objects, as actors in a network of play and the relationship between players and game objects are essential for a material semiotics analysis of games. While black boxing a game as a whole cultural actor is possible and common in materialist approaches to games, this won't serve to understand how games for learning agencies can be designed. In one sense, a game object, like a dodgeball being thrown by a child, can be seen as an instance of Bond's layered tetrad. The ball is a technology with its own aesthetic, it plays a role in the narrative of the game and has underlying mechanics that serve the player in taking lusive means to achieve the game's pre-lusive goals. In another sense, the ball and player consist of a network of relationships. Part of the relationship is physical, the ball's weight, texture, and throwability; part is cultural, the player's knowledge about their throwing ability, dodging ability, and their past enjoyment of the game; part is ludic, in that holding the ball gives a player the ability to get an opponent 'out.' Huizinga uses the term ludic to refer to the "non-serious" nature of play.⁵² "The most we can say of the function that is operative in the process of image-making or imagination is that it is a poetic function; and we define it best of all by calling it a function of play – the *ludic* function, in fact."⁵³ When taken from the material semiotics perspective of everything being relational, this ludic function can be seen as made up of ludic relationships. When a father pretends to be a monster to chase around his child, they are creating a ludic relationship in the play. The designer of games needs to consider how these relationships mesh or conflict with possible physical or

⁵² Huizinga, *Homo Ludens*, 30.

⁵³ Huizinga, 25.

cultural relationships the player may hold. The designer should also be interested in how the ludic relationships are created, maintained, and destroyed. Much like Holman's toys that aim to be devoid of cultural relationships, thus supporting original ludic relationships, game designers need to carefully choose the symbolism of an object to support ludic relationships.

2.5 Case 1: Raft Crossing

This first case study comes from a former middle school teacher of the author, Chris Clark, who has a lengthy teaching history filled with engaging activities for his students. In 1997, he wrote a book filled with over 300 activities for teachers to engage their students, the cover page is shown in Figure 6. Under the "Initiative Tasks" section is the activity called *Raft Crossing*. The simplicity and physicality of this game lends itself well to fully articulating what ludic relationships are and how they can be analyzed in this research.

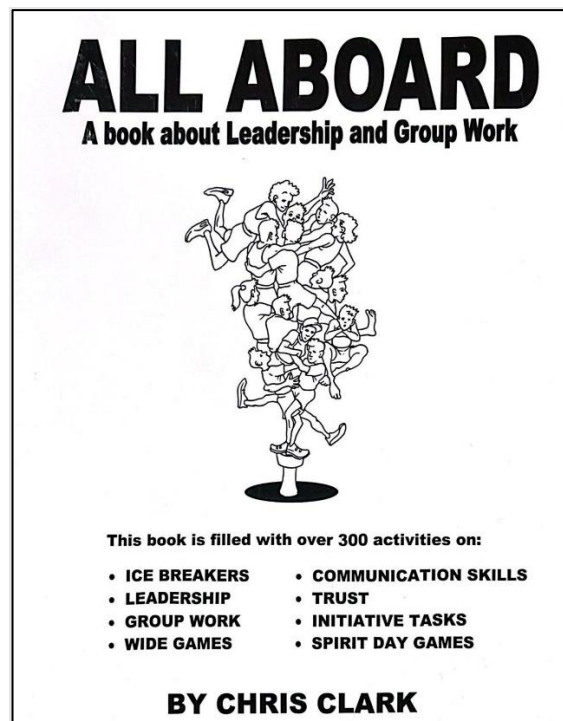


Figure 6: Cover of Chris Clark's book, with children balancing much like in Raft Crossing *All Aboard: A Book about Leadership and Group Work* (Unpublished Book, 2000), [Link to website](#). Used with permission.

The activity starts with the players standing on benches at one end of a gymnasium. The teacher tells the players that “they are in a safe place for the time being, but their job is to get to the opposite side where there is another safe place and a ‘transport beam’ or ‘escape rocket’ that will take them out of this volatile area.”⁵⁴ And that the rest of the room is covered with a toxic substance. They have life rafts in the form of gym mats, milk crates or whatever the teacher can find, that can help the students in their mission. However, if anyone touches the toxic waste, that individual must go back to the start. A bog monster (the teacher) is also in the toxic waste, who likes to steal transport pads, placing the teacher in a diegetic role within the game, rather than an external facilitator controlling student behaviour from outside the game world.

As players start their mission, different ideas for solutions emerge from students. They start taking risks. Transport pads may sometimes become pushed out of reach, creating a subgoal of recovering the rafts. With practice, the players get better at maneuvering atop the rafts, holding each other steady, and passing rafts in the direction a group is headed. If the teacher wants to increase the challenge, they will put on the bog monster role and try to steal a raft when it’s not in use. Eventually, players make it across, or not. While Clarke advises against making tasks too difficult at the start, he also encourages teachers not to go easy either; “time and time again, I have watched groups of children and groups of adults accomplish the impossible.”⁵⁵

For an analysis of the ludic relationships in a game, a good place to start is how those relationships were created. In *Raft Crossing*, the teacher’s instruction creates the ludic relationships between the players and their environment, the floor, walls, benches, and milk

⁵⁴ Chris Clark, *All Aboard: A Book about Leadership and Group Work* (Unpublished Book, 2000), 334, [Link to website](#).

⁵⁵ Clark, 16.

crates. It's surprising how quickly our minds accept new meanings for objects. For the players, the physical affordances of a milk crate change with these new meanings. How many people can fit on it? How hard is it to hold and lift? And the objects respond in kind. Its dimensions are observed, its weight and texture felt, and the stability, when stood on, is tested. All with the means of getting to the other side of the gym because it isn't just a milk crate, it's the players' last chance for survival, or at least it's the only way the player can achieve the goal within the game's rules.

While the start of this game sets the ludic relationships in motion, these relationships aren't static. As mentioned earlier, actor-networks aren't stable, and their changes are particularly interesting. The constructivist nature of the game means that the players drive many of these changes. Their choices, decisions, and reactions change how the objects are used or could be used. When the first player falls into the toxic waste, returning to the start reinforces that particular game mechanic. Players will need to decide how to rescue their fallen partner, reinforcing collaboration and encouraging players not to fall again. The bog monster also plays a role in the difficulty of the game. As the facilitator, the bog monster may engage more or less.

To wrap up the analysis on *Raft Crossing*, a look at how the ludic relationships break down and connect back to real-world relationships is needed. As described by Cindy Poremba, 'brink' games are games that purposefully bridge the "game/reality border."⁵⁶ Understanding this bridge helps navigate the dialectic relationships between imagination and concrete experience. Poremba directly addresses this tension in relation to the optional nature of games:

As internally-situated observers of reality, it is fair to say brink games (as a subset of all games) risk co-option, or at very least dismissal. However, by virtue of second-order observation, brink games open up the possibility for creating fissures in the foundations and structures of nongame realities implicated in the play by allowing for a higher level reflective stance that is not isolated within the game.⁵⁷

⁵⁶ Cindy Poremba, "Critical Potential on the Brink of the Magic Circle," 2007, 772.

⁵⁷ Chris Clark, Interview, Conducted by Tyler Beatty, January 2, 2024.

In some ways, *Raft Crossing* is purposefully a brink game. Players need to make physical contact as they navigate on top of the rafts. The game provides a space for purposefully breaking down typical personal boundaries, particularly for middle-school-aged players. From the trust required in these interactions, the game's mechanics push players to build confidence in trust-giving. For the teacher, this game is an exercise in collaboration. Clark often used the game to prepare for outdoor excursions where his students would need to rely on each other as they travelled, worked, and explored together. As the bog monster and facilitator, the teacher can frame and adjust the challenge, address unacceptable behaviours, and prompt reflection on what went well and what didn't.

2.6 Critical Play

In Mary Flanagan's book *Critical Play: Radical Game Design*, she argues that games and objects of play reflect culture through the forms of engagement they evoke, and the types of engagement people seek. Through this perspective, all popular games are a critical reflection of culture. Games and objects of play also offer a medium where the critical actions of subversion and activism can occur. Certain games point a critical lens directly at aspects of culture. Ian Bogost calls these persuasive games "that make arguments about the way systems work in the material world."⁵⁸ Flanagan makes a provocative statement highlighting this aspect of critical play, saying:

To twentieth-century critic Walter Benjamin, it is only through the intensification of everyday experiences that social change can occur. Play, in this case, could function not only to attract players from across the social spectrum but also to revolutionize culture by expressing what might otherwise manifest as dangerously suppressed desires.⁵⁹

⁵⁸ Ian Bogost, *Persuasive Games: The Expressive Power of Videogames*, 1. MIT Press paperback ed., [Nachdr.] (Cambridge, Mass.: MIT Press, 2010), 47.

⁵⁹ Flanagan, *Critical Play*, 89.

While *Raft Crossing* isn't meant to be critical of culture, the fact that identity-forming activities like it are reserved for extra-curricular activities and have little place in school structures points to critical questions about schools. What counts as a meaningful activity? How could curriculum documents better support collaborative learning? And how are teachers trained to be effective bog monsters?

2.7 Feast of Proportions: Representations for Play

To promote ludic relationships in *Feast of Proportions*, abstract shapes and figures on the material objects could allow players to imagine the world in their own way. However, information about the world can also be imbedded in the physical representations of a more detailed object.

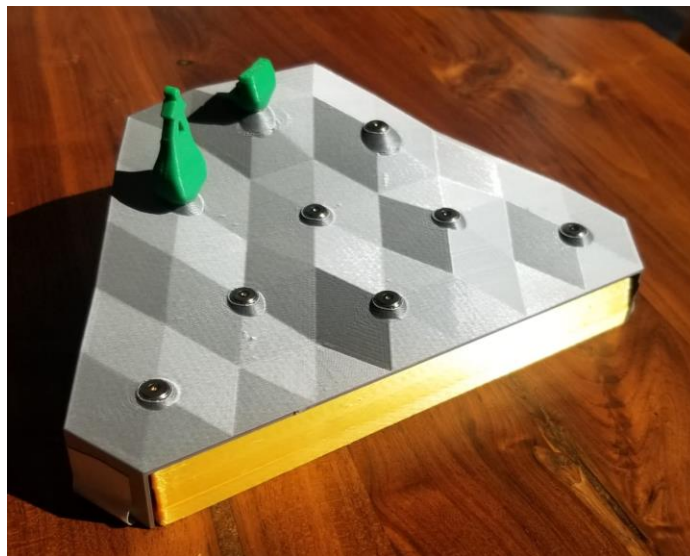


Figure 7: Original game board design.

While I was prototyping the technology and aesthetic for the early versions of *Feast of Proportions*, I used more abstract shapes and objects in the game board, as shown in Figure 7. While the tessellated gameboard challenged players to imagine the game world for themselves, it also meant more explanations were needed to get the players into that world. This appears to

be a challenge that arises from trying to blend the physical and virtual worlds, through augmented reality. The abstract forms limited my ability to communicate the goals of the game and the forms agency to engage in. In the next iteration of the game, I included a geography that would communicate geographic areas and flags for the markers of that would guide characters through the space, as shown in Figure 8.

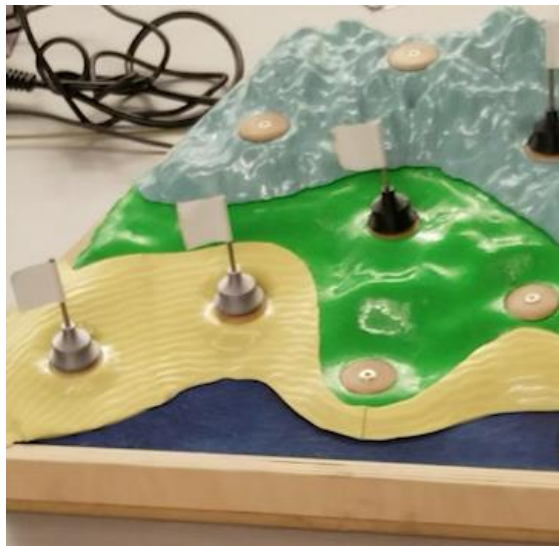


Figure 8: Game board with flags on game pieces.

There was however a tension that I was reminded of throughout early play tests of the game. The flags represented a colonial relationship with the land countering the desired cross-cultural nature of the game. This feedback demonstrated the critical play nature of all games, that play is pervasively critical. Although the flags gave me, as the designer freedom to adapt those markers as needed, I later decided to make the marker's trees to reinforce the player's relationship with nature. Similarly, play testers regular wondered how the game could be critical of the over extraction of resources and effects on biodiversity of the geography during play. It seems there is an ever present tension between achieving agential goals by providing clear representation and opportunities for critical reflection about the world.

This chapter has introduced two separate but connected perspectives on games. From

the designer's perspective Bond and Schell define game elements for the designer to consider, and from the player's perspective the theories presented here demonstrate how and why play happens. These theories set the stage for considering how games intersect with learning. Critical play and persuasive games play important roles in considering how games blend into the player's real-world lives.

3 On Learning

This chapter inquires into how the imaginative object-oriented relationships in games can create purposeful learning opportunities. Within the study of games for learning, Elizabeth Gee and James Paul Gee (2017) describe the nature of humans in their environment effectively when they say, “humans can imagine what might happen before they act. They can role-play other people and even other elements of their environment to imagine the consequences of their actions,”⁶⁰ pointing to the ludic relationships introduced in the previous chapter. If games offer new space to imagine and explore they can also teach things about ourselves and our relationship with other environments, as Gee and Gee argue, games “teach us things about the real world, about language and learning, and about ourselves and our minds.”⁶¹ In early childhood education (ECE), the success of play-based learning epitomizes the way play can teach students, such as teaching relationships between objects, social norms, or practical skills. This thesis risks falling into the incorrect notion that play is meant for children, by including ECE play-based as John Dewey cautions in 1916,

Theory, and—to some extent—practice, have advanced far enough to recognize that play-activity is an imaginative enterprise. But it is still usual to regard this activity as a specially marked-off stage of childish growth, and to overlook the fact that the difference between play and what is regarded as serious employment should be not a difference between the presence and absence of imagination, but a difference in the materials with which imagination is occupied. The result is an unwholesome exaggeration of the phantastic and "unreal" phases of childish play and a deadly reduction of serious occupation to a routine efficiency prized simply for its external tangible results.⁶²

Progressivist theorists like Dewey have driven much of the theory behind play-based learning. However, play and games are still largely not seen as a viable teaching tool for older students,

⁶⁰ Elisabeth Gee and James Paul Gee, “Games as Distributed Teaching and Learning Systems,” *Teachers College Record*, 2017, 8.

⁶¹ Gee and Gee, 10.

⁶² John Dewey, *Democracy and Education: An Introduction to the Philosophy of Education* (United States: Macmillan, 1916), 77, [Link to e-book](#).

echoing Dewey's concerns. While the world of games is different today than it was over a century ago, researchers continue to question why games aren't widely adopted in education. Young Kyun Baek surveyed teachers in South Korea and found the most dominant factors limiting the use of games for teaching tools to be the constraints imposed by the curriculum, possible negative effects of games, and student readiness. Bourgonjon et al. identified the preparedness of teachers as an essential consideration. On the other hand, some exceptions to this trend include games for social and emotional learning⁶³, computer simulations for technical training, and games for professional training and team building⁶⁴. All these uses fall under the umbrella of experiential learning as presented by educational researchers Alice and David Kold. Their work is detailed further in this chapter. Because their model doesn't explicitly identify how knowledge is developed in experience, a possible model for how players gain knowledge is provided to support a deeper analysis of learning games for engaging in new agencies.

3.1 Play-based Learning

In ECE, guided or purposeful play has become a valuable pedagogical practice. It builds off progressivist educational theory and is a focus of many innovative programs like Montessori and Reggio Emilia Schools. Cognitive scientist Deena Weisberg and her colleagues describe

⁶³ Robyn Hromek and Sue Roffey, "Promoting Social and Emotional Learning With Games: 'It's Fun and We Learn Things,'" *Simulation & Gaming* 40, no. 5 (October 2009): 626–44, [Link to article](#).

⁶⁴ Aida Azadegan, Johann C. K. H. Riedel, and Jannicke Baalsrud Hauge, "Serious Games Adoption in Corporate Training," in *Serious Games Development and Applications*, ed. Minhua Ma et al., Lecture Notes in Computer Science (Berlin, Heidelberg: Springer, 2012), 74–85, [Link to article](#).

guided play as

child-directed and can take a number of paths within a play setting. In guided play, teachers might enhance children's exploration and learning by commenting on their discoveries, co-playing along with the children, asking open-ended questions about what children are finding, or exploring the materials in ways that children might not have thought to do.⁶⁵

The effectiveness of guided play has been studied in many contexts. Kayleigh Skene and her colleagues conducted a meta-analysis of this research and argued that “guidance during inquiry- or discovery-based learning benefited science and maths outcomes when compared to traditional teaching.”⁶⁶ They observed less significant results for other learning areas but noted that the research conducted on these areas was less thorough. Furthermore, they challenge much of the research in “that the level of child choice being provided to children is often less than the amount that is conceptually framed as being needed to cultivate children's agency, motivation, and curiosity in learning encounters.”⁶⁷ In other words, not all play-based teaching strategies offer a reasonable agential distance. Skene and Weisberg's emphasis on guided play being more effective than free play for learning supports this thesis's constraint on games that structure student agency rather than sandbox or creative tools. An important question for this research is how these same principles can be applied to older students. Why is similar research less common among older students? Skene, as described in the educational scoping of this thesis, also points to 21st-century skills as a potentially valuable area of study.⁶⁸ Assumably, these para-linguistic skills are researched less because they are difficult to study empirically.

⁶⁵ Deena Skolnick Weisberg, Kathy Hirsh-Pasek, and Roberta Michnick Golinkoff, “Guided Play: Where Curricular Goals Meet a Playful Pedagogy,” *Mind, Brain, and Education* 7, no. 2 (2013): 105, [Link to article](#).

⁶⁶ Kayleigh Skene et al., “Can Guidance during Play Enhance Children's Learning and Development in Educational Contexts? A Systematic Review and Meta-Analysis,” *Child Development* 93, no. 4 (2022): 1176, [Link to article](#).

⁶⁷ Skene et al., 1177.

⁶⁸ Skene et al., 1178.

3.2 Experiential Learning

Experiential learning is often referenced as an effective model of learning in studying play and games for educating older students. The experiential learning theory (ELT) presented by David Kolb over four decades ago has been the most widely accepted model for work placements, problem-based learning, and project-based learning. The theory is built on the experiential learning model and the learning style inventory. Kolb's learning model, in Figure 9, is presented as a cycle of four learning modes, with opposing modes being dialectic, in that focusing on one moves you further from the other. The learning style inventory came out of Kolb and Kolb's experience with applying the model, finding that different individual engages with each mode differently.

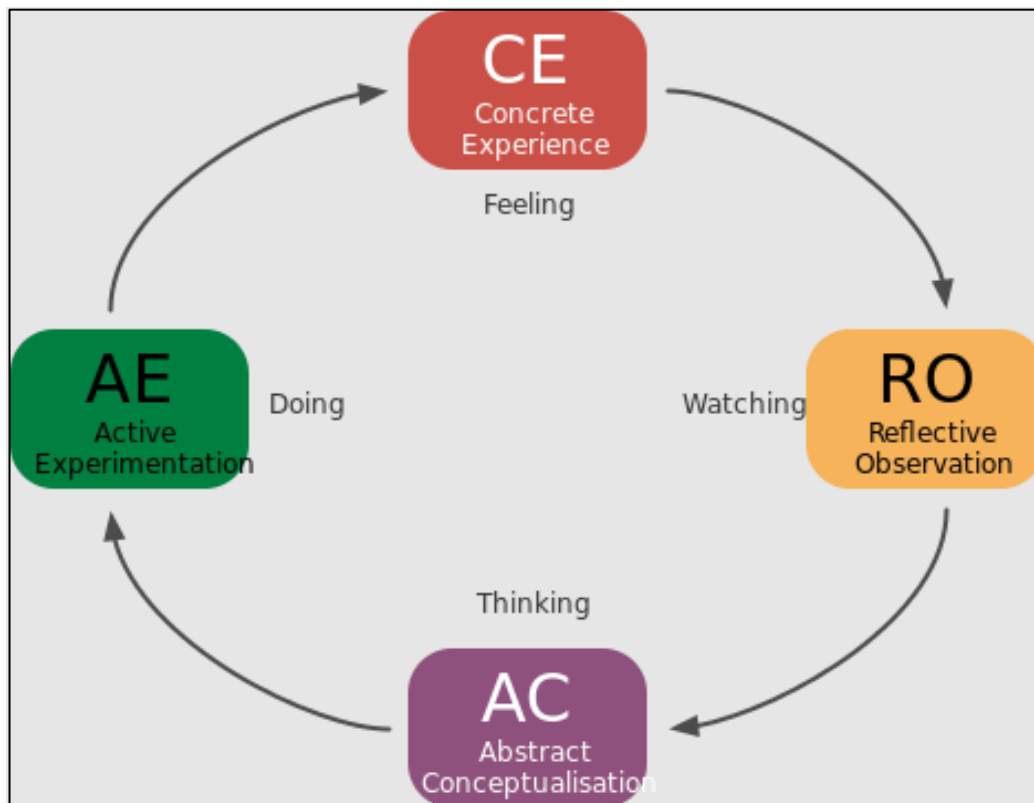


Figure 9: Kolb's experiential learning model
 "File:The Four Steps in Kolb Cycle.Svg," in *Wikipedia* [Link to website](#). Used under Creative Commons License

Unlike the research for this thesis, the ELT is not meant for designing experiences, instead it aims to make the most of an experience for the purpose of learning. However, the breadth of research and experience using the model is valuable for considering how learning through experience happens.

The focus of this thesis correlates to Kolb's 'concrete experience' learning mode. How this mode relates to the other three supports the potential extent to which ELT can be applied to games. Concrete experiences, diegetically opposed to abstract conceptualization, are deeply connected with the material world that can be sensed and interacted with. In reflecting on the work of William James' psychological theory of learning of 'knowledge about' and 'knowledge of acquisition', Kolb and Kolb note that "humans acquire knowledge through two independent but connected modes of knowing, one dealing with subjective sense experience and the other with abstract thoughts and concepts."⁶⁹ In their studies on how different professions tend towards different modes, they identified social professionals and social scientists as being more interested in concrete experiences. In contrast, technical jobs and those who study the physical sciences prefer abstract conceptualization. In education, they note that elementary education covers a broader range of modes, but as students become more specialized, they specialize in certain realms through social orientation.⁷⁰ The author, as a teacher, has had first hand experience with students who are oriented to concrete conceptualization, and struggle with the messiness of learning-by-doing.

The modes adjacent to concrete experience cycle towards and away from abstraction. Kolb and Kolb see active experimentation as turning abstractions into meaningful experiences. In comparison, reflective observation is the process of encoding experience into abstract ideas. Active experimentation could play an important role in gameplay, such as how players in *Raft*

⁶⁹ Kolb and Kolb, *The Experiential Educator*, 9.

⁷⁰ Kolb and Kolb, 35.

Crossing negotiate their new ludic relationships with the rafts as they try to cross the hazardous space. More importantly, they experiment with their interpersonal relationships within the new ludic space. On the other hand, reflective observation points to the notions of critical play that speak to how the game orients students to aspects of the real world. The trust and team building in the game will undoubtedly inform future interpersonal relationships between students, directly pointing to Clark's labelling of the activity as an "initiative task."

Kolb and Kolb also speak directly to the value of games as experiences. They argue that,

learners achieve deep learning through the integration of intellectual, physical, moral, and spiritual values in a free and safe space that provides the opportunity for individuals to play with their potential and ultimately commit themselves to learn, develop, and grow.⁷¹

In Kolb and Kolb's paper on the value of play through the case study on a regular pick-up baseball game hosted by an Organizational Behaviour department at a university.⁷² They point at several aspects of players that make it a valuable learning experience. They see the voluntary, uncertain, and flexible rules as providing a welcoming experience for players of all skill levels. They also point to an idea of 'play signals' that work to introduce new players to the game without any formal explanation. These same signals help everyone in balancing competition and free play. In their interview with players, they found that the learning from the game went beyond the skills of the game:

Many, however, reported learning that was deeper and more personal, contributing to their personal growth and development in all areas of their life. They spoke of gaining courage to fail, of controlling negative emotion and competitiveness, of developing empathy and personal authenticity. What was striking was that most often they attributed this learning not to any teacher, coach or other person but to the nature of the space created by the game itself, what we are calling the ludic learning space.⁷³

⁷¹ Kolb and Kolb, 284.

⁷² Alice Y. Kolb and David A. Kolb, "Learning to Play, Playing to Learn: A Case Study of a Ludic Learning Space," *Journal of Organizational Change Management* 23, no. 1 (2010): 26–50, [Link to article](#).

⁷³ Kolb and Kolb, 45.

Kolb and Kolb borrow heavily from Huizinga's theory of play in their definition of ludic learning spaces, contending that play should not be considered a non-serious activity, but "that play is an activity of utmost seriousness which is played out within a 'consecrated spot' mentally and physically, with strict rules of its own."⁷⁴

3.3 Case 2: World Simulator

This case is another, more recent, product of Chris Clark. *World Simulator*⁷⁵ acts as a contrasting case to *Raft Crossing* while maintaining the capacity for a similar material semiotic analysis. Unlike *Raft Crossing*, which takes place within an hour with very material technology, *World Simulator* takes place over multiple play sessions. *Raft Crossing* could function without any teacher intervention as a bog monster, while *World Simulator* depends heavily on the teacher acting as a game master. Clark calls *World Simulator* a fusion of *Dungeons and Dragons*, *Risk*, *Sim City*, and *The Game of Life*. Through an interview with Clark and the vast array of resources on his website, the following is a loose summary of how *World Simulator* would be played out.

Players are introduced to the game with a five-page list of rules and descriptions of how the game is played. They are also tasked with researching the country their group has been assigned to play in the game. When players enter the room, tables for each country are laid out in a circle, with the game master's table separated slightly from the country. The game master acts as the World Bank and other countries with which the players may need to interact. Like the bog monster in *Raft Crossing*, this places the teacher diegetically within the game world.⁷⁶ At the center of the room is a table with the world map, with pins locating forests and mines,

⁷⁴ Kolb and Kolb, 30.

⁷⁵ Clark, "Simulations," Engaged Student, accessed February 29, 2024, <https://engagedstudent.weebly.com/simulations.html>.

⁷⁶ Rodney D. Myers Reigeluth Charles M., "Designing Games for Learning," in *Instructional-Design Theories and Models, Volume IV* (Routledge, 2016).

which can be seen in Figure 10.



Figure 10: Students playing World Simulator.
Clark, "Simulations" Used with permission.

Each country's table contains a folder and an envelope. The folder contains expense report they will fill in at the end of the play session and a news report that outlines problems each country is facing and problems all the countries are facing collectively. The envelope contains paper notes representing resources such as money, industry, education, and natural resources. The play session has four stages: the news cycle, when the news is read, the trade cycle when players negotiate with other countries to gain the resources they need to solve their problems, a war cycle when players may choose to go to war with other countries, and a global council cycle when the countries have an opportunity to solve their problems collectively. The final session of the game drastically changes when aliens colonize Earth. The game master acts as the aliens, supported by dramatic videos of possible actions players might take against them (often

referencing the film *Independence Day*).⁷⁷ The countries' final task is to write a treaty to be approved by the aliens for how they want the citizens of their country to live.

The problems presented to the countries start as an introduction to the systems embedded into the simulation and slowly grow in complexity. For example, the first news bulletin often includes a dictator nation demanding resources from all countries with the threat of a nuclear attack. Unbeknownst to the players, the threat isn't real. This provides an interesting but ultimately meaningless problem to be solved. Meanwhile, each country is facing its own problems such as terrorism, social unrest, or economic turmoil. These problems orient the players towards their ludic relationships with resources, their team members, and the other countries. As players act on the problems, the game master complicates the problems even further, deepening these ludic relationships.

What makes this a simulation and not quite a game, is that the players get to choose their own goals as they solve the problems. Some may aim to accumulate wealth, others are fighting climate change, and others may be looking for an opportunity to fight a war. It is the role of the game master to manage these goals within the larger context of the simulation's pedagogical purpose. Clark knows that the skill set of a good game master is a unique one. They need to act out their roles, respond to how students solve problems to maintain a desired level of agential distance, and plan future problems to guide students through the simulation, much like an ECE teacher engaging with students in a guided play session. Being a game master requires considerable amount of skill and training to facilitate the game.

Part of the value of *World Simulator* is rooted in the changes to the player's ludic relationships with the resources in the game and with the other countries. A more significant part of its value comes at the end when aliens invade. It is purposefully designed to create an

⁷⁷ *Independence Day* (20th Century Studio, 1996).

opportunity to reflect on what it means to live in a post-colonialist country. During a personal interview with Clark, he calls this the “Treaty Simulation” and describes its importance well:

The treaty simulation is so powerful because the game is so powerful. They [the students] are holding on throughout the entire alien invasion. They’re like: “Maybe the game still lasts. Maybe we can still play. Maybe we can still do it.” Some of them have tears. “No this is our world, we’ve built this country and you’re destroying it.” So, they’re holding out hope to the last possible second that they might actually still get this thing.

We [teachers] can clinically teach about the fact that Europeans came over and did all this stuff to indigenous people and took all this land. What does it really mean to take? I can’t really understand it. I need something taken away from me by a superior military technological force for me to truly go, “ohhh!” [In the simulation] we haven’t actually taken anything from them, it’s something that we gave to them in the first place. To truly understand it [colonialism], I need to come take your car and not give it back for real. You’d understand. Well, I can’t do that, but I can give you something that’s fun and not even tangible. And then I can take it away. Then we have conversations about it. This is your microscopic little taste of that because in the end you still go home, with all your belongings.

While Clark argues *World Simulator* can address the entire grade 8 social study curriculum, in the end, *World Simulator* is designed for the agential experience of loss, something that can only be achieved through an interactive experience. Isbister argues that games, unlike any other medium, can create emotions of pride and guilt.⁷⁸ When these emotions are applied pedagogically, the learning is profound.

3.4 A model for knowledge building

Kolb’s ELT provides a helpful lens for seeing *World Simulator* as an experiential learning opportunity. It treats the activity as a whole to consider how different learning modes could be implemented through the experience. Still, the ELT doesn’t help in identifying the relationships in the game. ELT can’t articulate the power of the Treaty Simulation Clark describes. For this, a model of para-linguistic learning is needed. One that centers on the objects learners interact with and think about. In Figure 11, a proposed model for learning places knowledge of the

⁷⁸ Katherine Isbister, *How Games Move Us: Emotion by Design*, First MIT Press paperback edition, Playful Thinking Series (Cambridge, Massachusetts London, England: The MIT Press, 2017).

learner's environment at the center. Learners build knowledge of their material, spiritual, imaginary, and virtual environments in two ways: on the left, it is informed by the emotional, affective, reactionary identity of the learner. On the right are recallable abstractions, mental models, and taxonomies stored in the learner's memory.

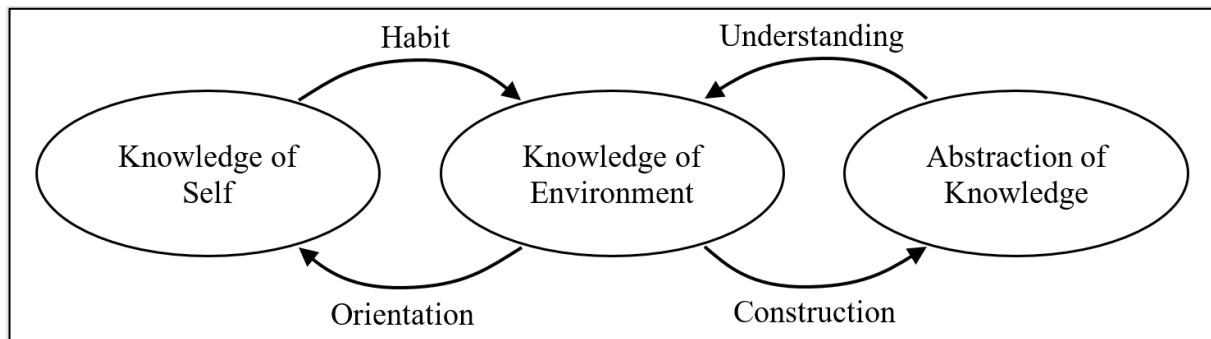


Figure 11: Proposed model of knowledge building that center's on the learner's knowledge of their environment.

Each arrow in the model represents how knowledge is reinforced and developed through experience. On the right side of the diagram, abstract knowledge 'transfers' to spatially or temporally new environments through understanding. Wiggins and McTighe's developed the backwards design framework 'understanding by design' that makes this form of knowledge building the starting point for curriculum design. Conversely, constructivists hold that abstract knowledge is only constructed through engaging with new environments. The separation of abstract concepts emphasizes the para-linguistic nature of the model's left side despite the tight entanglement of the model.

Our bodies - holding notions of self - cannot be spatially separated from their environments. In the model, separating the self from their environments, the left side defines an individual's agency. The perception of self is formed through experience, specifically the human and non-human actors in the environment, as perceived by the individual. This notion of how objects direct bodies is detailed in Sara Ahmed's interpretation of her queer identity and summarized as a process of orientation. Michalinos Zembylas uses this process in his argument

that the formation of new habits for social transformation can only happen through environments that “bring established habits into conflict with and give rise to new habits.”⁷⁹ This model situates individuals as a network of knowledge-building agents engaging with other actants in their environment. It defines habits as the part of agency informed by identity and informs a perception of actions on environments.

3.5 Orientation And Habits

Zambylas makes a meaningful reference to "mind-body-environment assemblages" presented by Bennett et al. They call for theorists to revisit habits to uncover "body-society relationships" rooted in non-human agents. They argue:

The processes through which habits are formed and re-formed have to take account of the imbrication of human conduct within socio-material environments in which the agency of deceptively simple things, like schoolroom desks, complex infrastructures, like logistical systems, and regional ecologies have to be taken into account.⁸⁰

Similarly, Nguyen emphasizes environments as being one of three tools game designers have, the other two being goals and abilities. In the two games presented so far, it is clear how the environments shape the experience. In *Raft Crossing*, when the teacher calls the gym floor toxic, the player takes this abstract knowledge to form new knowledge about their imagined environment. This environment orientates them to new habits of movement and social interaction. In *World Simulator*, players co-create an environment built through both abstract learning about the real world, and actions taking place around them. Through this experience their identity becomes tightly entangled with the imagined world, giving the game master the power to truly reorientate their real world identity when it comes to colonization.

⁷⁹ Michalinos Zembylas, “Dewey’s Account of Habit through the Lens of Affect Theory,” *Educational Theory* 71, no. 6 (2021): 776, <https://doi.org/10.1111/edth.12505>.

⁸⁰ Tony Bennett et al., “Habit and Habituation: Governance and the Social,” *Body & Society* 19, no. 2–3 (June 2013): 19, [Link to article](#).

Sara Ahmed's use of the term orientation effectively describes the entangled relationship between individuals and their environment. Three of her ideas, orientation, background, and line, support my thesis on agency. In describing the ways her queer identity was oriented in her own environment, Ahmed frames orientation nicely in saying:

It is important that we think not only about what is repeated, but also how the repetition of actions takes us in certain directions: we are also orientation ourselves towards some objects more than others, including not only physical objects (the different kinds of tables) but also objects of thought, feeling, and judgement, as well as objects in the sense of aims, aspirations, and objective.⁸¹ (p. 56)

Through any interaction, she argues, bodies shape environments and environments shape bodies. She furthers this idea by building on Husserl's notion of background. What is common or expected becomes the background of experience. She points out that, "this disappearance of familiar objects might make more than the object disappear."⁸² When objects and their usefulness disappear into the background, they become familiar and expected. They become part of a 'line' that informs the spaces we inhabit, and to be 'out of line' is, from Ahmed's experience, to be queerly oriented. "Lines disappear through such process of alignment, so that when even one thing comes "out of line" with another thing, the 'general effect,' is 'wonky' or even 'queer.'"⁸³ Classrooms are place of alignment, bringing students to places of reorientation requires that schools become out of line with the existing orientations.

Turning inaction into action through environments that reorient individuals is the goal of Zembylas. He emphasizes the importance of cultivating democratic habits considering current "top-down accountability measures" in education. Democratic habits encourage students to work together, share ideas, and take ownership of their learning. He highlights the importance of this perspective on environment when he frames the formation of habits as "implicated in the

⁸¹ Sara Ahmed, *Queer Phenomenology: Orientations, Objects, Others* (Durham: Duke University Press, 2006), 56.

⁸² Ahmed, 34.

⁸³ Ahmed, 66.

environment, the conditions of the environment have to change if there is going to be any transformation of habits."⁸⁴ Habits are the actions or thinking of actions that emerge from agency that an environment evokes.

This chapter presents two learning theories that are needed to support the types of learning that the agency in games can promote. *World Simulator* acts as a central case studies to which *Feast of Proportions* and the case studies still to be presented can relate to. The concepts of orientation and habits are used throughout this text, and the works of Ahmed and Zembylas, solidify these terms as important aspects of learning, and support the proposed learning model.

⁸⁴ Zembylas, "Dewey's Account of Habit through the Lens of Affect Theory," 775.

4 On the Aesthetics of Games

In the introduction of this thesis, Janet Murray's definition of agency initiated a perspective on the value of games. While Murray presents agency as a means of differentiating the aesthetic value of interactive experiences over linear forms of literature, Flanagan observes how these mangled interactive experiences offer insight into the greater social context of the player. Thi Nguyen takes this a step further, arguing that the aesthetic joy of games comes from striving towards a goal. He argues that "somebody can pursue a goal for the sake of the struggle for that goal. ... We can justify our pursuit of an arbitrary-seeming goal in terms of the aesthetic value of that struggle."⁸⁵ For Nguyen, the pre-lusory goal drives striving play. In *Raft Challenge*, the goal of getting to the other side of the gym was abstractly constructed by the teacher's instruction but quickly oriented players to the rafts and how they would physically get there. In *World Simulator*, the players formed their own goals arising from their individual and collective identity. The two video game case studies introduced in this chapter explore this agency-goal relationship further.

4.1 Case 3: Adventures with Anxiety!

Nicky Case is known for creating web-based, interactive, 'explorable explanations,' to teach concepts such as viral spread, game theory's interpretations of trust, and the negative effects of media. They created *Adventures with Anxiety!* similarly, to help players explore humans' relationship with anxiety.⁸⁶ It is mostly text-based, with animations supporting the narrative and some branching storylines. The first dialogue warns the player that "this is less of a 'game,' more of an interactive story."⁸⁷ However, the aesthetics of the experience refer heavily

⁸⁵ Nguyen, *Games*, 103.

⁸⁶ Nicky Case, "Adventures With Anxiety!," *Adventures With Anxiety!*, accessed February 15, 2024, [Link to website](#).

⁸⁷ Case.

to games, with energy bars and familiar 8-bit sound effects. The story follows a human and their anxiety, represented as a wolf. The player takes on the wolf's role, and their job is to protect humans from danger by using fear of being harmed, unloved, and bad. Throughout the narrative, the player usually has three choices of how to respond, moving the story forward and, at times, attacking the player, see Figure 12.



Figure 12: Screen shot of Adventures with Anxiety! after player (right) has inflicted fear on the human character (left). Case “Adventures with Anxiety!”, Used under creative commons license.

In the story's first chapter, the human character cannot block or attack, only lose energy from the player's fear attack. In the second chapter, the human character attends a party and at one point, the human is given alcohol to calm down. Now, every time the player tries to use fear, their only agency, they lose energy with every drink of alcohol, see Figure 13. This is directly critical of the relationship between substance abuse and controlling anxiety. The player might devise strategies to avert the counterattacks, but it isn't possible. What Case has done in this game is directly using Murray's notion of agency. Although the technology for interaction is merely buttons on a screen, the interesting results of the player's choices drive the player's

agency. Case also achieves this by providing two possible endings to each chapter and by having choices impact future dialogue. These mechanics make the player's decisions meaningful, reinforcing that environments define player agency, not the interaction technology.



Figure 13: Three images from *Adventures with Anxiety!* showing the progression of the human non-player character receives and uses alcohol to attack the player. Case “*Adventures with Anxiety!*”, Used under creative commons license.

Adventures with Anxiety! also points to another important perspective Nguyen takes.

Nguyen argues that players struggle to achieve the pre-lusory goal, so they take on new agencies within their real-world agency.

An interest in winning is, for the striving play, only a temporary feature of the inner agent, which they set up and submerge themselves in for the sake of the struggle. The outer agent sets on the inner agent with a particular motivational structure for the sake of the outer agent's enduring interests – say in the beautiful experience of struggling.

Case's choice to place the player into the agency of human anxiety creates an opportunity for the player to experience a unique struggle. It makes possible the reorientation of the player's relationship with their own anxiety. This is similar to Clark's approach to the treaty simulation, the goal of which was to place players in the place of a colonized population. Proponents of games in education often argue that video games and virtual reality will help get students into environments that are too inaccessible or too dangerous. Still, as these examples show, games are even more powerful when students can wear someone else's or something else's shoes.

4.2 Nguyen's Aesthetics of Agency

Adventure with Anxiety illustrates the power of interactive experiences through simple interactions yet powerful responses to those actions. But do more involved games provide a deeper level of agency? What value does more dynamic, systemic, or embodied interaction offer? At the heart of Nguyen's book, he provides three positive aesthetics that could be attributed to agency and gives value to negative aesthetics. Through his thesis, Nguyen argues that games can and should be treated as art. For this thesis, the aesthetics of agency support the types of enjoyment and engagement that can be sought to motivate and teach.

The first aesthetic judgment is harmony of action, which Nguyen says is the feeling when "you're experiencing your agency and action as fitting the demands of the environment."⁸⁸ In *Adventures with Anxiety!*, Case brings the player to this harmony of action by the end of the game, as the human and their anxiety come to terms with the value and the challenges of anxiety. The player experiences this by simply choosing a response. In sports, this aesthetic arises more often through the embodied action with a material environment, scoring a goal, blocking a shot, or, as Nguyen argues, "when you figure out, during a rock climb, that you need to slide your hips over just enough to balance on the tiny nubbin of rock."⁸⁹ Players in *Raft Crossing* likely have moments of harmony as they work together to move quickly and effectively.

Additionally, Nguyen's second aesthetic judgment, the harmony of solutions, points to the moment a player has an idea of solving one aspect of the game. This aesthetic judgment is most profound in puzzle games like *Sudoku* or the *Portal*⁹⁰ series, where the player often feels the 'ah-ha' moment. In many games, players feel this harmony when the imaginative

⁸⁸ Nguyen, *Games*, 107.

⁸⁹ Nguyen, 108.

⁹⁰ Kim Swift, "Portal," PC (Valve, October 10, 2007).

relationships with their environment fits towards resolving or overcoming obstacles. The final positive aesthetic judgment Nguyen provides is harmony of capacity, which he says, “is the sense that one’s total capacities fit precisely with the demands of the world.”⁹¹

Nguyen also describes negative aesthetic judgment. Like horror movies, roller coasters and dark humour, negative aesthetics can provide a meaningful or interesting affect to the viewer. Through several examples, Nguyen calls this aesthetic of dissonance, which can be seen in Case’s work. The introduction of alcohol in the second chapter of *Adventures with Anxiety!* removes the agency the player was given in the first chapter. Nguyen points out the power of such dissonance, “Some negative experiences may help us to have aesthetic experiences, because they accentuate and intensify the final positive experience.”⁹² In Clark’s treaty simulation, dissonance is the goal. In one playing of the game, Clark quotes a student getting down on his knees to say, “I would rather die standing than live on my knees.”⁹³ Such a statement emphasizes the power of a negative aesthetic experience. While games often seek to ‘follow the fun,’ for designers of engaging experiences in striving play, dissonance is equally valuable to ‘fun’ consonance.

4.3 *Feast of Proportions*: Design for Aesthetics of Agency

As the designer of *Feast of Proportions*, I found designing for moments of aesthetic harmony or dissonance challenging. In one sense, this aesthetics of agency can only be observed through play testing at the agential distance. In another sense, it was difficult because of the agency I desired for the player. For collaboration to happen, the game needed to allow time for players to talk to each other with some depth. To achieve this, I kept the interaction to a minimum, forcing players to wait for their virtual gatherers to move around the map and collect

⁹¹ Nguyen, *Games*, 109.

⁹² Nguyen, 113.

⁹³ Clark, “Simulations.”

ingredients for the collaborative feast. This is similar to *Adventures with Anxiety!* in the limited modes of interaction; however, it provides immediate feedback to the player, while *Feast of Proportions* takes time to show the fruits of their virtual gatherer's labour. Test player's patience did give a mode of dissonance as they urged their character on to make it to a power-up before it disappeared or to get one more resource to complete a meal. This resolved with moments of harmony of action when players achieved what they were waiting for. The addition of power-ups that speed up collection and a bear that limits gatherer mobility in the game were important additions that created more interesting decisions for players and created more moments of tension and release. Yet, these moments weren't part of the desired agency of collaboration.



Figure 14: Play testers playing Feast of Proportions

After playing the game, play testers often pointed out their lack of confidence with the game mechanics; see play testers playing game in Figure 14. In these tests, I acted as a facilitator of the game's rules. Game studies theorists would call this non-diegetic, as I was separate from the ludic space of the game. The initial design concept for the game was to make

a diegetic tutorial where in-game characters guide the player through the core mechanics. This wasn't completed in time for testing. Having a facilitator risks closing the agential distance, and like in video games, "players usually feel that the tutorial level is not part of the real game and tend to skip it. This is why many games are trying to camouflage it within the game world."⁹⁴ Following Case's excellent narrative in *Adventures with Anxiety!*, *Feast of Proportions* would benefit greatly from a diegetic tutorial that builds the ludic relationships in the game world. And perhaps through the tutorial and the stronger ludic relationships, players will take on the role I desire for them, engaging more readily in collaboration and the aesthetics of agency that it provides.

Players who did make sense of the mechanics, after observing other players play the game, often strategized early in the game. Strategies included each player focusing on resources that were more accessible to their community and focusing on resources in the mountains, further from the community earlier in the game. During these play tests, players noted a sense of agency related to their chosen collaborative strategies. I see this as a form of Nguyen's harmony of solution as they see a potential means of 'winning' and get to see the effectiveness of the solution throughout the play. I hoped for this type of agency in the design of the game. The differences between players who think ahead and those who don't are discussed at the end of this chapter.

4.4 Designing with the Aesthetics of Agency

Taking Nguyen's thesis as a whole is important for seeing how games can be valuable learning tools for engaging students in a desired agency. By not looking at achievement play and the gamification of the real world that he criticizes, Nguyen focuses on striving play. He

⁹⁴ Janina Wildfeuer and Dušan Stamenković, "The Discourse Structure of Video Games: A Multimodal Discourse Semantics Approach to Game Tutorials," *Language & Communication* 82 (January 1, 2022): 33, [Link to article](#).

points at the agential distance game designers need to maintain to encourage this form of play, and it also promotes players to develop an inner agency, which can be seen as an assemblage of ludic relationships with the objects in the game. As the player adopts this inner agent, their outer real-world agent is rewarded with aesthetic judgments on their play. For educational theorist Michalinos Zembylas, these aesthetics can have an important affect for developing social habits. Huizinga and Flanagan, illustrate the cultural and critical power of play and through Sara Ahmed's' perspective on people's relationships with objects and environments, these aesthetics orientate players in some ways and not in others. Or, taken all together through the proposed model for knowledge building in the previous chapter, the aesthetics of agency felt in a game can drive the para-linguistic orientation and habituation of the player in building knowledge of their self and their environment. James Gee describes this well when he says,

When we play videogames, we confront the nature of our own minds. A videogame gives us a new world to probe and with which to have a conversation. And, perhaps, these new conversations can teach us things about the real world, about language and learning, and about ourselves and our minds.⁹⁵

The tension between ludic spaces not being a real-world experience and a desire for students to gain concrete learning outcomes challenges this para-linguistic perspective of learning.

Whether the aesthetic experience of a game alone is a valuable experience or not, the following section looks at how reflection on the experience can be a valuable learning opportunity.

4.5 Case 4: This War of Mine

*This War of Mine*⁹⁶ is a video game created by the independent 11 Bit Studio in Poland.

The game aims to engage players in what it means to live in a war-torn country. Karol Zajeczowski, a game creator, defines this agency by saying, "in this unfriendly reality, you

⁹⁵ Gee and Gee, "Games as Distributed Teaching and Learning Systems," 10.

⁹⁶ "This War of Mine," PC (11 Bit Studio, November 14, 2014).

have to make tough decisions that deeply affect the lives of the people you meet.”⁹⁷ Unlike *Adventures with Anxiety!*, this game has many interactions with systematic results to every player's decision. The Polish government has accepted it as a required reading for students, and through a video of a teacher who has used the game in her class, the game demonstrates how reflection on games can leverage the agency students engage with in games to create meaningful learning moments. The following paragraph describes the author's play through of the game, presented in first person to emphasize the agency the game provides.



Figure 15: Screen shot of *This War of Mine*, with Christo show Katia how to cook. 11 Bit Studio, “*This War of Mine*,” used with permission.

This War of Mine randomly generates a home and a set of characters at the start of each new game. The characters need to clear rubble and explore their new home for resources such as food, crafting materials, and medicine. My play through of the game started with a father, Christo, and daughter, Iskra. As a parent of a daughter myself, I personally identified with Christo. Iskra has limited capabilities but can be taught more skills, such as cooking, throughout

⁹⁷ *This War of Mine - Dev Commentary #1*, 2014, [Link to video](#).

the game, see Figure 15. She also needs to play in certain areas and with toys that can be crafted. At night, adult characters can sleep on the floor or on crafted beds, scavenge other locations, or guard the home. During the game, other characters can be welcomed into the home, mine where Bruno and Katia. One night Bruno was scavenging, but I didn't get him home before sunrise. As a result, he was robbed and injured. I had to send Christo the next night to get food the household needed desperately. He returned the next morning to discover the home was raided; supplies taken, and his daughter was physically injured and emotionally broken. While I wondered what habits would have prevented the state of the household, and I wanted to see if I could improve their situation, the experience was emotionally challenging for me, so I stopped that playthrough of the game.

My experience in the game world of *This War of Mine* was an entanglement between my own orientations and the structures designed by its game designers. My experience of striving play towards the goal of survival was a clear example of dissonance, or a negative aesthetic. My analysis of the game will be limited to the food and home raid mechanics. The game is very systemic; all of the objects in the game have mechanics that impact many other objects in the game. For example, when characters in the game don't get enough to eat, it affects the speed at which they move and work, and it wears down on their mental and physical health. When characters become 'broken' mentally, as was the case with Iskra in the playthrough, as shown in Figure 16. Other characters need to help the broken character eat and heal, otherwise, their state won't improve. To detail all the interconnected mechanics in the game is well beyond the scope of this thesis.

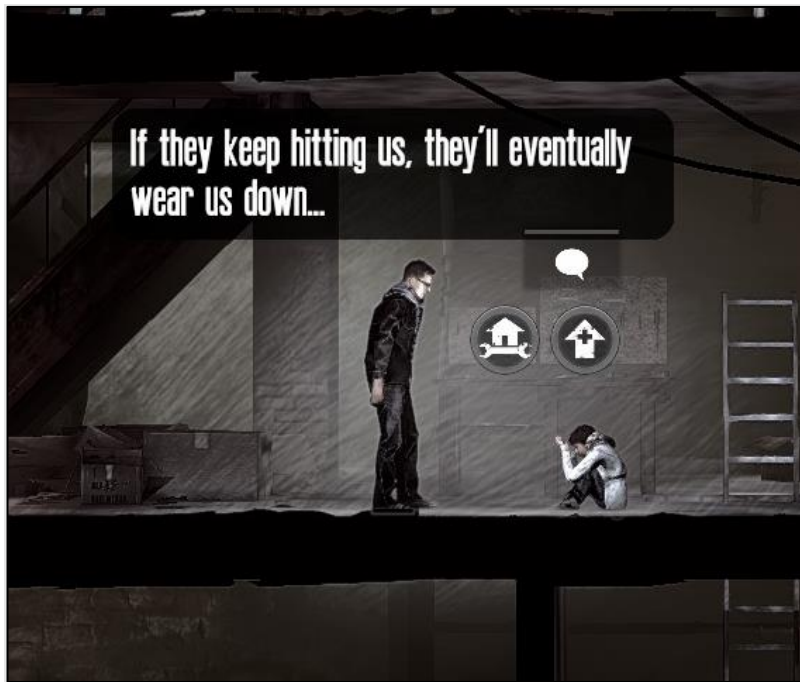


Figure 16: Screen shot of This War of Mine with Iskra emotionally broken.
11 Bit Studio, "This War of Mine," used with permission.

The representation of food in the game is very simple, with only icons representing raw, canned food, as well as a stove in the kitchen that characters can use to turn raw ingredients into more nutritious meals. While the player's relationship to these representations is obviously ludic, as they are perceived within the game's virtual world, the designers rely heavily on the player's lived experience with food. At the start of the game, the designers challenge this lived experience of someone who hasn't dealt with starvation, as players need to scavenge rubble and abandoned cabinets to find the food. As the game progresses, players need to find food in other locations, including the homes of other non-player characters. In one home, an elderly couple pleads that you not take anything, and the player must choose whether to steal food. Players bring with them their moral code on property and theft. *This War of Mine* allows players to choose between testing their existing habits in a new environment or trying new habits that may not align with their real-world selves. If players decide to steal, this impacts their character's mental health, as shown on the player cards in Figure 17. As the game continues

the nightly raids increase in frequency and severity, forcing players to rethink their relationship with food and reorientating them to the challenges civilians face during war.

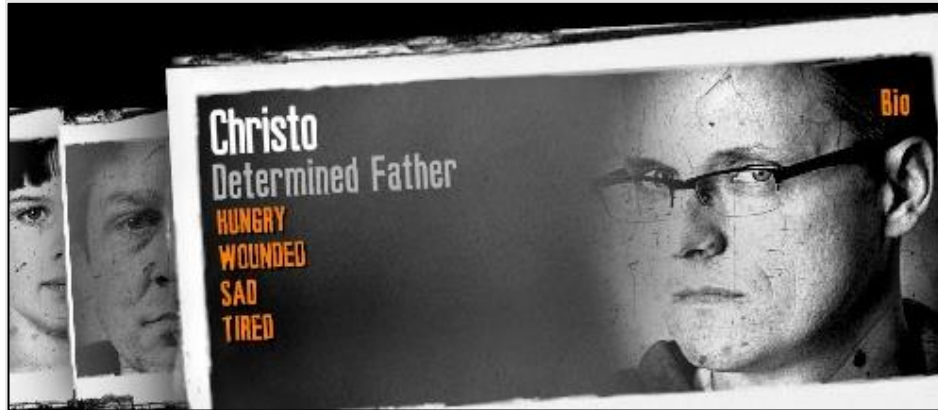


Figure 17: Screen shot of This War of Mine character cards.
11 Bit Studio, “This War of Mine,” used with permission.

The agency players take on during the game is highly impactful, but unlike *World Simulator*, which has curricular goals embedded in the design, the content in *This War of Mine* doesn’t necessarily intersect directly with the high school English curriculum the Polish Government has assigned the game to. Nor does it blend into the player’s world like the ‘brink game’ nature of *Raft Crossing*. Instead, learners need to reflect on their experience in the game for valuable learning to happen. An interview with a Polish high school teacher who was using the game in her classroom noted that students “wondered what it means to win in a game like this. Does winning mean surviving? Does it make sense to survive at all costs?”⁹⁸ These are highly para-linguistic questions, as they are questions about the player’s identity, how they see themselves and how they want to be seen. Words can only answer these questions in limited ways; instead, they are questions that help individuals see themselves within new environments as well as their day-to-day environments. This reinforces Kolb’s experiential learning model, demonstrating the importance of reflection after a concrete experience. It also questions the rest

⁹⁸ *This War of Mine in Polish Schools*, 2022, [Link to video](#).

of Kolb's model, which states that abstract reasoning follows reflective observation. Suppose the educational goal of an experience for a student is their knowledge about who they are and how they relate to their environments. In that case, it shouldn't be necessary to move into abstract knowledge building, although it could. For the teacher using *This War of Mine*, they don't need students to reflect to articulate their relationships with the concepts of property and theft. Instead, the act of reflection works to revisit, through imagination, the students' relationships with the game environment and how those relationships change. Specifically, in reflections on *This War of Mine*, students can build empathy for different lived experiences, such as going hungry due to war, poverty, or oppression.

Like Clark's comments on the Treaty Simulation, para-linguistic learning won't happen through lectures. Like how Clark's students build a strong relationship between the concept of their country and their identity, players in *This War of Mine* build a relationship with the characters in the game as they ensure they are fed, healthy, and safe. Also, like the alien invasion that strips Clark's students from their country, the nightly raids in *This War of Mine* challenge the player's relationship with their characters. Through reflection on the aesthetic experience of agency during this experience, the student-player strengthens their reorientation within the ludic space, promoting different habits from their everyday lives. For the author, this is an undeniable indication that para-linguistic learning in games is a meaningful mode of learning.

4.6 *Feast of Proportions*: Reflection on Play

As a teacher, if tasked with teaching students about collaboration, my approach would initially involve researching relevant information for the lesson then curating engaging activities to hone their collaboration skills. For a more student-centred approach, a Socratic seminar, where students collectively develop their own shared ideas on collaboration, would help to connect students' prior knowledge and experience to the lesson. What advantages might a

game encouraging collaborative tasks offer to students? The following two perspectives on *Feast of Proportions* support the argument for its pedagogical value by questioning how players are introduced to the concepts of collaboration and how I, the facilitator, engaged students in reflection on the aesthetics of collaborative agency.

One possible way to introduce players to the collaborative aspects of the game would be to have a conversation with the players about how they might see themselves working together, before starting the game. However, this is problematic for several reasons. It creates a very non-diegetic perspective at the beginning of the experience, causing players to split their inner agency between being a learner in a room and being the leader of their community. Taking this approach would also tighten the agential distance between the facilitator and the player. Instead of having the freedom to choose how to collaborate, players may feel they need to adhere to the suggested behaviours in the discussion, creating a form of achievement-oriented play of collaborating 'the right way.' The method turns the knowledge away from identity-forming paralinguistic knowledge building and towards an abstract understanding of collaboration.

The desired plan for this game was to have the narrative aspect of the gatherers prompt players into collaboration by asking how the total meal count was going. Development time focused on adding the power-ups and the bear, which acted as prompts that created more exciting decisions for the players. Through this, the reflection on the game became more effective.

While *Feast of Proportions* doesn't have the cultural significance of *World Simulator* or *This War of Mine*, it does promote a particular desired agency. The desired relationships players might have with the game include their leadership for the gatherers, which becomes challenged by the presence of a bear, limited space on the board, and a steady reduction of the abundance of resources. While these prompts aren't as shocking as an alien invasion or violent home raid, they provide players with specific points of reflection on how they handle these

changes. During the playtests I facilitated, I initiated reflections with the open question, "How well do you feel you worked together?" Then, depending on their response, I asked leading questions on what they did or could have done, using the game objects as a speaking point. For example, "What parts of the game needed collaboration? What about the power-ups?" Then, I focused on reflections on their collaboration habits by asking, "How did this experience compare to other projects you collaborated on?" or "What would you do differently if you played again?" One player answered these final questions: "In projects, we sometimes focus on the specific tasks, not thinking about the overall goal that we need to work on together." While *Feast of Proportions* has many areas for improvement, the underlying premise of a game to promote collaboration is present.

This chapter connects the theories of learning to Nguyen's aesthetic of agency. At this intersection, the two video games presented exemplify how games can inform the player's real world, directly responding to the research question; How might games be used for para-linguistic learning? Additionally this chapter demonstrates the overlap between material semiotics and Nguyen's notion of agency, where the relationship players have with game objects define the experience of striving play.

5 Research Through Design

The sensitivities identified in this thesis were fully developed only through the design and development of *Feast of Proportions*, in parallel with studying the case studies and conducting a literature review. Zimmerman and Forlizzi argue that in research through design, “interaction designers explore new problem spaces, codifying understanding through the construction of artifacts.”⁹⁹ From this perspective, much of the research can only be understood by playing *Feast of Proportions*, to unravel the agential distance of playing the game. In the first two chapters, many significant design decisions were discussed, and in the third and fourth chapters, aspects of the dynamic layer were introduced. This chapter fills in a few more important design considerations of the game not yet discussed, including the technology used in the game, the goal of the game, and the way ludic relationships were managed. The next concluding chapter explores how well the game engages players in para-linguistic learning, which can be accepted as meaningful learning.

5.1 Augmented Reality

My initial thinking for designing a board game that uses augmented reality on a mobile device was to merge the affordances of video games and board games. Board games tend to be more tactile and offer more intimate social experiences. In contrast, video games allow for more systemic gameplay, with the computer managing the game mechanics instead of the players. Using an emergent technology also creates a level of intrigue in the game and how it is used, bringing a focus onto the types of learning this research is aimed at. Remembering that technology should be treated in the sense of practice, as Ursula Franklin teaches, merging different technologies merges the practices, at times in harmony and at times in dissonance.

⁹⁹ Zimmerman and Forlizzi, “The Role of Design Artifacts in Design Theory Construction,” 42.

One of my biggest concerns with using augmented reality on mobile devices was that players would look at the world through the screen alone. This largely ended up being the case in play testing despite my design considerations. This behaviour is problematic for two reasons: players miss many non-verbal cues from the other player, and the game may have been equally effective as a traditional video game if the visual focus of players is on the screen. The design elements I included in an attempt to encourage the players' gaze away from their phone were limiting the information on the mobile device to one community, slowing that game down to limit how much time was needed looking at the screen, and including a shared scoreboard for players to keep track of what they have collected. Although players spent the majority of their time looking at their screens, there was value in the shared material objects. Many players noted that they appreciated the feeling of manipulating the physical trees. Also, players often pointed at the physical board to help communicate ideas and share knowledge about the state of the game.

One suggestion I received sticks out when considering this screen-focused shortcoming of the game, which was to include a card-based mechanic. This idea wasn't implemented as the mechanics in the existing game were already tricky to balance, getting the right amount of resources distributed on the game board, choosing the best speed for the gatherers to move, and the frequency of power-ups and bear movement. If I were to pursue another augmented reality board game, I would first design a reasonable card game or board game mechanic, then complicate the game's systems through the affordance of augmented reality.

5.2 Imagination through Ludic Relationships

Feast of Proportions aims to turn a small game board into a vast geography filled with life-nurturing resources. The players need to imagine themselves as a community leader tasked with gathering enough food for their family and friends. As Cas Holman shows in her

imaginative toys that resist any clear sign of how they should be played with and instead allow the children to make their meaning through play. Designing for imagination is challenging, as designers can prompt ludic relationships but must do so at an agential distance. *Raft Crossing* showed how a simple explanation can create an imaginative world, while often more time is needed to build more intricate worlds. In *Feast of Proportions*, I worked to maintain a similar distance. Abstract icons and accepting the need for a learning curve for players were important considerations throughout the design process. Ideally, the players will build an emotional connection with their gatherers, which would be better achieved through a diegetic tutorial and a better narrative structure. However, adding these features also comes at the risk of tightening the agential distance. That is, if players are being guided throughout the game, they may be told how to play, what to prioritize, and how to imagine the world. In another sense, the aesthetic harmony of action and solution in striving play may be decreased as players feel less responsible for their actions. These concerns can only be observed through more iterations of testing with each change to the design.

5.3 Goals of the Game

Taking Bernard Suits' perspective on goals, the pre-lusory goal in *Feast of Proportions* effectively met the striving play needs of the game. The goal of collecting enough food before the end of the game was intriguing enough to kickstart player engagement with various mechanics at the beginning. It also encouraged strategic food decision-making as the game progressed towards its conclusion. The obstacles to reaching the goal include limited resources at each location, travel time, avoiding the bear, and getting power-ups to get more resources. This is a lot for players to keep track of in the game, as they face the network of relationships between these constraints. With these complications in mind, it's unsurprising that some players struggled to collaborate effectively. But this is also evidence of success. Players should be

engaged in tension between collaborating with their partner and their attention on everything else happening in the game. The pre-lusory goal points to attention on collaboration, without saying how to do this, thereby calling on the player's habits to inform how they will move forward.

An essential change to the game that became apparent after several playthroughs was how the game ended. The initial design of the game played through its entire 15 minutes. My thinking was for players to gather as many resources as possible in the given time. However, watching players take a moment of joy when they achieved 20 meals, only to continue with the game, lost that emotional charge. That moment of completion, or harmony of solution, is an essential point of reflection after the game, specifically, having players think about the actions that got them to the goal. Instead, a better design is finishing the game once players reach the goal. Then, using the time remaining to gauge how well they did. That way, players end up having held on to the positive aesthetic experience.

6 Conclusion

This thesis leveraged game and play theories to understand better how games can be meaningful learning opportunities. By looking at guided play-based learning and experiential learning theory, the notion of para-linguistic learning was analyzed to develop the proposed model of learning, where their environment orients the learner's identity in Ahmed's terms and informs the learner's habits, much like described by Zembylas, as well as Bennet et. al. These theorists build on Dewey's work to present habits as "mind-body-environment assemblages."¹⁰⁰ Para-linguistic learning can be seen as meaningful learning when the learner forms new habits or reinforces existing ones through their environment.

Games provide players with novel environments to explore, providing opportunities for para-linguistic learning. Of the case studies presented, *Raft Crossing* worked as a 'brink game' to create stronger relationships between players through trust building, collaboration, and leadership initiative. Through disorientation of navigating over rafts, players experience a harmony of action as they navigate across the hazardous terrain. Two cases, *World Simulator* and *This War of Mine*, provided excellent examples of Flanagan's critical play or Bogost's persuasive games. In these two games, players are asked to take on a new agency in the game world and to negotiate the challenges that come with that agency. Finally, *Case's Adventures with Anxiety!* also asks players to take on a new agency, but, instead of changing perspectives on the external world, Case challenges players to take a new perspective on their internal selves. As a whole, all these games both provide an interesting perspective on how learning happens through play, as well as inform the design of future games for para-linguistic learning.

¹⁰⁰ Bennett et al., "Habit and Habituation," 12.

These games also give a breadth of data on how educators should position themselves with respect to games. The two video games studied only require teachers to support the reflection on the player's experience within the game's environment. In comparison, Clark's two classroom games necessitated that a teacher introduce, maintain, and conclude the game. However, in both games, the teacher takes on a diegetic role within the game world. It is crucial that teachers maintain this diegetic role or stay out of the game entirely to keep the player's agency, as recommended by Weisberg in her meta-study on guided play in early childhood education. In the games, there weren't any specific instructions on what decisions players should make and no expectation of being assessed on their ability to make good decisions. Doing so would limit the player's relationship with their environment, prevent striving play, and limit the game's aesthetic value. In other words, the pre-lusory goal proposed by the game is the primary driver of the player's choices.

Games face challenges in finding their way into educational systems. First is the notion that games aren't serious, which the arguments presented above challenge. Second, many educators lack game experience, which is often a challenge with any new pedagogical strategy. Third, games don't usually fit into schools' schedules, spaces, and curricula, but as argued in the introduction, these constraints are too rigid for effectively designing games. Perhaps the systems should be adjusting to meaningful learning experiences instead of vice versa. Last, in education, much emphasis is placed on the real-world, concrete, or 'authentic' (a term commonly used in education).¹⁰¹ This challenge cannot be fully resolved, as games are purposefully not the real world. Instead, games offer something more. This challenge asks, what if a student doesn't want to play a game? Clark accepts students to act as spectators, and Nguyen argues that spectators can appreciate many of the aesthetics of a game. There is also

¹⁰¹ Todd Stanley, *Authentic Learning: Real-World Experiences That Build 21st-Century Skills*, 1st edition (Routledge, 2018).

the important notion that the negative aesthetic of dissonance is an equally valuable experience. Games like *World Simulator* and *This War of Mine* are influential because of the dissonance. Games don't need to be fun; instead, if they target para-linguistic learning, they should be designed with the player's agency in mind.

Feast of Proportions aims to engage players in collaborative resource management. Although its efficacy as a meaningful learning experience isn't fully known, there is evidence for and against its positioning. Arguing for the game's effectiveness as a learning experience is how play testers engaged with collaboration or not. Notably, Players who struggled with collaborating had more meaningful reflections on their experience than those who worked together more effectively. The game offers interesting decisions for players to make, chasing after power-ups or deciding if it's worth stopping the gatherers working at one location for a more favourable location. Through these decisions, players have an opportunity for striving play, which brings with it the aesthetics of agency previously discussed. Working against the efficacy of the game is the non-diegetic role a facilitator needs to play in introducing and maintain the play of the game. Through a more narrative-focused tutorial for the game, players will be better immersed in the game world. Section 6.3 *Further Research* explores further possible improvements for *Feast of Proportions*.

6.1 Scope and Limitations

While this thesis has served to answer the research questions related to games and learning, the research could be extended to thoroughly test the viability of *Feast of Proportions* as a game that engages players in the agency of collaboration. Therefore, the sensibilities observed in this research would be better understood. The updated trajectory of this thesis has followed through a complication of the connections between games and learning. *Feast of Proportions* and the games presented through case studies worked as a medium through which

the theories explored were interpreted. An updated model of this trajectory is shown in Figure 18, where elements omitted from the thesis are on the right side of the red line.

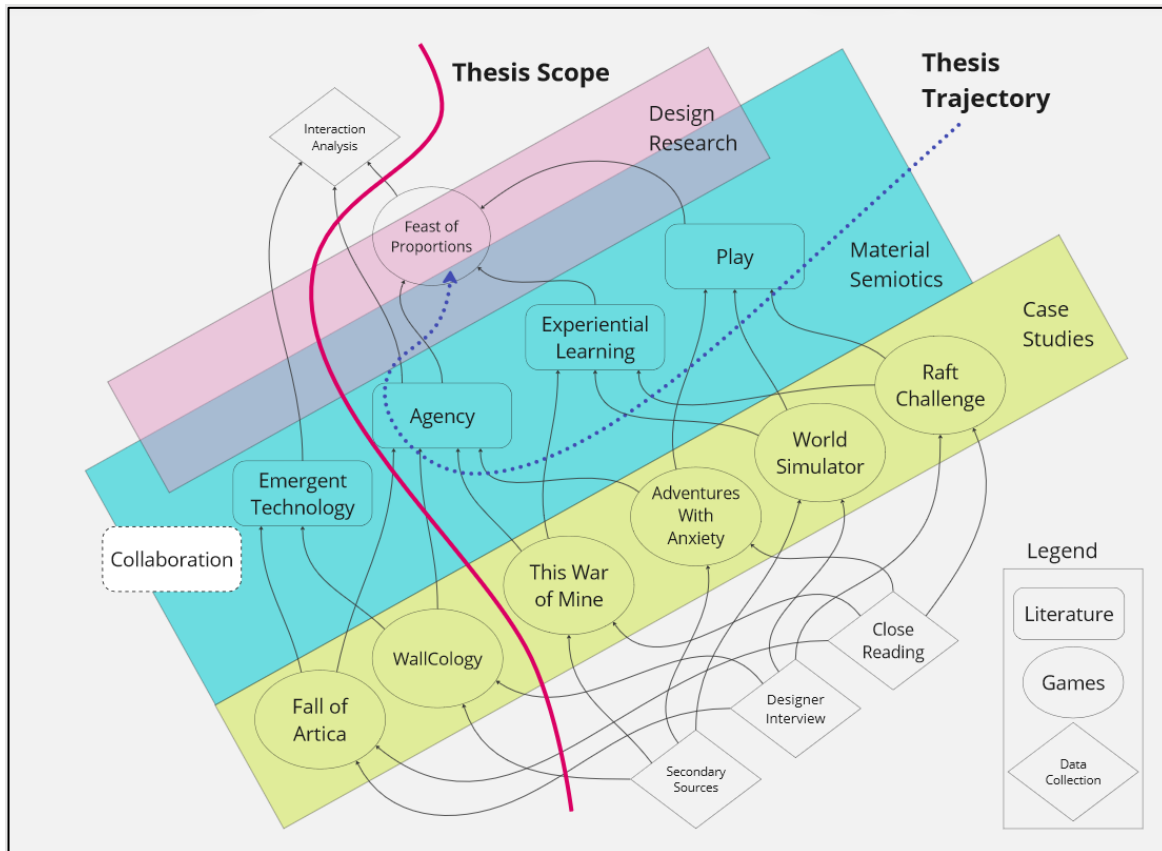


Figure 18: Updated thesis trajectory showing the scope of this thesis as presented.

One area omitted from the through line presented in Figure 18 is the nature of emergent technology in games for education. The games designed for the classroom, *Fall of Artica* and *Wal-Collogy*, use large language models of artificial intelligence and distributed video screens within the classroom space, respectively. As research projects themselves, they provide potential for connective points with *Feast of Proportions*. The nature of these games was situated in the context of their use, and the theory on emergent technology was too broad. In Law's terms, following these "threads" would have taken away from the focus of this thesis.

The multi-modal interaction analysis method is also presented in Figure 4, as an

approach to evaluating the design decisions made in *Feast of Proportions*. As mentioned in the introduction, this method is outside the scope of the research. It is worth noting here how a deeper interaction analysis would support a better understanding of how *Feast of Proportions* could function as a meaningful learning experience. As discussed, meaningful learning happens when changes in game state destabilize the existing ludic relationships that players hold with game objects. The process of an interaction analysis would follow that the player's verbal and non-verbal communication would be codified chronologically alongside moments in the game that demonstrate a new game state. These would be changes to ingredient abundance, the discovery of the bear, the appearance of power-ups, and the moments when enough of one ingredient has been collected. The game's effects on player behaviour would be better understood by analyzing the codified data. Considering the situated context of the game play, such as existing relationship between players, the number of playthroughs player engage in, and reflections player have on the game, would encourage future directions of game development and this research.

An additional literature review of collaboration and collaborative learning would be needed for an effective multi-modal interactions analysis of *Feast of Proportions*. Existing research within the field of Computer Supported Collaborative Learning would support this method.¹⁰² A review of the factors needed for effective collaboration, such as those presented by Mattessich and Johnson, would help frame the analysis.¹⁰³ With *Feast of Proportions* in mind, they propose; “mutual respect, understanding, and trust,” “ability to compromise,” “multiple-layer's of participation,” and “adaptability to changing conditions.” Researching existing

¹⁰² Jauwairia Nasir et al., “Many Are the Ways to Learn Identifying Multi-Modal Behavioral Profiles of Collaborative Learning in Constructivist Activities,” *International Journal of Computer-Supported Collaborative Learning* 16, no. 4 (December 1, 2021): 485–523, [Link to article](#); Chris Proctor and Dalia Antonia Caraballo Muller, “Joint Visual Attention and Collaboration in Minecraft,” 2022, [Link to article](#).

¹⁰³ Paul Mettessich and Kirsten Johnson, *Collaboration: What Makes It Work* (Turner Publishing Company, 2018).

models of collaboration along with observed behaviours in the playthroughs of the game would lead to an additional outcome for this research.

6.2 Outcomes

Three valuable outcomes can be taken from this research. Foremost is *Feast of Proportions* and how it acts as a final prototype that speaks to a possible future for games in education. As Zimmerman and Forlizzi articulate, the final product:

allows for development of solutions that consider relationships between multiple phenomena in the design space instead of trying to control many variables and focus on a single relationship. The focus on wholes keeps the research focus on the construction of the future, of what should and could be, instead of on developing an understanding of the present.

The game therefore, has become an actor in the world, with agency to inform future works on games and learning. This also reaffirms the research through design methodology, which is still growing in educational research.

Similarly, a material semiotics approach was used to navigate the webs of relationships between play theory, educational theory, exemplar games, and the objects in those games to understand how those relationships are built, changed, and broken. This research would not be possible without this ontological perspective on the complexity of games and education. Additionally, the sensibilities presented through this approach serve as an outcome that can support game designers for learning and educators who use games.

Game designers who want to create games for para-linguistic learning would likely succeed in following their own best practices. However, the following sensibilities learned through this thesis could support more meaningful learning. If the designer expects teachers to facilitate the experience in some way, it is important that players still hold a large share of agency in the game. One option would be to give the teacher a diegetic role in the game. Another consideration for maintaining player agency is ensuring that the pre-lusory goal is the

only one that drives the striving play. How the agency is emphasized in the game could be 'brink' play that purposefully blurs the lines of real-world and game-world relationships. Games might also take the form of critical play that presents a culturally meaningful perspective on the real world. Otherwise, designers may attempt to integrate reflection or awareness into the game, or they may choose to leave the reflection to the educator. Finally, a deep understanding of Nguyen's striving play can support games that don't simply 'follow the fun,' but work towards forms of play that create an aesthetics of agency that drive the desired learning.

For educators looking to use games to engage students in meaningful learning, the biggest challenge they will face is finding the right fit for the desired agency, learner skill level, time commitment, and number of players. If these challenges can be overcome, then the following sensibilities to analyzing games can be considered, in addition to an appreciation of the design considerations mentioned above. Foremost, taking the material semiotics approach to analyzing game objects and their relationship to the player as they strive towards the pre-lusory goal, can inform the modes of agency the player engages in. Including how ludic relationships are built and how they change throughout the game. By accepting that, at a superficial level, the player's agency is the actions they can take and the game's responses to those actions. At a deeper level, the agency is about the player's relationship with the game objects and how those relationships change as the game's state changes. From this lens, the actions players don't make are just as meaningful as the actions they do make. The game objects also provide important points of reflection on the experience the game offers. Educators must also recognize the tension between concrete, real-world experiences, and fanciful imagined worlds. Mary Flanagan argues, "The more fantastic and fictional the story, the more effective the message."¹⁰⁴ So, while there is undoubtedly value in immersive, imagined spaces,

¹⁰⁴ Mary Flanagan: *Games Change How We Think*, 2018, [Link to video](#).

others argue that realistic, authentic experiences provide better learning.¹⁰⁵ It's up to the educator to decide which environment best suits their learner's needs if there's time in their class schedule.

6.3 Further Research

As mentioned in the introduction, future work could collect detailed data on the playing of *Feast of Proportions* for a multimodal interaction analysis in the context of games for para-linguistic learning. By collecting data on the many modes of expression players have during the gameplay, valuable lessons may be learned at the intersection of the game as designed and played. This method could also help understand how educators could provide feedback on players' actions in the game.

Within the realm of assessment, most educators work through checkboxes, rubrics, or anecdotal feedback. These present a challenge to striving play as they set goals for the game's experience outside the pre-lusory goals. One interesting intersection with games and para-linguistic learning for assessment is David Dirlam's developmental rubrics for what he calls "praxosystems."¹⁰⁶ These rubrics aren't designed for individual tasks; they consider the developmental stages as learners engaging in new or challenging practices. In his work, he defines methods of developing and verifying these rubrics to support learners, wherever they are in their learning process. Games may serve as effective experiences in which developmental rubrics could be applied, as they are less directed at specific actions and more interested in the learner's habits.

The technology used in *Feast of Proportions* is unique and could provide opportunities

¹⁰⁵ Thomas Howard Morris, "Experiential Learning – a Systematic Review and Revision of Kolb's Model," *Interactive Learning Environments* 28, no. 8 (November 16, 2020): 1064–77, [Link to article](#)

¹⁰⁶ David Kirk Dirlam, *Teachers, Learners, Modes of Practice: Theory and Methodology for Identifying Knowledge Development* (Routledge, 2017).

for different games and simulations. The game pieces don't have to be limited to a single game board but could be distributed in a room, a building, or an outdoor environment. As apparent by the challenge of players looking primarily at their phones with playing *Feast of Proportions*, much more research on extended reality is needed to effectively blend material and virtual environments, particularly in educational contexts.

As discussed in the introduction, games and learning activities have much in common. This research focused solely on how the two fields of study intersect to study games for learning. However, these sensibilities could be applied to learning activities in general, particularly constructivist pedagogical practices and technology enriched environments, by asking what agency an activity evokes as learners strive in its completion. Additionally, the proposed learning model could be applied to many experiences to consider how they inform both para-linguistic and abstract knowledge learning.

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Appendix A: Game Design Document

FEAST OF PROPOTIONS

Core Concept

Desired Agency

Through this design it is desired that participants will engage in collaborative resource management. Key resources include the placement of game pieces, and the proportional collections of ingredients.

Game Format

Table top board game with gameplay feedback presented through augmented reality superimposed over the game board

Number of Players

Two players are positioned on adjacent sides of the game board. Each with their own phone, displaying information specific to their interaction.

Game Duration

5 minutes practice game to learn mechanics. 15 minutes with defines the endpoint of the game.

Objective

The players must work together to collect as many ingredients as possible in equal proportions to make stew for their annual feast.

Story

Setting

Feast of Proportions is set in a quaint and lush landscape where two neighboring communities celebrate an annual feast. Three distinct geographic zones paint the landscape. The two

communities are located on a beautiful, glimmering coast. They are nestled against the beginning of vast rolling hills filled with greenery, and in the distance rugged mountains fill the skyline for beautiful sunrises and sunsets.

Story

In the game world, two communities (led by each player) gather every year for a feast of seafood chowder. The day before the feast a team of gatherers collect the ingredients needed for the chowder, shellfish from the seaside, vegetables from the plains, and herbs and spices from the mountains. At the end of the day, all the ingredients are combined between both communities.

Characters

Gathering Leaders (player)

Responsible for directing the gatherers in their community, while communicating with the leader in the other community to ensure the most efficient gathering. Their goal is to collect as many ingredients as possible in equal quantities of each kind.

Gatherers

Following directions from the leader, they travel to different areas of the world, collecting resources, and communicating where they see an abundance of ingredients.

Physical Components

Game Board

A large wooden and plastic game board with 9 locations, each location has magnetic connectors for the player markers to attach. A microcontroller in the game board sends marker movement to other devices.

Markers

4 gatherer markers, with magnetic connections each with an identifying resistor in it,

represented as trees. Left player; deciduous, red and orange, with black base. Left player; coniferous blue and green with silver base.

Smartphones

One smart phone held by each player is used to gather information about the world and keep track of the NPCs. The software on the phone was built in the Unity Engine, and use the Vuforia framework for augmented reality and tracking of the game board, using an uploaded 3D model of the game board. These phones send updates of abundance and collected resources to the game board. A third smart phone on the game in front of the game is used to display both players tallies and change the state of the game board from practice mode to play mode.

Virtual Components

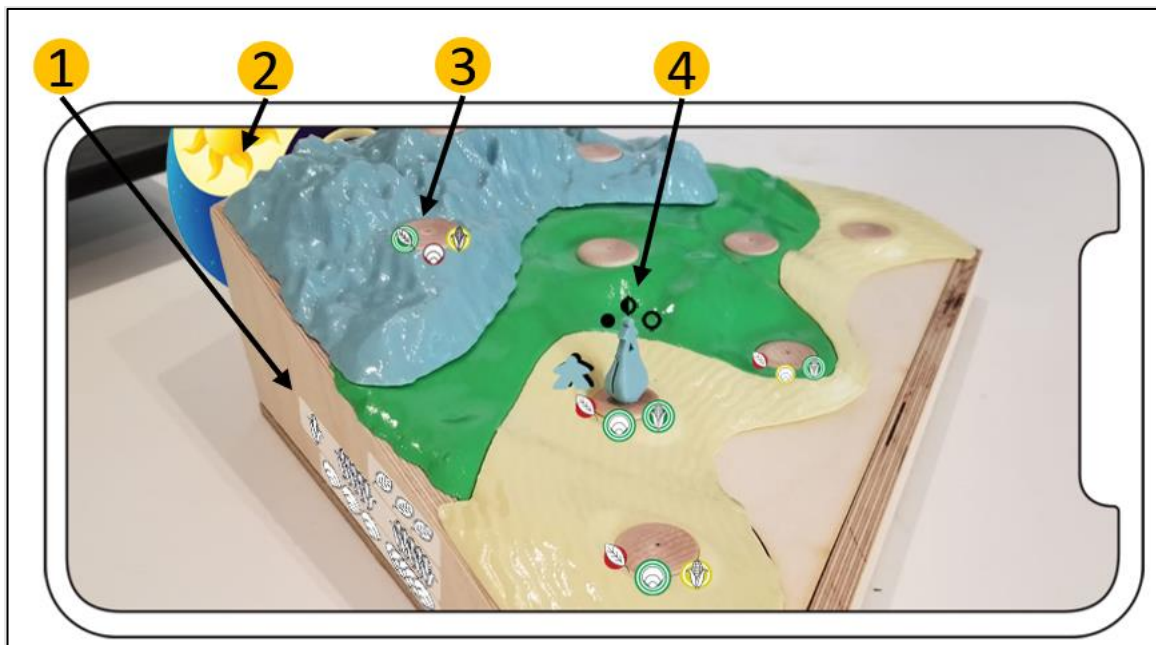


Figure A1:Augmented reality representations; [1] collected resources, [2] game clock represented by the sun behind the board, [3] resource abundance at move locations, [4] gatherer collecting their second resource.

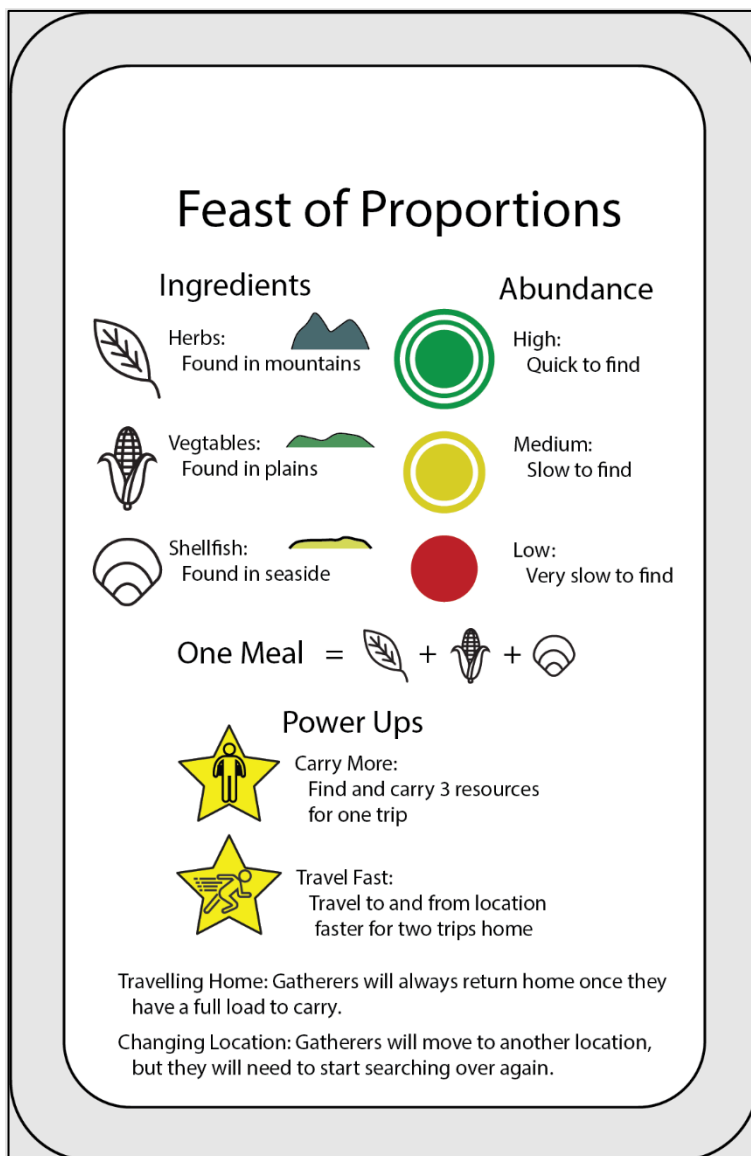


Figure 19: Info card given to players at the start of the game.

Home Location

In front of each player at the corner of the game board, each player has an indicator of the number of resources they have collected. This is the location the gatherers start at and need to return each resource to.

Gathering Locations

Each location on the physical game board is mapped to its virtual counterpart. These virtual

locations have indicators to show when a gatherer is walking towards the location, and an indicator when a meeple is searching the area for ingredients. Additionally, each location is assigned a resource based on the physical board's geography: beach has shellfish, plains have vegetables, and mountains have herbs. Each location has its own amount of abundance, pre-set at the start of the game and changes as players take resources from the location. The less abundant a resource, the more time it takes to gather. Players can only see the abundance of locations that their gatherer has visited.

Meeple (Gatherer)

The 3D people figures move between locations on the game board, using an A-Star algorithm to plan paths from their current location to their destination. The meeple also needs to keep track of their state, which includes: Traveling to gathering locations, travelling home to drop off resources, power-up activation, stopping because of bear, and returning home at the end of the game.

Sun Clock

An image at the back of the game board shows the change from day to night. A digital countdown timer is overlaid for more accurate feedback to the players.

Speed Power-up

When a gatherer visits a site that has a speed power-up, that gatherer will move faster for two trips back to their home.

Carry Power-up

When a gatherer visits a site that has a carry power-up, that gatherer will carry 3x the amount of resources.

Bear

The bear roams the terrain, and this icon is only shown to players if they attempt to visit or pass through the bear's location. Gatherers cannot collect or pass the location with the bear.

Stages

Tutorial

The tutorial acts as an essential piece of the game experience, introducing the player to the game's narrative and mechanics. The tutorial is led by cartoon versions of the gatherers, bridging the imagined world, with the virtual and physical worlds.

The experience starts with the player scanning an image attached to the game board, which helps calibrate the virtual components with the physical board. After this, a cartoon version of the NPC shows up on the screen to introduce the player.

NPC1: Hi there I'm Sam! You are leading us in gathering ingredients today, aren't you. I'm so excited for the annual festival tomorrow.

NPC2: Hi I'm Jack! Ya, last year was fun, but we didn't have enough to eat.

NPC1: That's why we are responsible for getting the ingredients for the traditional chowder we make each year.

NPC2: I'll definitely collect more you, and more than the two gathers from the other community.

NPC1: Sure! As the leader, it's your job to decide where we go. Just be sure to communicate with the other community.

NPC2: Last year the gatherers spent too much time in the mountains collecting herbs and spices, collectively they had double the amount of those than they did shellfish.

[Image demonstrating the combined total of two communities]

NPC1: We need equal quantities of all ingredients, after we combine ours with the other communities.

NPC2: We'll let you know what we see out there to help you decide where we should go next.



Figure 20: Example of tutorial screen over augmented reality.

NPC1: Let's practice! Use a gatherer marker to send Jack to the area closest to our community. Okay he's got a few ingredients, you can bring him back any time by removing the marker, he'll stay until he collects one more ingredient.

[Arrow point away from location on board]

NPC2: I'm back! See how fast I was!

NPC1: I saw you collect those earlier this morning.

NPC2: If you leave our marker at a location we'll come back when our bags are full. That would be a good time to move our marker for our next journey.

NPC3 (builder): You three are meeting without me?

NPC2: What!?! Why are you clearing paths already?

NPC3: Its going to be a long day! But you're right, I should get going. Move my marker to the next closest area, when I finish that path, let me know where to go next.

NPC2: The sun is coming up! Lets get started!

NPC1: We have until the sun sets on the other side of the mountain.

NPC1: Choose a location for each of us and we'll get started.

Anticipated Emergence

Through the game play I expect that players will run into time in the game that needs negotiation.

Once both players have all 4 markers on the game board, that only leaves 5 open spaces for other movement. How players choose where to move next should require verbal or non-verbal communication.

As players start gathering resources, they will need to negotiate which ingredients to prioritize.

Both of these points of player tension could be supported through prompts from the NPCs introduced in the tutorial.

End Game

After a day (~15 mins), the ingredients collected by both communities are combined, and the least collected resource is their final score.

Player Reflection

Following the experience, a teacher leads players through a reflection on how well they negotiated NPC movement and managed ingredient proportions.

Appendix B: Game Testing Plan

- **Recruitment:** Play testers are recruited from undergraduate and graduate classes at OCADU. A minimum of four play sessions with two testers each session is required.
- **Sign Consent form:** Players are briefed on the consent agreement before play starts, and the consent form is offered for their consideration.
- **Introduction to game story and technology:** Players are introduced to the game's story and how to play the game by the facilitator. Players are informed that they can ask clarifying questions at any time during the game.
- **Room Setup:**

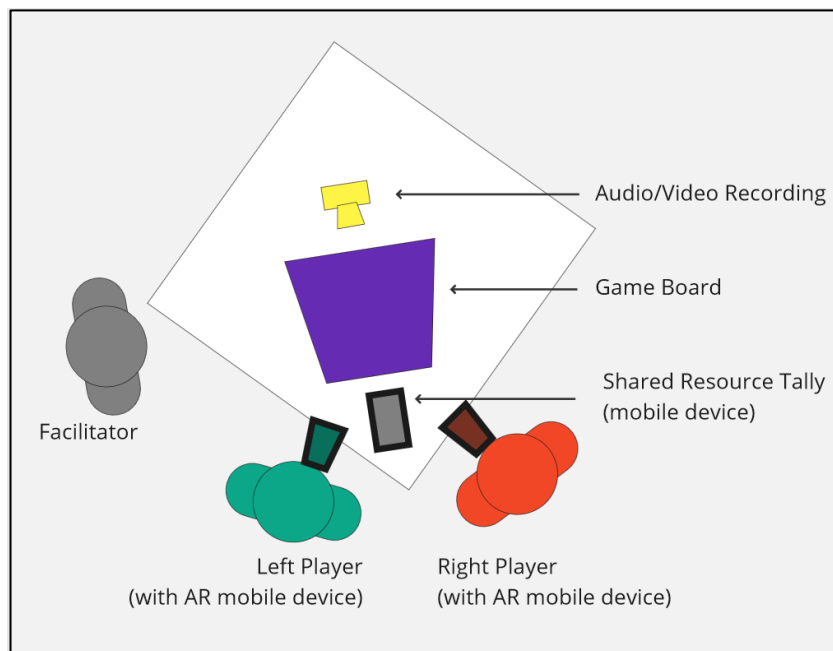


Figure 21: Layout of play testing.

- **5 minute practice session:** Players are given 5 minutes of practice where they attempt to collect enough resources on their own for 5 meals.

- **15 minute game play session:** Players are told that it is the day of the collaborative feast, and they need to collect 20 resources together in 15 minutes.
- **Guided Reflection:** Players are led through an unstructured guided reflection on their experience with a specific interest in how well they collaborated. Example questions:
 - How well do you feel you worked together?
 - What parts of the game needed collaboration? What about the power-ups?
 - How did this experience compare to other projects you collaborated on?
 - What would you do differently if you played again?